



# STAFF REPORT

## SAUSALITO CITY COUNCIL

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**AGENDA TITLE:** Discussion of PG&E Smart Meter Installation

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**RECOMMENDED MOTION:** Information Only.

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### SUMMARY

At the City Council meeting held on July 13<sup>th</sup> the City Council directed staff to agendize a discussion of PG&E's installation of "Smart Meters" in Sausalito.

### DISCUSSION

In 2006 the California Public Utilities Commission (CPUC) granted PG&E permission to install Smart Meters throughout California. The CPUC has stated that:

"Smart Meters represent an integral part of the state's "demand response" efforts. Demand response programs allow consumers and businesses to reduce the use of their electricity during times of high energy demand. Smart Meters enable the utility to provide customers with more detailed information about their energy usage at different times of day, which in turn enables those customers to manage their energy use more proactively. Smart Meters are only a small part of an overall package of information and technologies that can be used to help consumers manage their energy use and reduce their bills; other technologies such as programmable and/or communicating thermostats, can work in conjunction with Smart Meters to help consumers control their energy use more automatically." CPUC Press Release, March 30, 2010.

In 2009, responding to a large number of ratepayer complaints regarding billing accuracy the CPUC ordered that an independent investigation be conducted to evaluate the Smart Meters. In 2010 the CPUC selected The Structure Group to conduct the investigation which is still ongoing. Under the contract overseen by the CPUC The Structure Group has been directed to:

- Evaluate whether PG&E's Smart Meter system is measuring and billing electric usage accurately, both now and since meter deployment began.
- Conduct an independent analysis of the high bill customer complaints. This analysis will leverage industry accepted practices for estimating

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customer consumption, as well as account for changes in PG&E tariff rates. This will likely require interviewing a sample of customers whose usage patterns are not easily explained using conventional analyses such as comparing usage to weather data.

- Analyze PG&E's Smart Meter Program's past and current operational and deployment processes, policies, and procedures, against the framework of industry best practices.

The CPUC did not require PG&E to stop the deployment of the Smart Meters during the pendency of the investigation.

In June, 2010 the City and County of San Francisco filed a petition with the CPUC to immediately suspend the authorization of PG&E's installation of the Smart Meters until the CPUC's investigation is complete. (**Attachment No. 1**) The Town of Fairfax has joined in San Francisco's petition. The County of Marin has submitted a letter in support of the petition. (**Attachment No. 2**). The date for the CPUC's consideration and action on the petition is unknown.

## FISCAL IMPACT

None.

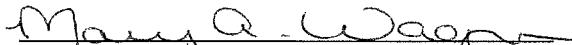
## STAFF RECOMMENDATIONS

Information only.


## ATTACHMENTS

1. City and County's Petition to the CPUC
2. County Letter

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BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA

Application of PACIFIC GAS AND  
ELECTRIC COMPANY (U-39-E) for  
Authority to Increase Revenue  
Requirements to Recover the Costs to  
Upgrade its SmartMeter™ Program

Application No. 07-12-009  
(Filed December 12, 2007)

**THE CITY AND COUNTY OF SAN FRANCISCO'S PETITION TO  
MODIFY DECISION 09-03-026 TO TEMPORARILY SUSPEND PACIFIC GAS  
AND ELECTRIC COMPANY'S INSTALLATION OF SMARTMETERS**

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June 17, 2010

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## I. INTRODUCTION

The City and County of San Francisco ("City") submits this petition to modify California Public Utilities Commission ("Commission") Decision ("D.") 09-03-026, in which the Commission granted the application of Pacific Gas and Electric Company ("PG&E") to upgrade its SmartMeter Program.<sup>1</sup> The City requests an immediate suspension of PG&E's further installation of SmartMeters until the Commission concludes its investigation into the significant problems created by PG&E's deployment of its SmartMeters.<sup>2</sup> In view of the problems already known to the Commission, it is unreasonable for PG&E to simply continue installing SmartMeters as if nothing is wrong.

