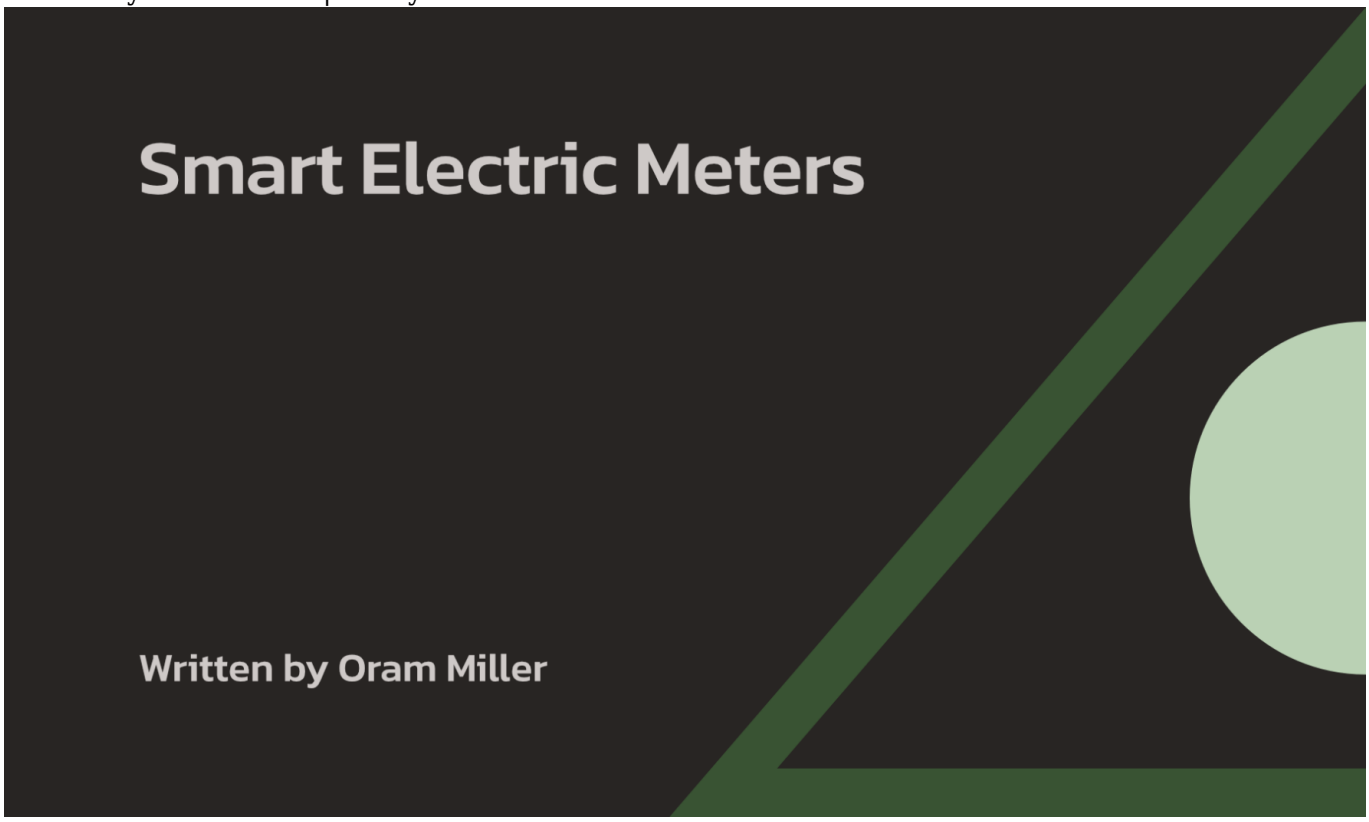
Smart Electric Meters

written by Oram Miller | 1 May 2021



*To view an update, dated September 16, 2013, with photos and measurements of **smart electric meters in the Pacific Gas & Electric (PG&E) service area** taken in July 2012, click here.*

*To see my study to determine whether **dirty electricity** is present in smart meters in Southern and Central California, click here.*

To see the results of a study of dirty electricity and photovoltaic (PV) inverters and how that relates to the issue of dirty electricity from smart meters, click here.

Summary of Oram's Findings and Conclusions Regarding Smart Meters to date

Note: While many of these comments pertain to smart meters everywhere in the US and Canada, a good deal of the following information and comments pertain primarily to EMF-sensitive and EMF-concerned people living in Southern California.

Also, my focus is on the known and suspected health effects of short- and long-term exposure to smart meters. I let other concerned individuals and activists focus on the other downsides of smart meters, including privacy, billing and potential fire issues.

Here is what I do know:

- **Smart meters cause symptoms for some people.** (We also believe that there are others who likewise have health symptoms from their smart meters and the

neighborhood mesh network and don't yet know that their symptoms are caused by these sources.)

- There are serious questions about the efficacy and need for smart meters in the power grid in the first place — see "Getting Smarter About the Smart Grid," by clicking here. There are also reports of a coming decrease in their deployment in the US in 2014.
- The remote communication of electric, gas and water usage data from smart meters to the utility central office wirelessly through a mesh network is not necessary. Sending this information wirelessly is not the only means of communicating the data.
- **Hardwired, non-wireless alternatives for communicating user data to the utility already exist in virtually every home** in the form of copper pair telephone lines and hardwired Internet networks to and from the house (that is, telephone and cable company Internet service). This is how Italy gathers its meter data. The country has banned smart meters altogether.
- One technology you want to avoid is **Power Line Carrier, or PLC, technology**. Some electric utilities, particularly those in rural cooperatives, are choosing this method of conveying their data to the home office from the electric meters of their customers. While this is technically not a smart meter system in that this data is not being transmitted from house to house via radio waves using a so-called "mesh network," the meters involved are digital. Analog electric meters cannot participate in a PLC system.
- The problem is, **PLC technology** works by putting data onto the zero-crossing point of the 60 Hz sine wave of the utility's electricity, thus conveying the data along the electric power line from the electric meter back to the office, through the utility grid. Unfortunately, this stream of data also goes downstream and is carried into your house along with 60 Hz electricity. This data from the electric meter is a form of dirty electricity, meaning it is a higher frequency than 60 Hz. As with all dirty electricity, these higher frequencies emit 6-8 feet into the rooms of your house, coming off electric circuits in walls and AC power cords that you plug into outlets. Many electrically-hypersensitive people are bothered by dirty electricity, including PLC technology as used in electric meter data transmission. Try to avoid it if you can.
- Regarding wireless transmissions by smart meters through the mesh network, **there is a vast difference in power density levels emitted by smart meters when compared from one utility to another,** even when two utilities use the same brand of meter.
- **There is also a vast difference between utilities in the number of beacon signals transmitted by each smart meter per minute.** These beacon signal transmissions are programmed by the utility to "keep the network healthy" and to "synchronize the meters." This is done so that when the time comes each day for all smart meters to actually transmit their data, usually once or twice per day, the entire system works as designed.
- In July 2012 I measured three homes with smart meters and one home with an electromechanical opt-out meter in the Pacific Gas & Electric (PG&E) service area in Central California (Landis+Gyr model smart meters and GE electromechanical meter). **I measured the same power density levels and number of transmissions per minute from the three smart meters that is being reported by smart meter activists in San Francisco and other Northern California cities and towns in the PG&E service area.**
- In my study of homes with smart meters **throughout Southern California, however, I have found substantially *lower* power density levels of radio frequency exposure compared to the levels that I detected from smart meters in Central California. The levels in Southern California are lower by a factor of at least 75-100 times.** (The one exception to this is GE brand smart meters used only by Burbank Water & Power (BWP), which transmit the same power density levels as Landis+Gyr meters that I

measured in central California and are reported in Northern California.) (There are, also, transmissions of higher power signals by all smart meters once or twice a day when the actual usage data is transmitted. These have been measured to be higher than during the beacon signal transmissions.)

- **Likewise, the number of synchronizing beacon transmissions from Itron Openway smart meters used throughout Southern California is also substantially fewer per minute than transmitted by the Landis+Gyr meters that I measured in Central California** and lower than what is reported from PG&E meters in Northern California. (Again, the exception to this is Burbank Water & Power, where the frequency is actually one transmission every *15 to 20 minutes*. Thus BWP customers have beacon signals that are *much* stronger than any other utility customer in Southern California, but that beacon signal occurs much less often than anywhere in the state.) **(To view this report, click here.)**
- **Thus power density and number of beacon transmissions varies widely from utility to utility. It is therefore not accurate to say that all smart meters are the same. Nevertheless, all wireless smart meters are still harmful and should, in my opinion, be replaced with meters that communicate only over hardwired lines (including phone or Internet lines, but *not* Power Line Carrier, or PLC, technology).**
- As harmful as smart meters are, however, there are additional forms of EMFs in homes and offices that people should also know about.
- It is interesting and important to note that **some electrically hypersensitive (EHS) people report that while they can tolerate the more steady wireless transmissions from cordless telephone base units and Wi-Fi enabled Internet routers, they *cannot* tolerate the intermittent and much more short, sharp and persistent beacon signal transmissions from smart meters on their homes and in their neighborhoods.** They say this **even when the power density levels from smart meters are lower than from these other devices, as they are here in Southern California.** Thus for these people, smart meters are a definite health hazard. Researchers say the human body cannot easily accommodate to the short bursts of radio frequency exposure from smart meters, measured in milliseconds.
- It has also been my observation, and the observation of my colleagues around the country, that **those electrically-sensitive individuals who are most bothered by smart meters almost always have one or more serious EMF exposure issue in their home concurrent with their smart meter.** These other EMF issues (high electric fields, ungrounded outlets, wiring errors, knob and tube wiring, close proximity to power lines) are usually above and beyond the normal EMFs we find on our home evaluations. In our opinion, these additional EMFs create a situation whereby the client's body is simply not able to cope with the overwhelmingly negative health impact from the combination of all these EMFs, causing them to be more sensitive to the addition of a smart meter than is the case for other homeowners who do not have these same serious EMF issues in their home. Remediating these other EMFs helps reduce the electrically-sensitive person's intolerance to wireless transmitters. The bottom line is, if you are bothered by smart meters, besides opting out, make sure you get your home evaluated and mitigated for *all* types of EMFs so that you can truly heal.
- Furthermore, smart meters cause another problem aside from radio frequencies. There are credible reports from two engineers in San Francisco that **smart meters used by Pacific Gas and Electric (PG&E) generate detectable transient voltage harmonics on circuits throughout the house as seen on oscilloscopes.** These include Landis+Gyr and GE brand meters. These harmonics, a form of "dirty electricity" and presumably caused by the switched mode power supply used in smart meters, cause