PG&E has now installed nearly 5.8 million SmartMeters throughout its service territory and plans to install another 3.9 million.<sup>3</sup> This means a significant number of additional customers will be exposed unnecessarily to the same problems with SmartMeters that have already harmed many of PG&E's customers. As detailed below, there is substantial evidence that a disturbingly high number of the SmartMeters are unreliable. The Commission has received hundreds of complaints from PG&E customers concerning large increases in their electric bills following the installation of SmartMeters in their communities.

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<sup>1</sup> The City's proposed modifications to the Ordering Paragraphs in Decision 09-03-026 are set forth in the attached appendix to this petition, as required by Commission Rule of Practice and Procedure 16.4(b).

<sup>2</sup> Along with this petition, the City is filing a motion for expedited treatment of the petition. As the City explains in this petition, there is good cause for the Commission to take immediate action to temporarily suspend PG&E's deployment of its SmartMeters. See pp. 8-9, *infra*.

<sup>3</sup> PG&E's SmartMeter Program Data, p.1 (6/8/2010). These figures include 69,215 "second generation" SmartMeters that PG&E installed to replace "first generation" SmartMeters. *Id.* PG&E appears to be referring to the Kern County retrofit. See pp. 3-4, *infra*.

The Commission is concerned enough about those complaints to have started an independent investigation of PG&E's SmartMeters and required PG&E to make its progress reports public.<sup>4</sup> And even though PG&E treated the SmartMeter problems as simply a public relations issue,<sup>5</sup> its own statements and documents indicate that there have been numerous problems with the meters that could affect the accuracy of their readings.<sup>6</sup> A significant number of SmartMeters remain to be installed in various cities and communities in PG&E's service territory, including in San Francisco, Santa Cruz, and San Rafael where PG&E plans to start deployment in July.<sup>7</sup> Prudence dictates that these further installations be postponed until the questions regarding the accuracy of the SmartMeters have been fully resolved.

Ensuring the accuracy of electric bills is a fundamental responsibility of PG&E and the Commission under California law.<sup>8</sup> Receiving a timely and correct bill from PG&E is *the least* a customer is entitled to expect. Customers should not be in the position of wondering whether their bills are accurate or whether the equipment installed by PG&E is working properly. The Commission is required to ensure that utility customers pay just and reasonable charges for electric service.

Until the Commission concludes its investigation, and determines that the problems with PG&E's SmartMeters have been resolved, the Commission cannot vouchsafe that bills based on SmartMeter readings are just and reasonable. Under these circumstances, the Commission should suspend the installation of SmartMeters in order to proactively protect consumers. When the investigation is completed, the Commission will have the information it needs to determine how and when PG&E should continue installing SmartMeters.

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<sup>4</sup> See pp. 8-9, *infra*.

<sup>5</sup> See pp. 6-7, *infra*.

<sup>6</sup> See pp. 4-7, *infra*.

<sup>7</sup> PG&E SmartMeter Report, p. 18 (April 28, 2010).

<sup>8</sup> See pp. 9-12, *infra*.

## II. STATEMENT OF FACTS

### A. Overview of PG&E's SmartMeter Program

PG&E's program to replace its electric meters has been costly and plagued with problems from its inception. In D.06-07-027, the Commission authorized PG&E to recover in rates up to \$1.7 billion to install an Advanced Metering Infrastructure ("AMI") system. Some 18 months later, PG&E filed the application in this proceeding, its second AMI application, seeking to "upgrade" its AMI system by spending another \$572 million on its SmartMeter program.<sup>9</sup> In D.09-03-026, the Commission authorized PG&E to spend another \$467 million on SmartMeter deployment.<sup>10</sup> Despite the expenditure of increasing sums of ratepayer money, problems with SmartMeters continue.