symptoms in certain people in the PG&E service area separate from the ill effects known by these customers to be caused by radio transmissions.
    - Many of these customers noticed the onset of symptoms starting the day the smart meter was installed. These symptoms are thus presumed to be from the harmonics of dirty electricity because they occurred *before* the radio frequency mesh network was activated in their neighborhood and on their meter. This was verified by measurement with radio frequency detectors.
    - **I have studied many homes in Southern California with smart meters** (using different brands than used by PG&E) **and have not found evidence on my oscilloscope thus far of any harmonic frequencies that I can attribute directly to the smart meter,** yet, I do measure harmonic frequencies caused by other known sources of dirty power, such as dimmer switches. I realize this statement flies in the face of the widely assumed fact among smart meter activists and concerned citizens throughout the US and Canada that all smart meters produce dirty electricity, but I made significant attempts to try to measure these harmonics and was unable to attribute any to the Itron Openway brand smart meters that I measured. I did find harmonic frequencies, but in all cases they had a known cause other than from the smart meter. Click here to see the study.
    - *Note 9/12/13:* Furthermore, in July 2013, I worked with a client in Thousand Oaks, California who is an Electrical Engineer who informed me that he had read that Itron does filter their smart meters. He said he would look up that citation and get back to me, and I await that. I will post that information when I obtain it. This may indeed explain why I have not documented thus far any evidence of dirty electricity explicitly attributable to the Itron Openway smart meters measured in Southern California.
    - This is consistent with the report from engineer and fellow building biologist Tom Wilson of Florida that **all smart meter manufacturers put filters in their smart meters to filter out these harmonics.** The fact, however, that harmonics are being measured from PG&E smart meters and that PG&E customers report the onset of symptoms from their smart meters *before* the radio transmitter is activated, while others of us do not measure harmonics from other brands of smart meters, may indicate that these filters work with some brands and not with others. See my smart meter study page for details.

I am in contact with engineers within my profession to review my findings for accuracy and to help our profession develop a reliable, consistent protocol for measuring harmonics of dirty electricity throughout the country and Canada to verify that they do exist as universally as is now presumed. We want to be accurate in knowing exactly what is causing the symptoms that people genuinely do feel with these devices, and we also want to maintain our credibility among outside engineers and utility representatives with whom we communicate as we try to find solutions to this health issue.

- Thus I have come to the preliminary conclusion that **dirty electricity from smart meters may not be the universal phenomenon that smart meter activists and concerned citizens believe it is.**
- I have also come to the conclusion that people in the PG&E service area, one of the first utilities to roll out smart meters in the country, experienced a “triple whammy,” so to speak, when they were deployed. The three elements of this triple whammy included: 1) Very high power density levels from the beacon signal transmissions; 2) A very high number of transmissions per minute; and, 3) According to measurements taken by engineers in San Francisco, the additional presence of harmonics of dirty electricity on circuits and plastic AC power cords. This confluence of effects caused symptoms in numerous PG&E customers and prompted citizen pushback against the utility. This forced the California Public Utilities Commission (CPUC) to issue mandatory opt-out provisions for all three regulated electric

utilities in the state (PG&E, Southern California Edison and San Diego Gas & Electric).
- However, it is also accurate, according to my evaluation of clients' homes, to say that what is true for smart meters in Northern and Central California is not universally true for customers of other utilities throughout the state or nation. I do know, however, that people in other parts of the country *are* experiencing the same degree of symptoms as people in Northern California, at least from the transmission of radio frequencies and possibly from the effects of dirty electricity (if it exists beyond PG&E's service area). I also know that we measure similar power densities and numbers of beacon signal transmissions per minute in other utitilies outside California.

Here is what I do not know:

- **We do not know who else in the country has actually measured harmonic frequencies known to be caused solely by smart meters.** We would like to know what other findings exist outside Norhtern California to corroborate the presence of dirty electricity from smart meters.
- If filters are indeed present in all brands of smart meters, how effective are they in blocking harmonic frequencies from getting onto circuits and plastic power cords?
- **What is the reason some electrically hypersensitive people are so bothered by smart meters when they can tolerate other wireless devices, even when power densities are measured at much higher levels from these other devices than the smart meters on their homes?**

In conclusion, it is my observation that smart meters in Southern California produce beacon transmissions that are less strong and occur less often compared to those in Northern and Central California. It is also my observation that smart meters outside Northern California may not be producing dirty electricy. I present these observations and the conclusions they lead me to not to support the deployment of smart meters, but rather to separate fact from assumption and so that concerned people can focus on what is truly causing their symptoms and what is not.

Furthermore, it upholds our credibility to be accurate in what we actually measure and to what we attribute the very real symptoms that many people have and continue to experience from smart meters.

(End of July 4, 2013 summary.)

Update 9/12/13:

I traveled to Central California in July 2012 and had an opportunity to personally evaluate smart electric meters on three homes in the Pacific Gas and Electric (PG&E) service area. The meters were Landis+Gyr models. I also measured one home with a GE electromechanical (analog) opt out electric meter.

This update, dated September 12, 2013, includes photos and oscilloscope tracings from my visit to those three homes in the San Luis Obispo area, which are shown below.

I specifically measured what we call "beacon signals" sent out several times every minute of the day and night from these smart electric meters. These are not the signals that transmit the actual data of electricity usage, which happens only once or twice each day. Rather, these are signals that occur quite regularly to "keep the mesh network healthy" by synchronizing all the smart meters in the neighborhood so that when the data is scheduled to be sent, the mesh network works as planned and

the data from all the meters gets sent successfully. Also, the utility will know immediately when a particular electric meter is out of service, because it is not reporting in. Unfortunately, these beacon signals (along with the daily data signals) also make many people quite ill.

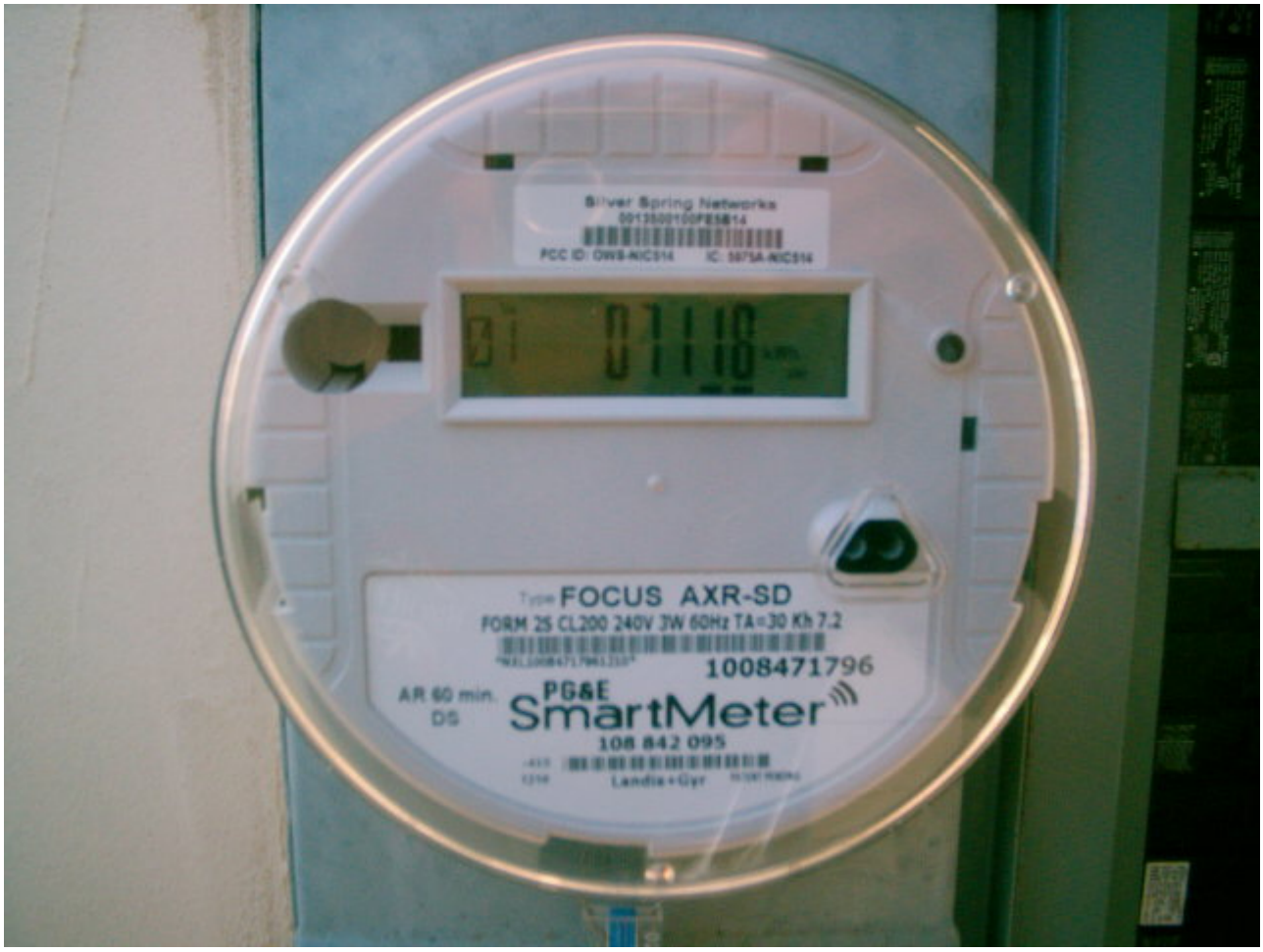
The readings I measured for the power density, or strength, of the beacon signals at these three homes was *much* higher than the levels that I routinely measure from Itron Openway smart meters used here in Southern Calfornia, by a factor of at least 75-100 times. However, the readings I obtained from smart meters on homes in the San Luis Obispo area were right in keeping with power density levels for smart meters in PG&E's service area reported by activists in Northern California and as seen on numerous YouTube videos recorded by those homeowners and activists.

Furthermore, the number of beacon signal microburst transmissions measured per minute at these three homes was also *much* more often than I routinely record from Itron Openway smart meters used by electric utilities here in Southern California, by a factor of 15-20 times. In Southern California, the beacon signals occur on average twice per minute. At these three homes, on the other hand, the signals occurred every few seconds, many times per minute, sometimes in rapid bursts.

Here is an overview of my measurement of a PG&E Landys+Gyr smart meter at a home in Morro Bay. Readings were obtained at roughly 6:00 PM on July 29, 2012:



Here are two close-ups of the smart meter, identifying it as a Landys+Gyr model from PG&E:


Silver Spring Networks
Type FOCUS AXR-SD
FORM 2S CL200 240V 3W 60Hz TA=30 Kh 7.2
1008471796
AR 60 min.
DS
PG&E
SmartMeter
108 842 095
Landis+Gyr


Type FOCUS AXR-SD
FORM 2S CL200 240V 3W 60Hz TA=30 Kh 7.2
NXL10084717961210
1008471796
AR 60 min.
DS
PG&E
SmartMeter
108 842 095
-415
1210
Landis+Gyr
PATENT PENDING

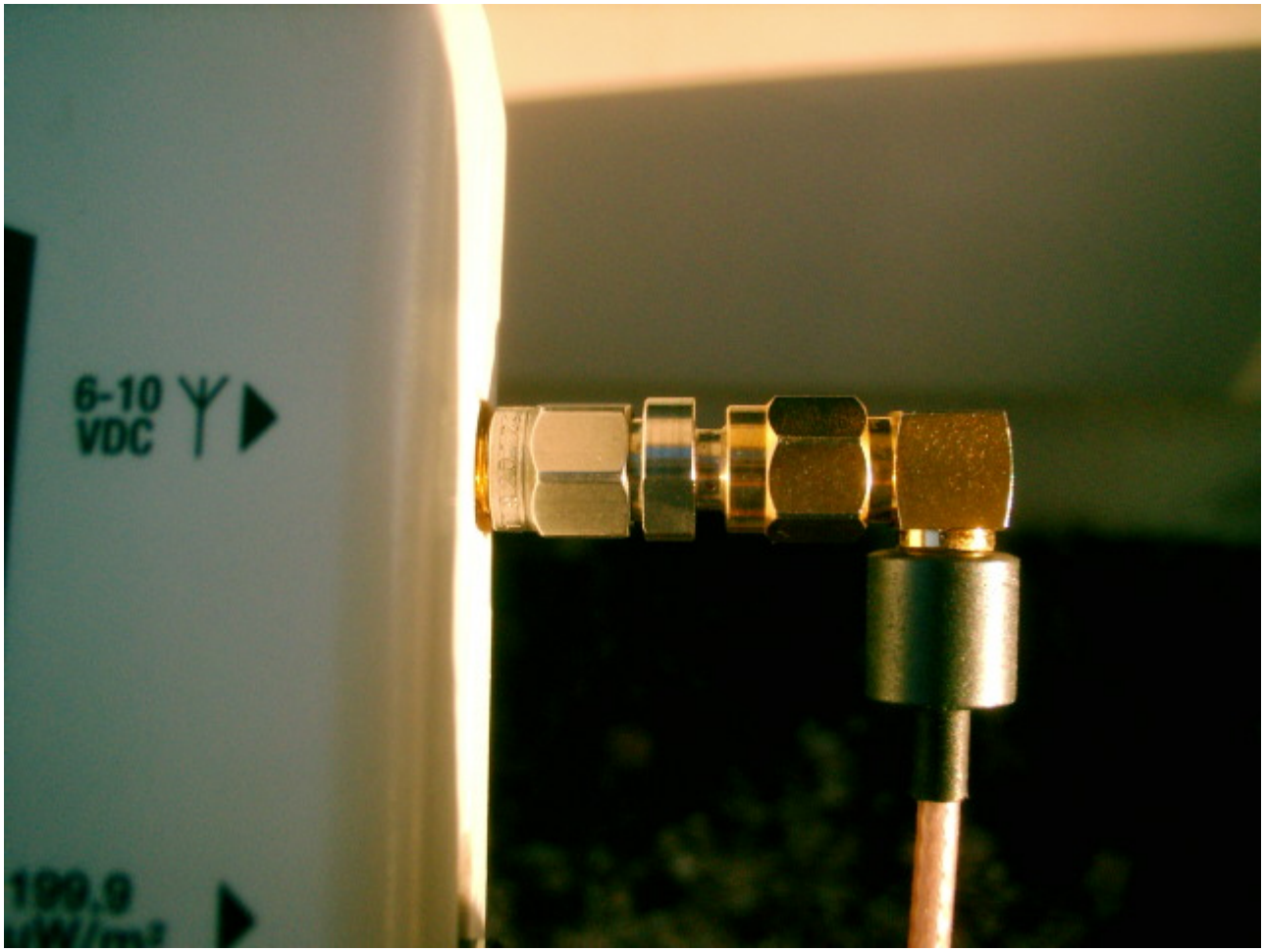
Here is a close-up of the brand of radio frequency (RF) detector used, an HF35C made by Gigahertz Solutions in Germany:



When radio frequency readings exceed the maximum that this detector can measure, which would be in the “course” setting and the number is higher than 1,999 microWatts/meter squared (uW/m2), then it is necessary to insert what is known as an attenuator to get a reading. That condition certainly occurs when you measure three feet from a smart meter when it is transmitting a beacon signal.

The attenuator is a filter that condenses the reading down to a scale that can be read by the detector. The attenuator reduces the reading by a factor of 20 decibles (20 dB), which means a 100 fold reduction. You therefore must multiply the reading on the screen by 100 in order to get the correct radio frequency exposure level.

Here is a photo of the attenuator in place:



Here are two views of the RF detector on the “course” setting, which can read up to roughly 2,000 uW/m2, but with the attenuator in place, the detector can actually now read up to 200,000 uW/m2 (100 times 2,000):


Power


199.9
µW/m²
1999
µW/m²
Power

Here are photos of two readings I obtained during micro-bursts of radio frequency transmission during a beacon signal from the Landis+Gyr smart meter. In the first photo below, the detector screen reads, “898.” This signifies a radio frequency power density, or strength, of 89,800 microWatts/meter squared (because when you multiply 898 times 100, you get 89,800).

The second photo shows a situation where the screen is blank, except for a vertical mark on the left (which is not the number “one”). This signifies that the RF detector is reading a radio frequency level that *exceeds* the limit of this RF detector with the attenuator in place, which is 200,000 microWatts/meter squared:





This means that the Landys+Gyr smart meter being measured at a house in Morro Bay in the Pacific Gas & Electric service area is sending out radio frequency microbursts in excess of 200,000 microWatts/meter squared at three feet, comparable to readings reported by smart meter activists in Northern California, as shown by videos they post on YouTube. This confirmed for me what they are reporting, and I have also measured radio frequency power density levels from smart electric meters around the country that are as high as those measured in Central and Northern California.

Those readings are, however, *much* higher than the standard 8,000 – 15,000 uW/m2, if that, that I routinely measure from all Itron smart electric meters here in the Southern California Edison service area. The strength of the RF beacon signal from smart meters in the San Diego Gas & Electric service area is usually even less strong, only in the range of 3,000 to 6,000 uW/m2 at 3 feet, occasionally up to 9,000 uW/m2.

The next day of my trip to Central California, July 30, 2012, I measured two more Landys+Gyr smart electric meters at homes in Templeton, just east of Morro Bay and north of San Luis Obispo. I did not take photographs of those measurements, but I measured power density levels at three feet from these PG&E Landis+Gyr smart meters at levels that ranged from 160,000 microWatts/meter squared (uW/m2) to in excess of 200,000 uW/m2, the level that again *exceeds* the ability of my Gigahertz Solutions HF35C radio frequency detector to measure.

Granted, this is still less than the 5.3 million uW/m2 allowed by the FCC (equal to 0.53 milliWatt/centimeter squared, their safe exposure limit set in 1997 for 900 MHz, the frequency used for the neighborhood area mesh network of smart meters). See my Article on Radio Frequency EMFs and scroll down to the section entitled, "The FCC versus the Rest of the World". Yet, it is *well* above the "Extreme Concern" level as determined by the building biology profession and many other independent sources of only 1,000 uW/m2 (click here for the standards).

Furthermore, when I stepped back to 8 feet from the two PG&E Landys+Gyr smart meters in Templeton, I still measured readings as high as 54,000 uW/m2. When I moved further back to 30 feet from the smart meter, the reading reduced to 160 uW/m2.

Compare these readings taken in Central California in excess of 200,000 uW/m2 at 3 feet to the 8,000 – 15,000 uW/m2 range that I typically measure at the same distance from Itron Openway smart meters on homes in the Southern Califonria Edison and San Diego Gas & Electric service areas. Likewise, compare the 54,000 uW/m2 measured at these homes in Central California at 8 feet to typical readings I obtain at 8 feet from Itron smart meters in Southern California of only 300 – 1,000 uW/m2.

Furthermore, once again, the beacon signals occurred at these three homes in PG&E territory every few seconds, sometimes in rapid succession, compared to only once every 30 seconds on average from Itron Openway smart meters in Southern California.

The bottom line appears to be that while many people, particularly those who are electrically hypersensitive, are bothered very much by smart electric meters in Southern California, we seem to have dodged a bullet, at least to some degree, compared to homeowners in Northern California and the rest of the country and Canada where many more people are bothered by smart meters than down here. That does not mean that I endorse smart meters. They are not healthy and need to be eliminated altogether, but at least in this corner of the state and country, our smart meters are not as strong, nor do the beacon signals occur as often, as other brands of smart meters used elsewhere in California and in the rest of the US and Canada.

Furthermore, and this to me is the most important point, there are *many* other sources of EMFs in homes, including sources of radio frequencies, that are more powerful and bothersome for most people here in Southern California than smart meters. For example, while local Itron smart meters, once again, have a power flux density of 8,000 – 15,000 uW/m2 at 3 feet that transmits only once every 20-30 seconds on average, I routinely measure up to 90,000 – 120,000 uW/m2 at 3 feet from a typical Wi-Fi router, which are found in many homes. This is 8 to 10 times stronger than Itron smart meters and the router transmits continuously, 24/7. The same is true for cordless telephone base units, which can transmit at 30,000 – 40,000 uW/m2 and higher at 3 feet. Cell phones, tablets and lap top computers can and do likewise transmit at higher levels, up to tens and hundreds of microWatts per meter squared, compared to Itron smart meters when measured at the same distance.

The bottom line for me is that people in Southern California need to learn about and reduce *all* sources of EMFs in their homes, including smart meters, but be aware that smart meters, at least in this part of California, are not the major health hazard for most people that they truly are elsewhere. Do opt out of your smart meter and get behind the very necessary efforts of local smart meter groups to convert them to hardwired technology rather than wirelessly for transmitting data. Urge utilities to use telephone and Internet lines — but not Power Line Carrier, or PLC, technology — as is done in Italy and elsewhere.