### B. PG&E's Prior Deployment Problems with its AMI Program

In its initial AMI application, PG&E asked the Commission for authority to deploy electromechanical meters, even though other electric utilities in California and throughout the United States were deploying solid state meters for their AMI programs. Upon receiving Commission approval, PG&E began deploying electromechanical AMI meters in Kern County. However, less than two years later, PG&E was back before the Commission seeking to replace those same electromechanical meters that it had just installed.<sup>11</sup>

Under the guise of an "upgrade," PG&E asked the Commission to approve an expenditure of nearly \$38 million to "retrofit" 230,000 electromechanical AMI meters procured for its Kern County customers (123,000 of which PG&E had already

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<sup>9</sup> TURN, the Division of Ratepayer Advocates, and the City opposed PG&E's upgrade application in part because PG&E seemed to be using it to mask significant problems with PG&E's initial deployment of AMI.

<sup>10</sup> D.09-03-026, at p. 148.

<sup>11</sup> See D.09-03-026, at pp. 17-18.

installed).<sup>12</sup> The Commission rejected that request in part, but still authorized PG&E to spend nearly \$19 million to retrofit the electromechanical AMI meters in Kern County.<sup>13</sup>

While this second application was pending, PG&E abandoned the installation of electromechanical meters and began to install solid state meters, even though: (i) the Commission had not approved PG&E's expenditures of ratepayer funds for that purpose; and (ii) the meters did not have the Home Area Network ("HAN") functionality that PG&E was asking the Commission to approve in this application.<sup>14</sup>

Because the newly installed solid state meters did not include the HAN functionality PG&E was seeking to deploy, PG&E then asked the Commission to approve an additional \$32 million to retrofit the nearly 288,000 solid state SmartMeters installed in Kern County to add the missing HAN capability. The Commission approved that request in large part.<sup>15</sup> These bad decisions by PG&E increased the cost to all of PG&E's ratepayers.<sup>16</sup>

### **C. PG&E's Present Deployment Problems with its SmartMeter Program**

Since the Commission's authorization in D.09-03-026, PG&E's deployment of SmartMeters has fared no better. Among the problems that PG&E has admitted to are the following:

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<sup>12</sup> See D.09-03-026, at p. 48.

<sup>13</sup> D.09-03-026, at p. 54.

<sup>14</sup> See D.09-03-026, at pp. 39-40.

<sup>15</sup> See D.09-03-026, at pp. 39-48. The Commission reduced the amount of PG&E's request by \$5.5 million (plus a 10% risk allowance) because the Commission found that "the magnitude of the retrofit cost estimate (\$32,026,000 plus a 10% risk based allowance) has not been fully supported and justified." *Id.* at 48.

<sup>16</sup> The City urges the Commission to examine the prudence of PG&E's ever-increasing costs of its SmartMeter program in an appropriate proceeding.



- PG&E had to replace nearly 45,000 meters – 23,200 that were installed incorrectly, 12,376 that had data storage issues, and 9,000 that had wireless transmission problems.<sup>17</sup>
- PG&E admits that less than 100% of its SmartMeters are accurate.<sup>18</sup> This means that tens of thousands of PG&E customers are getting inaccurate bills.
- Approximately 4% (13,674) of the Aclara SmartMeters installed by PG&E are expected to have “poor read performance.”<sup>19</sup>
- Based on “issues related to Aclara electric meter performance” PG&E had to “contain” its deployment of Aclara meters at 145,000.<sup>20</sup>
- Deployment delays due to Silver Spring Networks’s inability to provide a consistent supply of SmartMeters.<sup>21</sup>
- “[P]roduction performance problems” with Silver Spring Networks SmartMeters related to “[a]bility to read” the meters.<sup>22</sup>
- PG&E skipped approximately 12,000 meter installations between March 31 and May 20, 2009 based on interference with ground field interrupters (“GFI”). In buildings where a GFI is placed next to a Silver Spring Networks meter panel, PG&E determined that the SmartMeters could trip the GFI.<sup>23</sup>
- Silver Spring Networks found a problem with a component that could cause its meters to stop working. PG&E placed a “hold” on installing 340,000 meters that could be affected by this problem. As of March 2010, only 50,000 meters were removed from “hold” status.<sup>24</sup>