Also learn about, remove and reduce use of all the other sources of EMFs that lurk in your home. Read the Articles on EMFs page on this website to link to articles that discuss these various types of EMFs and how to reduce them.

(End of 9/16/13 update.)

*My original **Smart Meter Article** starts below after "Smart Meter News." This includes a discussion of a study I have conducted of circuits in homes with smart meters in Southern California.*

I also present the results of my evaluation of smart meters in Central California in July 2012 in the Pacific Gas and Electric (PG&E) serivce area on a separate smart meter study page. I conducted this evaluation due to reports of **voltage harmonics of "dirty electricity"** produced by switched mode power supplies in smart meters on homes in Northern and Central California in the PG&E service area. This is part of a larger study that I am conducting to see if these harmonics are indeed being produced by the smart meters used in Southern California, and in collaboration with colleagues in the building biology profession, elsewhere in the US and Canada.

Click here to view the study, which was updated December 8, 2012.

I also present information that sheds light on why so many people are reacting negatively to the presence of smart meters on their houses and in their neighborhoods, including evidence that the ***signal strength of the radio frequency (RF) transmitter*** *is much higher at the time of data transmission than the transmissions to synchronize the mesh network throughout the rest of the day. There is also a discussion of the adverse health effects of the* ***short, sharp and persistent nature of RF spikes from smart meters*** *compared to the continuous RF transmitted from more commonly used wireless devices, as harmful as those can be. The updated article can be found after Smart Meter News below.*

I wrote two articles in September 2012 on smart meters that appeared in the blog for fellow building biologists Ron and Lisa Beres of Irvine, California, the Healthy Home Dream Team. To view the first article, entitled "Smart Meters: Should We Be Concerned?", click here. To view the second article, entitled, "Smart Meters: The Dirty Truth", click here.

To view an excellent power point presentation on ***Smart Grid & Smart Meter Architecture****, presented by engineer and fellow building biologist Tom Wilson of Florida, at the Wireless Safety Summit in Washington, D.C. on October 5, 2011, click here.*
To view a technical white paper entitled, ***"Smart Meters: What Do We Know?"*** *written by engineer and fellow building biologist Peter Sierck of Carlsbad, California, click here.*
To view an excellent primer on smart meters from building biologist and electrical engineer, Sal LaDuca of New Jersey, entitled, ***"'Smart' or Demand Metering,"*** *click here.*
To view an article entitled, ***"Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters"*** *written by EMF consultant Cindy Sage of Santa Barbara, California, click here.*
To view information on a ***consensus document*** *written by fellow building biologist, Michael Schwaebe, of Encinintas, California and a coalition of building biologists and engineers on ways that electric utilities can eliminate the EMFs from smart meters, click here.*
To view a press release entitled, ***"The American Academy of Environmental Medicine Calls for Immediate Caution regarding Smart Meter Installation,"*** *click here.*
Also see below for links to websites on smart meters and information on ways to shield yourself from the radio frequencies from smart meters.
For ***options to avoid smart meters****, click here.*

Smart Meter News

New Nein! Germany ministry rejects smart meters
From The Microwave Factor
From the article: "Ernst & Young has authored a study on behalf of the German Federal Ministry of Economics analyzing the costs and benefits of a full smart meter rollout. It concludes that smart meters are not in the interest German consumers."

UK delays all Smart meter installations by a year. Italy bans them entirely.
From Before It's News
On May 10, 2013, the UK government ordered a country-wide one year moratorium on smart meter deployment due to health concerns. What is most troubling, though not surprising, is that this was not covered at all by American media. Italy has also decided to ban wireless smart meters, however, I understand they use hardwired telephone lines to collect data.
To read the article and watch a video of citizen testimony before an April 23, 2013 Commons Select Committee enquiry into the UK smart meter roll-out, click here.

Cindy Sage & LA DWP discuss 'Smart' Meters (part 2)
From Environmental Options Network
A neighborhood meeting was held May 8, 2013 by the Woodland Hills, California Neighborhood Council on the topic of the installation of smart meters through a pilot project implemented by Los Angeles Department of Water and Power (LA DWP). A representative of the utility, Marcelo Di Paolo, spoke, followed by Cindy Sage of Sage Consulting, formerly in Santa Barbara.
Oram was present and spoke during the public comment section on his experience with clients who are effected by smart meters, and on the need for DWP to implement an opt-out program, as is offered by every other electric utility in the state. Mr. DiPaulo of DWP indicated that customer participation in the pilot program was, indeed, voluntary.
You can hear **Oram's two-minute comments** starting at 20:17 (20 minutes, 17 seconds) into the video. (At 20:00 during my comments, I mistakenly said, "All these wireless devices are safe…," when I meant to say, *"We in America officially say* all these wireless devices are safe.…")
To see part 1, which includes Cindy Sage's presentation, click here.

Getting Smarter About the Smart Grid
"An energy and electricity policy white paper" published by the National Institute for Science, Law & Public Policy
Co-authored by Timothy Schoechle, PhD; Camilla Rees, MBA; and Duncan Campbell, Esq. (all of whom presented at our Conference of the Institute for Bau-biologie and Ecology, October 2012, in Washington, DC — click here to purchase a copy of the five DVD set of presentations at that conference, including by these three experts)
Published November 2012
"Getting Smarter About the Smart Meter offers a roadmap to a truly 'smart' decentralized electricity grid capable of integrating 'distributed' power generation and renewable energy sources without the privacy, security, reliability, economic, or potential health impacts of our present 20th century centralized and wasteful utility infrastructure investment approach."
The white paper asks the question, "Why are federal government stimulus programs underwriting billions of dollars of 'dumb' smart meters for utility companies — with taxpayer dollars — meters that will soon be obsolete and not integrate with, or enable, the 'smart grid' of the future on which U.S. energy sustainability depends?"
To link to the website and to download the press release and the white paper, click here.

CPUC Approves Analog Meters for Southern California Edison and San Diego Gas and Electric customers
After mandating an analog meter opt out for customers of Pacific Gas & Electric in February 2012, the California Public Utilities Commission announced their opt out policy for customers of the other two regulated utilities in the state, Southern California Edison and San Diego Gas and Electric.
Customers of San Diego Gas and Electric who have a smart meter and want to opt out can have an analog meter put back on their home. Those customers of SDG&E who still have their analog meters can now keep them.
Customers of Southern California Edison have a slightly different plan. If you opt out, the company

will replace your smart meter with whatever model you had before. If that was an analog meter, you will get an analog one. If your previous meter was a digital meter, that is what you will get. If you are on the Edison delay list and still have your analog meter, you get to keep that.
There will be an initial $75 fee and a monthly charge of $10 for customers of both companies. Those fees are less for those on limited income under both utilities' CARE program.
From an article by San Diego-based non-profit Center for Electrosmog Prevention, entitled, ALERT: CPUC Passes SDG&E / SCE Opt-out Plans 4/19/12: "Today, the CPUC Commissioners unanimously passed both SDG&E and SCE opt-out proposals for the utilities' embattled RF-radiation emitting smart meters. This will impact Southern California customers of San Diego Gas & Electric and Southern California Edison, two of the state's three largest independently operated utilities. Residential customers of both utilities may now officially request that the smart meters be removed from their residences. Edison indicates 28,000 have indicated an interest in opting out, and SDG&E has gone from an estimate of around a hundred to 3,000, to date…"
Link directly to the CPUC directive to Southern California Edison here, and to link to the CPUC directive to San Diego Gas & Electric, click here.

Ojai Places Moratorium On Smart Meter Installation
By Tiobe Barron, Ojai Valley News Blog
May 30, 2012: "Tuesday night (May 29, 2012), the Ojai City Council unanimously passed an urgent ordinance effectively placing an immediate moratorium on the installation of smart meters by Southern California Edison in the city of Ojai. The language of the ordinance itself cites the California Public Utility Commission Code section 2902 which grants municipalities 'the right to supervise and regulate public utilities in matters affecting the health, convenience and safety of the general public,' and goes on to state 'significant health questions have been raised concerning the increased electromagnetic frequency radiation and radio frequency radiation emitted by the wireless technology in smart meters, which will be in every house, apartment, and business.'
"City manager Rob Clark stated at the special meeting Tuesday night that city staff had tried to contact representatives at Southern California Edison, but have so far had no response. Ojai becomes the first city serviced by SCE to enact such measures; all prior have been Pacific Gas & Electric, which serves customers mainly in Northern and Central California."
To view the article, click here.

The American Academy of Environmental Medicine Calls for Immediate Caution regarding Smart Meter Installation
April 12, 2012, Wichita, KS: "The American Academy of Environmental Medicine today released its position paper on electromagnetic field (EMF) and radiofrequency (RF) health effects calling for immediate caution regarding smart meter installations. Citing several peer-reviewed scientific studies, the AAEM concludes that 'significant harmful biological effects occur from non-thermal RF exposure' showing causality. The AAEM also expresses concern regarding significant, but poorly understood quantum field effects of EMF and RF fields on human health.
"'More independent research is needed to assess the safety of "Smart Meter" technology,' said Dr. Amy Dean, board certified internist and President-Elect of the AAEM. 'Patients are reporting to physicians the development of symptoms and adverse health effects after "Smart Meters" are installed on their homes. Immediate action is necessary to protect the public's health.'"
To view the press release, click here.

Electric bill skyrockets after smart meter; opt-out option coming, but will cost
Article in the Orange County Register online edition, April 5, 2012, discussing the proposed analog meter opt out option for Southern California Edison customers and a pulic hearing of the California Public Utilities Commission scheduled for April 19, 2012.

The Nevada Public Utilities Commission approved by a vote of 2 to 1 to allow Nevada electric utility

customers to opt out of having smart meters on their homes.

The Michigan State legislature has two proposed bills before it to allow citizens to opt out of their state's smart meter program. These are Michigan House Bill 5411 (here) and House Bill 5439 (here). The Georgia Senate has passed similar legislation (here).

Maine PUC to require opt out for 'smart meters'
According to a May 17, 2011 article in the Bangor Daily News, the Maine Public Utilities Commission voted just days before "to let Central Maine Power customers opt out of using 'smart meters' that are part of a power grid upgrade by either turning off the wireless component of the new meters or keeping their old analog meters."

PG&E offers to let customers keep analog, mechanical meters
Pacific Gas & Electric in Northern California has for the first time asked the CPUC to allow them to offer analog electric meters to those customers who ask to opt-out from the smart meter program rather than a digital meter with the radio transmitter turned off (which still exposes occupants to harmonic voltage spikes of "dirty electricity" from the switched mode power supply in the smart meter), according to the Mercury News on 12/20/11.