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<sup>17</sup> Baker, *PG&E SmartMeters’ problems, and how to fix them*, San Francisco Chronicle (May 31, 2010). The latest information available on PG&E’s website shows that there presently are 19,307 (.11%) installed SmartMeters that are not correctly either storing or communicating billing information. (PG&E’s SmartMeter Program Data, p. 2 (6/8/2010).) There are 12,826 installed SmartMeters with outstanding “Data Storage Issues” and 6,481 outstanding “Non-Communicating Meters.” These figures include 4,850 electric meters (.17%) and 1,631 gas meters (.06%). *Id.*

<sup>18</sup> PG&E SmartMeter Report, p. 12 (March 31, 2010).

<sup>19</sup> PG&E SmartMeter Report, p. 9 (June 19, 2009).

<sup>20</sup> PG&E SmartMeter Report, p. 10 (May 29, 2009).

<sup>21</sup> PG&E SmartMeter Report, p. 4 (February 20, 2009); PG&E SmartMeter Report, p. 4 (March 18, 2009).

<sup>22</sup> PG&E SmartMeter Report, p. 9 (November 18, 2008).

<sup>23</sup> PG&E SmartMeter Report, p. 9 (May 29, 2009).

<sup>24</sup> PG&E SmartMeter Report, p. 5 (March 31, 2010).

- PG&E returned 117,000 meters to another of its device manufacturers after the manufacturer found that some of the meters weren't storing or sending data properly.<sup>25</sup>

#### **D. PG&E's Deployment Delays**

PG&E has installed nearly six million SmartMeters through the first quarter of 2010 and continues to install hundreds of thousands of SmartMeters each month.<sup>26</sup> Despite the large numbers of installations, PG&E's deployment is behind schedule. In addition to delinquent meter deliveries, PG&E admits that its actual deployment for 2010 is behind schedule for a host of reasons, including:

- "Potential endpoint deployment slowdown" due to a "meter capacity" problem at Silver Springs Networks.<sup>27</sup>
- "Increased resources and cost of activities related to litigation support, independent testing and CPUC responses."<sup>28</sup>
- "IT-enabled business capability implementations need to be aligned with vendor software and equipment delivery."<sup>29</sup>
- "Need to improve timeliness on resolution of operational data collection performance issues."<sup>30</sup>
- "Non-standard installations may impact deployment cost and schedule."<sup>31</sup>

#### **E. PG&E's Response to SmartMeter Deployment Problems**

After PG&E's customers first started questioning their bills from their SmartMeters, and the press started covering PG&E's deployment problems, PG&E's initial response was to blame the increased bills on "rate hikes, increased usage due to weather, changes in lifestyle, aging appliances that draw more power, house guests."<sup>32</sup>

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<sup>25</sup> Baker, *Reports Shed Light on PG&E's digital meters*, San Francisco Chronicle (May 11, 2010).

<sup>26</sup> PG&E SmartMeter Report, p. 7 (April 28, 2010).

<sup>27</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

<sup>28</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

<sup>29</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

<sup>30</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

<sup>31</sup> PG&E SmartMeter Report, p. 11 (March 31, 2010).

<sup>32</sup> Hull, *Complaints grow about PG&E SmartMeters*, San Jose Mercury News (November 16, 2009).

Those statements did nothing to either allay customer concerns or prevent additional negative coverage from the press.