The Center for Safer Wireless has released a **Citizens Call for Action by the Congress and the Administration**. This is based upon information presented at the Wireless Safety Summit, held this past October 2011 in Washington, DC. To view the document, click here.
They urge Congress to:

- Convene congressional hearings on the health effects of radio frequency (RF) exposure
- Ask the US Surgeon General to issue precautionary warnings, as they do in Europe, on the health effects of RF and other EMFs
- Place an immediate moratorium on Federal funding to further deploy the smart grid (using smart electric meters)

A new **nationwide citizen's action** website, Smart Meter Help, has been launched by Joshua Hart's Stop Smart Meters and Sandra Maurer's EMF Safety Network, both in Northern California.
From the website for Smart Meter Help: "Submit Your SmartMeter Complaint Online in Minutes! "Purpose of this website: This website is part of a grassroots movement to put a halt to SmartMeter programs in the United States and around the world. This website streamlines the thousands of SmartMeter complaints by logging the complaints and delivering them to the utility companies, utility regulators, and government officials…"
Contains a complaint form you can fill out online. They will forward it along with complaints from other citizens to your respecitive representatives in government and at your local utilities. To sign up online, click here.
To view a long and comprehensive list of Smart Meter Health Complaints already submitted, click here.

Here are **news reports on the Southern California Smart Meter Forum** held on Thursday, November 10, 2011 in Glendale, California, sponsored by BurbankACTION and Stop OC Smart Meters, featuring Cindy Sage, Mindy Spatt, and Orlean Koehle:

- KPFK's Roy Tucker interviews Cindy Sage Thursday morning (November 10, 2011): (Scroll forward to 2:54:00-3:21:45.) KPFK can be heard at 90.7 FM in Los Angeles and most of Southern California, 98.7 FM in Santa Barbara, 99.5 FM in Ridgecrest/China Lake and on 93.7 FM in Rancho Bernardo/North San Diego.
- KNBC-TV reporter Robert Kovacik's report for Thursday's 11 pm newscast (Nov. 10, 2011) and

the next day (Nov. 11) at 5pm
- LA Weekly's Simone Wilson's story posted Friday (Nov. 11, 2011)
- Glendale News Press' Brittany Levine's news story posted Friday, Nov. 11, 2011
- Ron Kaye's front page column in Sunday's Glendale News Press-Burbank Leader, published Nov. 13, 2011 (or here)

Oram's Smart Meter Article

(Updated June 21, 2012)

Note: There is information that can explain why people in Southern California, whether previously electrically-sensitive or not, are reacting adversely to smart meters when many of these people can tolerate the use of other wireless devices, even if dirty power from the smart meter is not the cause. I say this because the preliminary results of my survey of smart meters appears to show no evidence of voltage spikes from those smart meters. Click here to view the study.

The finding that smart meters used in Southern Calfornia do not appear to emit harmful voltage spikes of dirty electricity has led me to the conclusion that the reasons for the intolerance to smart meters must be:

- The power density of radio frequency (RF) transmissions from smart meters is much higher at the time of transmission of data than measured when the smart meters send out bursts of RF several times a minute at other times throughout the day and night to synchronize the mesh network and in the utility's words, "keep the network healthy."
- The harmful effect on human health from the uniquely short and sharp nature of radio frequencies being emitted by smart meters compared to the more continuous RF transmission from commonly used wireless device, such as cordless telephones

This could explain why some people are particularly bothered by smart meters even with the growing likelihood that the smart meter brands used in Southern California are not emitting harmful voltage spikes.

We may therefore be able to consider ruling out this one type of EMF, that is, voltage spikes, as a cause of people's symptoms from the brands of smart meters used in Southern California while we continue our efforts to recommend opting out and eventually banning smart meters altogther. That is necessary because of the harm they cause from the short, sharp, repeated microbursts 24/7 as well as the high RF levels emitted once or twice per day at the time of data transmission.

When it comes to radio frequency exposure, it may indeed be the case that power density alone is not the determining factor as to why one wireless device is more or less harmful than another. It has also to do with complex biological effects from the sharpness and persistence of the transmission.

Introduction

Smart meters have become a serious health threat for many people in California and around the world. Reports of headache, dizziness, tinnitus, and lethargy abound. I personally hear from clients every week who say they have lived in their homes, sometimes for decades, without symptoms, and the day their smart meter was installed or soon thereafter, symptoms began or significantly worsened. This is disheartening to these people, to say the least, and quite perplexing to those of us who are consultants in this field. Why would one particular technology be so troubling to a certain group of people?

One answer, at least for people in those areas where it is a problem, is provided by engineer Rob States of San Francisco and others, who have found voltage spikes on circuits in homes with smart meters used by Pacific Gas & Electric, including smart meters made by GE and Landis Gyr.

Rob believes these voltage spikes, which leak off circuits and plastic power cords into rooms throughout the home, cause as many symptoms as those caused by radio frequencies. I have evaluated homes here in Southern California with Itron and Trilliant brand smart meters and have not found the same voltage spikes, so far. Click here to view the study. If, however, you live in an area of the country or Canada where your utility uses other brands, you may have this problem. It is discussed in detail below.

The big issue for us here in Southern California, and for everyone else in the US and Canada who also have voltage spikes, is the mesh network of radio frequencies, or RF, in which every smart meter transmits its data one or more times per day to the central office. These data transmission are the highest in terms of the strength of the signal, and can be much higher than, or at least equal to, the RF signal strength from commonly used wireless devices such as cell phones, Wi-Fi and cordless phones.

These RF transmissions from smart meters are not just limited to once or twice per day, however, as they also broadcast intermittently once or more every minute 24/7 with a somewhat lower, but still harmful, power density transmission. This is done to keep the smart meters synchronized so that when the time of transmission comes, which is midnight, for instance, in the Southern California Edison service area, they will work properly.

Many people are particularly sensitive to the short, sharp nature of these microbursts, which can last only milliseconds, and they are also sensitive to the mesh network of radio frequencies in the neighborhood around them even if they have opted out and have a non-transmitting meter on their house and even at levels below what we can measure with our radio frequency detectors.

Our Focus is on the Health Effects, but Other Problems Exist from Smart Meters

Electric (and water and gas) utilities are replacing existing analog meters with digital smart meters as part of a world-wide effort to reduce electricity use and improve efficiency in homes and businesses. There are many down sides to smart meters besides health. These include concerns about potential breaches of privacy, reports of overcharging, and unintended damage to household appliances, particularly to low-voltage systems such as landscaping lighting, even an occasional fire. Clients tell me they hear this from smart meter installers and utility officials alike. One local utility worker told a client of mine that all he does is fix problems caused by smart meters.

While the reasons given by electric utilities for deploying these meters have merit on a theoretical basis, there are numerous consequences that need to be addressed. Workarounds do exist for some of the adverse health effects they create, which we discuss below. However, replacing smart meters with analog meters is always the best choice, which for a growing number of electric customers throughout California, is now an option.

Finally, while we support efforts to preserve homeowner privacy and generally oppose opt out fees, we focus our primary attention in my profession on educating the public about and mitigating the health impact of smart meter deployment.

Radio Frequency Communication Devices: The First Source of EMFs in Smart Meters

The way that smart meters relay information to the central office for utilities here in Southern California is through the use of radio transmitters. That is the case for homes in the service areas of SCE, SDG&E, Glendale and Burbank Water & Power, and Los Angeles Department of Water & Power (which has deployed only a limited number of smart meters thus far).

There are two radio transmitters in each smart meter. The first communicates with a neighborhood area network (NAN) at approximately 900 MegaHertz (MHz). This mesh network allows each meter to send its data to a neighboring meter. That data is fed up a heirarchy of collector meters on homes until the information from hundreds of meters reaches a single designated meter, which then sends it via cell phone frequencies to a nearby cell tower. From there it is sent to the electric utility office. This is the method used by Southern California Edison and San Diego Gas & Electric. Other local utilities, such as Glendale Water and Power (GWP) also use wireless transmitters in smart meters on homes, but the data is sent to collector receivers on utility poles, not to other smart meters on people's homes.

The actual transmission of data is programed to only occur once per day at midnight for Southern California Edison customers. Smart meters of other companies transmit data two or more times per day. As mentioned above, there are, however, microbursts of radio frequency emitted by smart meters from different utilities throughout Southern California as often as several times per minute. I asked an Edison mesh network administrator what these were, and he said they were radio frequency signals intended to synchronize the meters to "keep the network healthy." This is to insure that when the designated time arrives, which is at midnight for Edison customers, the system operates as expected and the data is transmitted properly.

The other radio transmitter in each smart electric meter is designed to send a signal to and from appliances *within* your home to monitor and manage electricity use by appliances. Right now, some appliance manufacturers are already selling products with a built-in radio transmitter. As the appliance stock is turned over in the coming years, new refrigerators, stoves, washing machines and other appliances will contain these radio transmitters.

This is called the home area network (HAN), often referred to as a Zigbee system. It operates at 2.4 GigaHertz (GHz), the same frequency used by some cordless telephones and all wireless Internet (Wi-Fi) routers. This transmitter is not yet activated in the smart meters deployed by electric utilities in Southern California and reportedly will only be activated if and when a homeowner signs up to monitor electric usage by appliances. That is the position of Glendale Water and Power (GWP) and Pacific Gas and Electric in Northern California. Burbank Water and Power does not even have Zigbee transmitters in its meters and only uses a transmitter for the neighborhood area network.

Smart Meter Frequencies and the Strength of the Radiated Signal

The frequencies transmitted by either radio transmitter are the same as those used by cell phones, cordless telephones and Wi-Fi routers, devices already in use by millions of people throughout the world (and which are known to cause ill health). I have measured the power flux density, or strength of the radiated signal, of smart meters used in Southern California to be roughly the same as that found in these wireless communication devices, which is lower than RF levels measured from smart meters elsewhere in the state and country. I have verified this at client's homes with my Gigahertz

Solutions HF35C and HFE35C radio frequency (RF) detectors, based upon mesurements of dozens of Itron Openway brand smart meters on homes in the Southern California Edison, San Diego Gas & Electric, Los Angeles Department of Water & Power, and Glendale and Burbank Water & Power service areas.

We hear a different story, however, from elsewhere in California and around the country, where they correctly say that the transmitted power density of RF transmissions from smart meters in their areas are as high as "50 to 100 times" that of cell phones, cordless phone base units, and Wi-Fi. While this is certainly true elsewhere, it appears that the radio frequency power flux density readings I measure from Itron Openway and Trilliant brand smart meters here in Southern California are less in intensity than that being measured from different smart meters elsewhere in the country.

I had direct confirmation of this recently when I sent my Gigahertz Solutions HF35C radio frequency analyzer to a colleague in the Washington, DC area. He used it to measure RF levels at hotels my profession considered for a conference we will hold on smart meters and other EMF and healthy home topics this coming October of 2012. We had to find a hotel that our EMF-sensitive attendees can sit in for three days without RF beaming in from a nearby cell tower. We found such a hotel, and we will have the staff turn off the Wi-Fi in our meeting and sleeping rooms while we are there.

My colleague told me he also measured GE brand smart meters on homes in Washington, DC, and said the RF meter consistently measured readings in excess of 1,999 microWatts/meter squared, the maximum that the HF35C RF meter can display without having to use an attenuator filter to get higher readings, when he stood more than 30 feet from the GE smart meter. I told him I had never measured that powerful a signal at that distance from any Itron Openway smart meter on any house here in Southern California *with that very same meter*.

This information, coupled with a comparison of the readings I get here in SoCal to those seen on YouTube videos obtained by people elsewhere from different brands of smart meters using the same HF35C RF detector, proves to me that Itron smart meters found here are lower in power density output than other brands of smart meters used elsewhere in the US and Canada.

This indicates that the utilities here in Southern California program the radio transmitters in their smart meters to trasmit their RF signal at a weaker strength than other utilities using other brands of smart meters elsewhere. I have even seen a slight difference between utilities in this area using the same Itron Openway brand smart meters. Southern California Edison has the highest RF levels at roughly 8,000-15,000 microWatts/meter squared measured at 3 feet standing outside directly in front of the smart meter with no shielding, while Glendale Water & Power and San Diego Gas & Electric are somewhat lower at roughly 3,000-6,000 microWatts/meter squared at the same distance. Measured RF levels are reported to be much higher, however, from other brands of smart meters used by utilities elsewhere in the state and country.

RF readings are further reduced when I measure inside the house near the wall on which the smart meter is mounted. This is due to the shielding that stucco walls provide and to the large metal backing of the box on which the meter is mounted, which is also partially shielding.

As a result, I see levels of roughly than 300-500 microWatts/meter squared one to two feet inside the wall, which drop further to 30-60 microWatts/meter squared in the middle of the room, six feet away, considered to be less harmful for a healthy person by my profession, and this is with no additional shielding. Moreover, because radio frequencies drop off by the inverse squared law, the intensity or power of any radio signal from any source is substantially lower even six to eight feet away.

Compare that to popular wireless devices found in many people's lives, where radio frequency levels from a typical Version 6.0 DECT cordless telephone or Internet router with Wi-Fi enabled will be 30,000-50,000 microWatts/meter squared at the same distance of 3 feet, triple what I measure outside standing 2-3 feet from an Itron smart meter.

Furthermore, a cordless telephone handset or cell phone held next to the head generates over 200,000 microWatts/meter squared, a significantly unhealthy level from our perspective (but still *well* within the accepatble level according to the FCC — see my Article on Radio Frequency EMFs by clicking here.)

Even with lower power density levels of smart meters in Southern California, these readings are still too high for you to safely sleep with the head of your bed against the wall with the smart meter without shielding. You can and should move your bed as far away from the smart meter as possible, shield the smart meter inside and out, and ultimately, opt out for an analog meter, if you can.

Power Density of RF Does Not Tell the Whole Story — Health Effects from Microbursts of RF

Even if we consider that RF levels from brands of smart meters used here in Southern California are lower in intensity than smart meters used elsewhere, that does not explain why certain people are so bothered by these devices. Reports are numerous of homeowners who have had no problem in their home for decades, and then suddenly having ringing in the ears, headaches, insomnia, rashes, head pressure, memory loss, dizziness, weakness, "brain fog" and other symptoms when the smart meter is installed. What could be causing this?

The consensus is that it is the short, sharp, and persistent nature of the microbursts of RF from smart meters that makes them so harmful compared to the more continuous nature of RF from commonly used wireless devices. Here is one report from a prominent smart meter activist in Canada who is himself electrically hypersensitive:

"I have been badly affected by Smart Meters in Stratford, Ontario. I think that the reason that the meters are causing so much sickness is the powerful bursts they send, which may be every few seconds or every few minutes. It's like a small shock to the body, each time they send their burst of radiation. Most other forms of EMR are generally continuous signals, that the body can become more accustomed (to). A smart meter burst can shock my heart out of sync, but a Wi Fi will cause different affects like itches, muscle shakes, headaches, sleep difficulties, etc."

Then there is the issue of the strength of the RF signal during the time of transmission, which has been shown to be much higher than the strength of the synchronous microbursts throughout the day and night. Peter Sierck is beginning to establish that there is a significantly higher power flux density transmitted by the smart meters he studied at the time it is programmed to transmit its data than he measured when it sends out its microbursts of RF several times per minute to "synchronize the network" throughtout the day and night.

Peter's findings were obtained using a Gigahertz Solutions HF59B RF analyzer connected to a data logger that monitored the strength of radio frequency transmissions by the smart meter over 24 hours. Peter reportedly found high peaks of radio frequency transmission at roughly 11 AM and 4 PM, the same times that San Diego Gas & Electric schedules its Itron smart meters to transmit their data. A follow-up study at another home in the SDG&E service area again showed high spikes but in this case at five different times throughout the 24 hour period at roughly 11:30PM, 2AM, 4AM, and two spikes just before 3 PM.

Putting This All into Perspective

The bigger picture is that all wireless devices are harmful, particularly smart meters, and you should find ways to reduce their use, increase distance and eliminate them altogher if possible. The harmful health effects from all forms of RF are cumulative, just as with cigarette smoking in the ’50s and ’60s. If you are concerned about RF from a smart meter, you should also be concerned about the cell phone, cordless telephone, Wi-Fi router and laptop that you use. However, smart meters have a unique effect, and you should sign up for your utility’s opt out program if they have one.

To learn steps you can take to safeguard yourself against EMF exposure in general, click on Tips for a Healthy Home, Articles on EMFs, Safer Use of Computers, and Steps to Protect Yourself from Cell Phone Frequencies.

What I have discussed up to this point is the situation for relatively healthy people.

Everything is Different for the Electrically-Sensitive Person

Having said all that, the situation is *even worse* for an already electrically hypersensitive (EHS or EMS) person. These people cannot tolerate wireless technologies at virtually any distance and have a zero tolerance policy towards them. They will not have any wireless devices in their homes by choice, and they are particularly bothered by the short, sharp, and persistent microbursts of RF from smart meters on their and their neighbors’ homes at distances well beyond what any of our radio frequency detectors can measure.

This is a fact of life for these people that is completely misunderstood by mainstream physicians, researchers, and utility and governmental regulatory officials, not to mention the EHS person’s skeptical family and friends. The needs of this group, conservatively estimated to number anywhere between 3 and 15% of the total population, are not being considered by industry, government or the medical profession. The Council of Europe, on the other hand, calls for recognition of the electrically sensitive in its resolution, passed in May 2011 and discussed below.

Fortunately electric utilities in California now offer analog meter opt out programs for most customers who want them, which is a step in the right direction. For others who cannot get an analog meter, they can at least have the radio frequency transmitter turned off. However, until you get an analog meter or you live in a part of the country where you have a smart meter and cannot opt out, many people are bothered by the RF. Some are also bothered by the “dirty power” from some smart meters throughout the country that leaks off circuits and plastic AC power cords plugged in throughout the house.

It is this EHS population that we in the building biology profession focus our attention upon. We also try to recommend the same stringent standards to the general public (to the extent they will listen!), following the precautionary principle in order to avoid risk.

The main difficulty that electrically sensitive individuals have with smart meters is the microbursts of radio frequencies lasting only milliseconds, repeated several times per minute from their smart meter, day and night. Some amount of radio frequencies do get through stucco and the metal backing of the meter box. Glass windows offer no protection whatsoever without shielding. For those who are sensitive to this, there are shielding strategies that have been effective to varying degrees, and they are reviewed below.

Utility officials incorrectly assume that if a radio frequency detector shows no significantly

measurable levels of RF (and what they consider to be a safe threshold is *much* higher than what we do), then the transmitting device must be safe. Researchers, building biologists and electrically-sensitive individuals throughout the world know otherwise, that the human body is more sensitive than radio frequency detectors. This means that electrically sensitive people can still be bothered by wireless devices beyond the distance that our meters pick them up, even at the more stringent levels that we accept as safe. Furthermore, few people, and fewer utility officials, know about and recognize the dirty power created by electronic components inside some brands of smart meter, which EHS people can be *extremely* bothered by.

Electric utilities also claim that smart meters emit the same frequencies as cell phones and Wi-Fi routers and at the same power density levels, and frankly, they are right with regards to the Itron smart meters used here in Southern California. Utility representatives mistakenly assume, however, that since wireless devices are used by virtually everyone and have been with us for years, they must be safe and would be accepted by everyone. They fail to recognize that electrically-sensitive individuals are significantly bothered by radio waves and choose to not have wireless devices in their homes at all. These devices are like poison to them, and the sharp nature of the RF microbursts are particularly bothersome. The electrically hypersensitive must protect themselves when in the public. These are choices they must make. With smart meters, however, up till now they have had no choice. Having a smart meter on their home is not something they would choose.

Fortunately many California utilities now offer various opt out options, including restoring and keeping analog meters. These plans do differ from company to company, and they are explained in detail below.

Switched Mode Power Supplies, Causing “Dirty Power”: The Second Source of EMFs in Smart Meters

An additional type of EMF is produced by certain brands of smart meters throughout the US and Canada, known as “dirty power” or “dirty electricity.” This is harmonic frequencies riding on the 60 cycle per second, or 60 Hertz, electric power on utility power lines and on circuits and plastic AC power cords plugged in throughout your house. These harmonic frequencies, measured as voltage spikes on an oscilloscope, are produced by energy-efficient devices, such as compact fluorescent lamps (CFLs), halogen lights, dimmer switches, and transformers, among other devices.

One particular type of transmformer, known as the switched mode power supply, or SMPS, is particularly known to produce voltage spikes of dirty electricity. An SMPS is needed to transform 240 Volts of electricity passing through a smart meter down to 2-6 Volts to power the circuit boards that measure electricity and also that broadcast data. Filters do exist in all brands of smart meters, according to some engineers, just as they do in other appliances, such as computers, printers and audio equipment that also have switched mode power supplies, to filter these harmonics so that, for instance, audible noise does not occur on speakers and computers are not affected.