Because PG&E denied that there were any problems with the SmartMeters, it approached these consumer concerns as a public relations problem. Late last year, PG&E established a “cross-departmental oversight committee made up of Officers and Senior Directors” to address the increasing “[n]egative SmartMeter press” and customer complaints.<sup>33</sup> Focusing on its treatment in the press, rather than addressing whether the complaints were grounded in fact, PG&E began to host a series of town meetings and train its “Answer Center” employees to “assist customers with inquiries related to their billing and SmartMeter technology.”<sup>34</sup> PG&E also began meeting with the press and using its website and the Internet to provide customer information:

Enhanced content on [www.pge.com/smartmeter](http://www.pge.com/smartmeter) to make information about the SmartMeter™ program more customer focused, more easily understood and more accessible. Proactive media outreach has been completed through several editorial board visits. . . . Created two new social media channels, on Twitter and Facebook, to share information with customers.<sup>35</sup>

By February 2010, having approved a “Customer Outreach plan,” PG&E treated the issue of the increased complaints as “closed.”<sup>36</sup> This response was entirely inadequate given the serious nature of the complaints. While it is important to have well-informed customer service representatives to assist customers who contact the utility, it is not a substitute for correcting the serious flaws of the actual SmartMeter devices and installation program. This is simply one more reason why Commission action is warranted at this time.

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<sup>33</sup> PG&E SmartMeter Report, p. 10 (October 14, 2009).

<sup>34</sup> PG&E SmartMeter Report, p. 10 (October 14, 2009).

<sup>35</sup> PG&E SmartMeter Report, p. 10 (December 18, 2009).

<sup>36</sup> PG&E SmartMeter Report, p. 10 (February 23, 2010).

**III. THE COMMISSION SHOULD MODIFY DECISION 09-03-026 BY TEMPORARILY SUSPENDING PG&E'S SMARTMETER DEPLOYMENT.**

**A. There is Good Cause for the Commission to Modify Decision 09-03-026**

The Commission and PG&E have received thousands of complaints from PG&E customers concerning large increases in their electric bills following the installation of SmartMeters in their communities. Local media in many in cities and counties where PG&E has deployed its SmartMeters have reported numerous instances in which customer bills have skyrocketed after a SmartMeter was installed.<sup>37</sup>

To its credit, the Commission has not just stood still in the face of these complaints. The Commission has taken two important steps. First, the Commission hired a consultant to conduct an evaluation of PG&E's SmartMeter program.<sup>38</sup> By doing so, the Commission will be able to make a reasoned decision concerning the cause of the deployment problems and to determine whether further Commission action is necessary. Second, the Commission required PG&E to release to the public its reports to the Commission about the SmartMeter program.<sup>39</sup> This action by the Commission has already done exactly what the Commission intended – provided information that verifies anecdotal evidence of meter problems.

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<sup>37</sup> See <http://abclocal.go.com/kfsn/story?section=news/local&id=7069123> (San Francisco) (Feb. 26, 2010);

<http://abclocal.go.com/kfsn/story?section=news/local&id=7069123> (Fresno) (Oct. 17, 2009);

[http://www.mercurynews.com/ci\\_13801866?source=pkg&nclick\\_check=1](http://www.mercurynews.com/ci_13801866?source=pkg&nclick_check=1) (San Jose) (Nov. 16, 2009);

<http://www.kget.com/mostpopular/story/PG-E-customers-in-Bay-Area-voice-similar/kCPCR7ffwki609ty-9Nupg.csp> (Kern County, CA) (Nov. 18, 2009)

[http://www.losaltosonline.com/index.php?option=com\\_content&task=view&id=20453&Itemid=46](http://www.losaltosonline.com/index.php?option=com_content&task=view&id=20453&Itemid=46) (Los Altos) (Feb. 2, 2010).

<sup>38</sup> Application 00-12-020, *Assigned Commissioner's Ruling Regarding Consultant Costs Related to Commission's Evaluation of PG&E's SmartMeter Program* (February 2, 2010).

<sup>39</sup> Application 06-06-028, *Assigned Commissioner's Ruling Reopening Proceeding, Requiring that Reports be Filed in this Proceeding, and Order Pacific Gas and Electric Company to Release Prior Reports and Future Reports to the Public* (May 4, 2010).

The Commission now must take the next step necessary to protect PG&E's customers. PG&E's SmartMeter deployment will continue unabated unless the Commission takes action, and problems associated with SmartMeters will continue. Additional PG&E customers in San Francisco and other counties should not be forced to bear the risk of excessive bills that has followed PG&E in every county where it has deployed SmartMeters. Given that PG&E still intends to install nearly 4 million SmartMeters, the Commission has the opportunity to proactively protect consumer interests. The Commission can then determine a permanent course of action once the investigation is complete.

**B. A Temporary Suspension Is Consistent with the Commission's Authority and Obligation under the Public Utilities Code and Commission Precedent**

There is ample authority under the Public Utilities Code for the Commission to grant the City's petition to modify and impose a temporary suspension. Public Utilities Code § 451 provides that "[a]ll charges demanded or received by any public utility . . . for any product or commodity furnished . . . shall be just and reasonable." Section 451 further states that "[e]very unjust or unreasonable charge demanded or received for such product or commodity or service is unlawful."

Given the admitted problems with SmartMeters that call into question the accuracy of significant numbers of bills, neither PG&E nor the Commission can now affirm that all charges demanded by PG&E based on SmartMeter readings are accurate and reasonable. By definition, a bill that charges a customer for too much electricity based on a defective meter reading is unjust and unreasonable and therefore unlawful under § 451.

Moreover, § 451 requires the Commission to ensure that "every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment and facilities ... as necessary to promote the safety, health,

comfort, and convenience of its patrons.” Unfortunately, the unresolved problems with SmartMeters render them inadequate and unreasonable for their intended task – providing reliable readings of electricity usage. These questions about SmartMeters pose a tremendous inconvenience to customers who must wonder whether their bills are accurate and who have no reliable way to answer that question. Section 451 requires that the Commission ensure that customers are not put to such anxiety and inconvenience based on faulty utility equipment.

Since the Commission issued D.09-03-026, there has been increasing public dissatisfaction regarding PG&E’s use of SmartMeters. State lawmakers have held hearings on SmartMeters,<sup>40</sup> consumers have voiced concern and distrust regarding abnormally high bills, and TURN and various public entities have urged the Commission to impose a moratorium on future installations.<sup>41</sup> Senator Dean Florez has called upon the Commission to impose a moratorium,<sup>42</sup> and the San Francisco Board of Supervisors recently passed a resolution supporting a moratorium on new installations.<sup>43</sup>

By instituting its own investigation, the Commission already has acknowledged the necessity of a close examination of whether PG&E has complied with its requirement to supply adequate, efficient, just, and reasonable equipment to its customers. Consistent with this statutory mandate, and in light of the Commission’s pending investigation, the Commission should issue a temporary suspension of SmartMeter deployment.

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<sup>40</sup> See <http://abcnews.go.com/Business/wireStory?id=10481874>.

<sup>41</sup> The City is aware that the City of Fairfax, City of Cotati, and the Camp Meeker Recreation and Parks District have sent the Commission letters requesting a moratorium.

<sup>42</sup> See <http://www.bakersfield.com/news/business/economy/x173373797/PG-E-reports-discuss-SmartMeter-problems>.

<sup>43</sup> Resolution 247-10, Resolution Supporting Outreach and Education Regarding Smart Meters to Prevent Power Service Disconnections. Available at <http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/resolutions10/r0247-10.pdf>.