Some smart meter manufacturers apparently do not use high quality filters and their switched mode power supplies create high voltage spikes, sending out noise and higher frequency harmonics onto circuits and power cords throughout the house. These frequencies, usually in the 4,000-100,000 Hertz (or 4-100 kiloHertz) range, leak off circuits and cords up to 6-8 feet into rooms, and they bother electrically-sensitive people. They can also leak off power lines into neighborhoods.

Voltage spikes of dirty power have been measured consistently in homes with GE and Landi Gyr brand smart meters in the Pacific Gas & Electric service area by Rob States and his colleagues in Northern California. This is reported extensively in Rob’s article on the Environmental Options

Network EMF blog and in his thirty-minute radio interview recorded on October 13, 2011 with San Diego's Dr. William Deagle.

I have begun a study of over 25 homes with smart and analog meters in Southern California using my own oscilloscope and spectrum analyzer to verify the presence of these same harmonic voltage spikes. To date, I have found no voltage spikes that cannot be attributed to some other cause. The study is ongoing and my findings are being reviewed by my colleagues, who are engineers, but so far, my conclusion is that dirty power from smart meters is not a problem that we are dealing with here in Southern California. To view the study, click here.

You will also find an excellent primer on smart meters from building biologist and electrical engineer, Sal LaDuca of New Jersey by clicking here. Sal has also written an article specifically on "dirty electricity filters" and Switch-Mode Power Supplies found here.

Possible Medical Explanation for Hypersensitivity to Dirty Power

An important part of the discussion between Dr. William Deagle and Rob States in their October 13, 2011 interview is Dr. Deagle's suggestion that the symptoms experienced by Rob's electrically-sensitive clients seemed to him to be due to cellular de-mineralization.

Dr. Deagle said, "I expect this affects ion channels…The biggest thing to prevent the effect of dirty electricity and radiation RF is mineralization. It appears electromagnetic radiation smog is a de-mineralizer. The primary effect seems to be de-mineralization of tissue…I think what it's doing is it's jamming ion channels and it's jamming the normal trans-cellular membrane potentials so your body can't pump minerals in that need to be in like potassium, magnesium, so you get a functional deficiency of those minerals."

Dr. Deagle mentioned a buccal (inner cheek) scraping method to determine your cellular mineralization levels. He sells what he calls his "Electrosmog Smart Meter Protocol" using mineral salts and other ingredients. This is discussed in his radio interview with Rob. As always, check with your health care practitioner before beginning any supplementation regimen.

If true, this information could give us an important physiological explanation for just how symptoms of electrical hypersensitivity manifest. It also gives us a way to measure these cellular effects and a way in which EHS people can potentially be helped from a dietary standpoint. Rob says, "A couple of people I have met who are EMF-sensitive for decades, for a long period of time, they actually tailor their diet to how much RF they've been exposed to. And they'll typically go through doses of Vitamin C and other supplements when they encounter RF disease."

How to Opt Out in Southern California

For those who *are* bothered by the EMFs produced by smart meters and those who want to be cautious and avoid any health effects, here are the **options you have at present** to avoid the effects of smart meters for electric utility customers in Southern California:

- If you are a Southern California Edison customer, you can opt out of their smart meter program, called "SmartConnect." Return the application contained in a notification letter that you should be receiving by mail, or call 800-810-2369. Many suggest that you follow any phone call up with a certified letter, return receipt requested.
  If you don't yet have a smart meter and you sign up to opt out, you can keep the analog

electromechanical (non-digital) electric meter you have always had. If Edison has already installed a smart meter, once you notify them you want to opt out, you will be able to have them come and remove it and replace it with the type of meter you had before. In most cases this would have been an analog meter, which is ideally the best choice as far as we are concerned.

The previous meter may. however, have been what Edison refers to as an "ERT" meter (pronounced "ert"). This is an older generation digital (non-analog) elecric meter that does transmit radio frequencies, but only when an Edison meter reader comes by once per month and presses a button on his or her hand-held reader device. That sends a signal instructing the ERT meter on your house to transmit its readings of electricity use for the month in a burst of radio frequency that is read by the hand-held device. I have tested Edison ERT meters with my radio frequency detector and have not found there to be any radio transmissions, at least not when I was measuring.

Smart meters, on the other hand, transmit meter readings once per day at midnight and all day long in lower strength bursts to keep the mesh network synchronized. The ERT meter does neither and will only transmit data once per month when the meter reader comes by.

While it is a digital meter and therefore would have a switched mode power supply inside of it, I have not so far measured any voltage spikes with my oscilloscope from Edison Itron-brand smart meters or ERT meters similar to the voltage spikes reported from Landis Gyr and Itron smart meters in use by PG&E in Northern California. See my smart meter study.

Finally, I have heard a report from a client who opted out of Edison's smart meter program who was reportedly given a choice by the installer of either an ERT or an analog meter. He said he had both on his truck and said it did not matter to him which he placed on the house. She is not aware of what the former type of meter was, as the smart meter was already on the house when she moved in. It is encouraging that some installers reportedly let the customer decide which non-smart meter to install when a customer opts out. Even though the ERT meter only transmits RF once per month when the meter reader comes by and I have not so far been able to measure any voltage spikes of dirty power from the meters in use by Edison, it is still probably prudent to choose an analog meter, if given the choice.

To link to Southern California Edison's page on their opt out program and see their FAQ, including costs associated with opting out, click here

Remember, as Edison says in its FAQ about opting out, "To enroll you in the opt-out program, we need to hear from you…If you do not call us to enroll in the opt-out program, your home will receive an Edison SmartConnect meter." Therefore it is very important that you take the iniative to make the call.

- If you are a customer of Los Angeles Department of Water and Power (LADWP), you may have been contacted as one of 52,000 of their customers who will be receiving a smart meter this May as part of a pilot project. A neighborhood meeting was held May 8, 2013 by the Woodland Hills Neighborhood Council at which a representative from the utility spoke, along with Cindy Sage of Sage Consulting in Santa Barbara.

  Representing DWP was Marcelo Di Paolo, head of their Power System Information Technology Smart Grid and Electric Vehicle program.

  Also present was Victoria Cross, DWP's Government and Neighborhood Relations Liaison.

  The following is an account of what was presented by Mr. Di Paolo:

  LADWP is the recipient of a grant from the US Department of Energy to launch a pilot program to put smart meters onto 52,000 homes of DWP customers. Mr. Di Paolo stressed this is a voluntary program. He said DWP, Cal Tech, JPL and USC will study many aspects of smart meter usage (unfortunately, health effects were not mentioned as one of those parameters).

He also said that DWP does not have the budget at this time to plan a full city-wide roll out of a smart meter program, as has been the case with Southern California Edison and the municipal utilities in Burbank and Glendale, which have installed smart meters on the homes of virtually all of their customers (with the exception of those who have opted out — but see below regarding Burbank Water & Power's limited program).
Thus, if you have not already received a letter from DWP informing you that you are part of this demonstration pilot project, you are not likely to get a smart meter any time in the near future.
If, on the other hand, you are someone who has received a letter that your house has been chosen to be part of this pilot project and you do not want a smart meter, Marcelo Di Paolo specifically said that you will not be forced to have that smart meter. He said the program is voluntary. He gave his office telephone number, 213-367-1388, to call if you do not want a smart meter. His email is marcelo.dipaolo@ladwp.com. Also, Victoria Cross's phone number is 213-367-4141 and her email is victoria.cross@ladwp.com.
Please let me know if you have any difficulty with "opting out" of the DWP demonstration pilot smart meter project now that we have been given this latest information.

- Customers of Glendale Water and Power (GWP) who want to opt out will get a smart meter with the radio transmitter turned off. The Glendale City Council voted on March 6, 2012 to implement a one-time smart meter opt out program. GWP did charge a hefty fee to opt out, much higher than the monthly fee that the CPUC has mandated for PG&E, Edison and SDG&E, but effective August 2013, Glendale charges only $10 per bi-monthly bill to opt out.
  Call Glendate Water and Power customer service at 818-548-3300 to get on their opt out program (if it is still available).
- Customers of Burbank Water and Power (BWP) were offered an opt out of that city's smart meter program when the Burbank City Council voted on March 6, 2012 to implement a one-time smart meter opt out program. However, that program was only offered during a three-month window that ended in May of 2012. Apparently no resident has been allowed to opt out after that time. Furthermore, residents who were able to opt out during that time and who want to move within the city are not being allowed to take that opt out option with them to the new residence.
- San Diego Gas & Electric (SDG&E) now has its own opt-out program mandated by the CPUC. SDG&E customers can keep their analog meter or get one back if they now have a smart meter. Information on SDG&E's opt out program is provided by clicking here. You can call 800-357-8525 or fill out an online form by clicking here to get on SDG&E's opt out list. Remember, you have to contact SDG&E to get on the opt out list. Otherwise, they will put a smart meter on your house.
- Also, for a flyer for SDG&E ratepayers on smart meters from the San Diego-based organization, Center for Electrosmog Prevention (CEP), including how to opt out, click here.
- As you wait for your local utility to replace a smart meter with an analog one or live in an area of the country where this is still not possible, see the information below on shielding for ways to reduce your exposure, at least to the radio frequencies (RF).

Consensus Document on Smart Meters by Michael Schwaebe, PE, BBEC

We have developed a **consensus document on smart meters** drafted by a building biologist and professional engineer, Michael Schwaebe of San Diego, with help from other engineers who are also building biologists and from practicing building biologists, including Oram.

Michael prepared this document for a meeting he had with representatives of the California Public

Utilities Commission (CPUC) to outline the true health impact of smart electric meters on the electrically sensitive and the general public. Our intent in preparing this document was to collobarate with electric utilities to identify the problem and propose technical solutions to result in a win:win solution for all concerned.

To see Michael Schwaebe's "Wireless Smart Meter Networks Problem Statement and Solution," in Word format, click here.

To see a power point presentation of this same document in PDF format put together by engineer and building biologist Tom Wilson, click here.

Smart Meter Website Links

Here are **links to websites on Smart meters** that you will find informative and helpful in learning what you can do for yourself and in your community.

To see links to websites with information on how to **shield yourself from smart meters**, see further below.

Smart Meter Health Alert — Local Los Angeles initiative

The People's Initiative — Local Los Angeles initiative

Burbank ACTION — Local Burbank and Glendale, California initiative

Stop OC Smart Meters — Local Orange County (California) initiative
To read and contribute your comment to a Yahoo chat group on this topic that one of the members of Stop OC Smart Meters has set up, click here.