Additionally, under Public Utilities Code § 1708, the Commission may “rescind, alter, or amend any order or decision made by it.”<sup>44</sup> As the Commission has recognized, it is appropriate to stay a decision that results in confusion or uncertainty, pending Commission resolution of those issues.<sup>45</sup>

Recently, the Commission relied on this rationale to issue a stay *on the Commission’s own motion* of its decision authorizing the use of tradable renewable energy credits for compliance with the renewables portfolio standard program.<sup>46</sup> One of the Commission’s justifications for that stay was to reduce uncertainty while Commission reconsideration of the decision was pending.<sup>47</sup>

Likewise, here it is appropriate to temporarily stay the further deployment of SmartMeters to reduce uncertainty, given PG&E’s difficulties in rolling out the SmartMeters, public dissatisfaction, the Commission’s own investigation, and the risk of harm to the public. It would be hard to identify instances of greater customer confusion and uncertainty than that caused by the installation of SmartMeters. It is also clear that this unfortunate situation will continue until the Commission’s investigation is completed. Whether through defective meters, installation, or otherwise, no additional customers should be subjected to the risks and confusion created by SmartMeter installation.

Where, as here, there is an admission that some SmartMeters are defective, and there is a pending Commission investigation, individual customers should not bear the burden of first determining whether or not the bills are disproportionate, and then proving

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<sup>44</sup> Public Utilities Code § 1708.

<sup>45</sup> See D.04-04-018, *In the Matter of the Application of Southern California Water Company (U 133-W), for an Order Authorizing it to Increase Rates for Water Service*, 2004 Cal. PUC LEXIS 113 (April 1, 2004).

<sup>46</sup> D.10-05-018, *Order Instituting Rulemaking to Develop Additional Methods to Implement the California Renewables Portfolio Standard Program* (May 6, 2010) (staying D.10-03-021).

<sup>47</sup> *Id.* at 5.

that fact to PG&E. The Commission can reduce the complexity and number of likely complaints by issuing the temporary suspension pending the outcome of the investigation.<sup>48</sup>

Finally, under State law the Commission “may supervise and regulate every public utility in the State and may do all things, whether specifically designated in this part or in addition thereto, which are necessary and convenient in the exercise of such power and jurisdiction.”<sup>49</sup> This provides the Commission with ample authority to temporarily suspend PG&E’s SmartMeter deployment.

**C. A Temporary Suspension Will Not Have a Negative Impact on PG&E’s Realization of Demand Response and Energy Conservation Benefits**

The Commission approved PG&E’s SmartMeter application in part because PG&E claimed that the additional \$749 million in costs (PVRR<sup>50</sup>) were justified by benefits of more than \$615 million (PVRR) in energy demand response and energy conservation benefits from the SmartMeter upgrade.<sup>51</sup> There is no evidence, however, that the temporary suspension requested herein will impact PG&E’s realization of these benefits.

PG&E has already forecasted that its 2007-2010 energy conservation benefits will not meet the “commitments” it made to the Commission.<sup>52</sup> The inevitability of this shortfall is evident in PG&E’s May 27, 2010 compliance filing with the

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<sup>48</sup> In fact, there is a pending class action lawsuit concerning SmartMeters. See *Flores v. PG&E* (S-1500-CV268647) filed in Kern County Superior Court. The case was stayed on February 19, 2010. A case management conference scheduled for April 23, 2010 was continued to August 27, 2010, pending release of The Structure Group’s report.

<sup>49</sup> Public Utilities Code § 701.

<sup>50</sup> PVRR means “present value revenue requirement.”

<sup>51</sup> See D.09-03-026, pp. 148-50.

<sup>52</sup> PG&E SmartMeter Report, p. 10 (March 18, 2009).