Stop Smart Meters Irvine — Local Irvine, California initiative

Center for Electrosmog Prevention (CEP) — A nonprofit based in San Diego, California
Smart Meter Dangers — A science-based website from the founders of the Center for Electrosmog Prevention (CEP)

Smart Meter Help — A joint project of EMF Safety Network and Stop Smart Meters. Encourages you to submit your smart meter complaint online to create a nationwide database to be submitted to utility companies, regulators and government officials.

Sage Reports — Cindy Sage's website with her report on "Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters." Her firm, Sage Consulting, was formerly based in Santa Barbara, California

EMF Safety Network — Sandra Maurer's initiative in Sebastopol (Northern), California

Stop Smart Meters — Joshua Hart's organization in Northern California
Sample Letter to Utility — From Stop Smart Meters. Use to try to opt out before a smart meter is installed and to keep your analaog meter

"Just Say No to Smart Meters" — Orlean Koehl's initiative in Northern California

Refuse Smart Meters — Based in Northern California

Environmental Options Network EMF Blog — An excellent resource

Center for Safer Wireless — Based in Virginia. The Center hosted the Wireless Safety Summit in October and will have audio and video of that conference available in December. Attendees met with their congressional delegations. As a result, “We have drafted a letter from Members of Congress to the US Surgeon General, Dr. Regina Benjamin, asking her to investigate and issue health advisories concerning the potential adverse health effects due to nonionizing electromagnetic radiation from wireless communications technologies.”

Smart Meter Safety Coalition — Based in Maine

Smart Meter Matrix — Based in Florida

Coalition to Stop Smart Meters — Based in British Columbia
Fact and Fiction PDF — From Coalition to Stop Smart Meters. Scroll down and click on “Fact and Fiction” to download a valuable primer on smart meters, which debunks many myths and incorrect statements put forth by electric utilities in support of this technology

Citizens for Safe Technology — Based in Canada

Smart Meter Shielding

If you already have a smart meter and are awaiting the opt out program or you live in a part of the country where an opt out program is not yet available, you can **shield yourself from your smart meter**, at least to some extent. It turns out that the diffusion pattern of the 900 MHz radio signal that communicates with neighboring smart meters on nearby houses as part of the neighborhood (mesh) area network (NAN) is 90% outwards from the smart meter and only 10% behind it back into the house. Rob States, however, says smart meters transmit most to the sides. We discuss shielding strategies below.

The other signal that the smart meter is capable of transmitting, the 2.4 GHz Zigbee transmitter, is designed to broadcast back into the house, but this has not been turned on yet by utilities until appliances are installed that have the transmitter to talk back to the smart meter as part of the home area network (HAN) and the homeowner has requested it. One utility, Glendale Water and Power Company, says it will only turn on the 2.4 GHz HAN transmitter when a customer signs up for the home area network option, designed to allow you to monitor electricity consumption by your appliances.

Regardless of the frequency, the strength of radio transmissions decreases exponentially with distance. I customarily measure up to a 90% reduction in signal strength of the radio transmission from a smart meter when I simply step back eight to ten feet from the meter outdoors. The readings that I get from the Itron smart meters used by electric utilities here in Southern California generally drops from 8,000-15,000 microWatts per square meter (uW/m2) at 2-3 feet to 300 uW/m2 or less at ten feet away.

Furthermore, the metal backing of the large metal box that the electric meter is mounted upon affords good shielding and effectively blocks most frequencies from coming indoors straight through the wall. Additionally, stucco siding found so commonly on California homes affords about 75% reduction of radio frequency transmissions that come indoors at an angle.

The net effect of a) having only a small portion of the major radio transmission aimed into the house,

b) the natural reduction in field strength of any radio signal with distance, and, c) the shielding effect of metal and stucco, all results in more than a 90% reduction in the signal strength that I measure indoors compared with the readings at the same distance from the smart meter outdoors, without any additional shielding. The reading at 1-2 feet inside the wall indoors is generally 300 or so microWatts per meter squared. When I move six to eight feet further inside from the exterior wall, my radio frequency meter drops closer to less harmful exposure levels of 30-40 uW/m2 (we consider readings below 10 microWatts per meter squared to be safe for sleeping areas for all people except the most electrically-sensitive).

If this is your bedroom, however, you don't want microbursts of radio waves with a field strength of a few hundred microWatts per meter squared pulsing into your sleeping area day and night every ten to fifteen seconds. Until you can opt out of the smart meter program altogether, you want to either sleep in another room or add additional shielding in order to further reduce your exposure to these radio frequencies. This would include the use of any of the fabrics or non-toxic carbon-based paints sold by the retailers linked to below. These may be necessary, depending upon your level of sensitivity, even if you can opt out because radio frequencies can still enter your bedroom from smart meters on neighbors' homes, particularly through the glass in windows.

A more affordable, though less aesthetically pleasing alternative, at least temporarily, to shielding fabrics and paint is to use several layers of aluminum foil or several sheets of a thermal blanket sold for $4 at any sporting goods store. Place these on the inside of the wall that the smart meter is mounted upon. It is best to ground these with an alligator clip patch cord to the earth. The "gator to plug" patch cord is sold by Less EMF.

The best way to shield a smart meter, however, that I have seen is to use a Smart Meter Guard, sold by an engineer in Northern California for $129. It is well worth the cost. Made with a fine mesh screen on the sides and front, it fits easily over your smart meter and is tightened down with a screwdriver. The mesh guard is grounded to the metal box that the smart meter is mounted upon, increasing its RF-shielding effectiveness.

When you order by phone, please mention my name, Oram Miller, as the person who referred you. When you order online, please put my name in the box labeled, "Special Instructions, Comments or Referrals." That sends a commission my way for making the referral. Much obliged.

The manufacturer has a YouTube video on his website showing how much attenuation (weakening or lessening) of the RF signal strength this shield is actually capable of achieving, which is impressive. It drops from an average of 54,000 microWatts/meter squared (uW/m2) down to below 60 uW/m2. Yet, they say the electric utility (Pacific Gas & Electric in Northern California in their case) can still get its information from the daily transmission that sends data from smart meter to smart meter, and they therefore won't require you to remove the shield. (This goes to show you that the RF signal from smart meters doesn't need to be nearly as strong as it is, nor do the beacon signals need to be anywhere as often as they are. Remember, in Burbank, California, the beacon signal is only two to three times *per hour*, rather than once every few seconds, as you see in this video from Northern California. The beacon signal is represented by the clicks you hear almost constantly kn the video from the GE brand smart meter used by PG&E, shown mounted upon the manufacturer's house.)

Also, since a smart meter is mounted upon a grounded metal box, even in those parts of the country where that box is small and does not also contain breakers (as it does in California and the Southwest), the grounded metal behind the smart meter blocks almost all of the RF from passing straight back into the house (also, most of the RF signal from a smart meter is designed to transmit out away from the house anyway, with less than 10% of the signal going straight back, even if there is no shielding). This is verified with an RF detector similar to the one that I use (GigaHertz

Solutions) as seen on one of the YouTube videos on the Smart Meter Guard website. For more information and to order a shield, go to www.smartmeterguard.com.

For windows, you can purchase a roll of aluminum window screen and place it over your window, or have a local hardware store replace the vinyl plastic window screen found on most windows today with true metal (aluminum or steel) mesh window screen. Even though we can see through it, to a radio wave, the metal mesh screen material looks like a solid wall and it is effectively blocked. More expensive transparent tinting material for windows is available from the retailers below.

As a reminder, you don't want to sleep with the head of your bed against the wall near the electric meter for a different reason. That is, the inevitable magnetic field exposure that all meters create within four feet in all directions.

Here are links to websites of companies that sell shielding material for radio freqeuncy transmissions:

Smart Meter Guard — A fine wire mesh that encircles the smart meter on sides and front, which is grounded to the metal box upon which the smart meter is mounted. Based in Northern California.

Less EMF — Information on how to shield your indoor living and work space from a smart meter, including what techniques and materials to use. Includes information about reflections, gaps and other pitfalls in shielding; 888-537-7363.

Safe Living Technologies — Retailer of shielding fabrics to protect against sources of RF. Headed by engineer and building biologist Rob Metzinger; 519-240-8735.

Smart Meter Shield — A full kit to cover your smart meter outside, including a shield for the inside of your wall. Protects you but still allows the utility to read the meter. Based in North San Diego County.

If you are sensitive to the **harmonic transient voltage spikes**, or "dirty electricity" caused by the switched mode power supply in some brands of smart meters (though not measured, so far, from smart meters in Southern California), here are suggested strategies to shield these high frequencies for those who are bothered by them and who cannot opt out with an analog meter.

These include:

- Live in homes with metal-clad wiring in walls
- Replace unshielded plastic AC power cords with shielded MU cord on lamps and other appliances, available from Less EMF — I can provide a protocol for a small appliance repair shop or an electrician who can do the rewiring
- Slide shielded grounded conductive tubing over those plastic cords, such as to a refrigerator, that cannot be replaced or unplugged — This conductive tubing, which must be grounded to a properly grounded outlet, is also available from Less EMF
- Use plug-in shut off switches, available at local hardware stores, to have these unshielded cords on for only a short time
- Simply unplug them

Once you have shielded the AC plastic cords that you plug into outlets for lamps and other devices within a few feet of you, you can also move yourself into the middle of the room in day and evening time. This is because agitating frequencies from voltage spikes riding on the electricity in your plastic circuits only leak six to eight feet into the room, and that harmful influence drops as you move away from the wall.

Likewise, at night, shut off the breakers to your bedroom circuit for the same reason, along with any other circuits that run within six to eight feet of your bed. A building biologist can help you determine what circuits to shut off. This will also provide you with a good night's sleep by reducing harmful electric fields, discussed in Articles on EMFs Parts Three and Four.

Be sure to install battery-operated smoke detectors if shutting off the breakers in and around your bedroom at night shuts off the smoke detectors. Also, there are automatic and remote shut-off switches that can be installed at the breaker panel by an electrician to shut off these circuits at night without you having to go down to the basement or out to the garage to the breaker panel. See Articles on EMFs Parts Three and Four.

These strategies should reduce much of the *electric* field component of the transient voltage spikes, which again, are in the kilohertz range, and some of the *magnetic* field component of these same spikes, particularly those above 1 MHz. This may help those who are suffering from smart meter-induced voltage spikes, at least to a partial extent.

Shielding is also possible using Finemet and Cobaltex fabric from Less EMF for those who need to create a safe room, such as a bedroom. This is particularly helpful in apartment buildings where you have high frequency transient voltage frequencies coming from circuits in walls.

If you are part of or know of an organization that maintains a website covering this important issue, please pass the link along to Oram at info@createhealthyhomes.com.