Commission in this proceeding.<sup>53</sup> In that filing, PG&E informed the Commission that its demand response benefits from the 6 million installed SmartMeters are virtually nil:

- Programmable Communicating Thermostat Benefits – 0 customers; 0 benefits
- Peak Time Rebate Benefits – 0 customers; 0 benefits
- Time of Use Benefits - 0 customers; 0 benefits
- SmartRate/Peak Day Pricing Benefits - 25,500 customers; \$664,000 in benefits.<sup>54</sup>

PG&E also informed the Commission that it had yet to accrue any energy conservation benefits:

- Web presentment of Interval Data – 0 customers; 0 benefits
- Home Area Network – 0 customers; 0 benefits
- Tier Notification Program – 0 customers; 0 benefits.<sup>55</sup>

Furthermore, in its monthly reports to the Commission PG&E has identified a number of problems that will likely further delay realization of energy conservation/demand response benefits. These problems include:

- “Delivered SmartMeter products do not meet PG&E quality standards.”<sup>56</sup>
- “Need to improve timeliness on resolution of operational data collection performance issues.”<sup>57</sup>
- “IT Systems may not be able to handle projected volumes.”<sup>58</sup>
- “IT-enabled business capability implementations need to be aligned with vendor software and equipment delivery.”<sup>59</sup>

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<sup>53</sup> Compliance Filing of Pacific Gas and Electric Company Pursuant to Decision 09-03-026 (May 27, 2010).

<sup>54</sup> *Id.* at p. 16.

<sup>55</sup> *Id.* at p. 17.

<sup>56</sup> PG&E SmartMeter Report, p. 10 (January 27, 2009).

<sup>57</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

<sup>58</sup> PG&E SmartMeter Report, p. 11 (March 31, 2010).

<sup>59</sup> PG&E SmartMeter Report, p. 10 (March 31, 2010).

In the absence of any benefits being accrued, the Commission's temporary suspension of PG&E's SmartMeter deployment will not prejudice PG&E from recouping those same benefits. Put differently, PG&E cannot be prejudiced by a delay in accruing nonexistent benefits.

**D. Any Prejudice to PG&E from a Temporary Suspension Is Outweighed by the Need to Ensure that PG&E's SmartMeters Are Functioning Properly**

PG&E will not be prejudiced by the moratorium. As demonstrated above, significant delays and cost increases have been hallmarks of the SmartMeter program since its inception. Moreover, any delays or costs caused by a temporary suspension are outweighed by the benefits of a thorough investigation into the problems of SmartMeters. The Commission should not expose more customers to faulty SmartMeters out of a desire to avoid delays in the deployment schedule. As noted above, there have been many delays in this program already and nothing is to be gained from installing more faulty meters that must be replaced later.<sup>60</sup>

More importantly, any delay is justified by the need for accuracy. The Commission has already begun an investigation into PG&E's deployment of its SmartMeter system. The Commission's outside consultant, The Structure Group, is now collecting and examining data to determine whether the SmartMeter system is measuring, collecting, and billing electric usage accurately. The Commission expects The Structure Group to provide its evaluation to the Commission by the end of this summer. For this reason, the Commission's temporary suspension will not be open ended and may not last more than a few months.

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<sup>60</sup> See pp. 3-7, *supra*.

### E. The City's Petition for Modification Is Timely

A petition to modify is the proper vehicle for a party to ask the Commission to make changes to a decision.<sup>61</sup> Generally, a petition to modify must be brought within one year of the effective date of the decision proposed to be modified.<sup>62</sup> If a party seeks to modify a decision more than one year after the effective date of the decision proposed to be modified the party "must explain why the petition could not have been presented within one year of the effective date of the decision."<sup>63</sup>

Decision 09-03-026 was issued on March 12, 2009. The City could not have filed this petition within one year of that decision because the evidence supporting the City's petition only became available to the public recently. While there have been claims of unfairly increased bills following the installation of SmartMeters for some time, these anecdotal accounts were only recently substantiated by PG&E's own reports. Furthermore, despite these complaints, PG&E continued to insist that the SmartMeters were functioning properly and the increased bills were due to rate increases. The City had no evidence to show that PG&E's assertions were untrue.

The reports made available to the public by PG&E on May 10, 2010, provide a strong basis for the Commission to take action. Now that PG&E has admitted that there have been numerous problems with its deployment of SmartMeters,<sup>64</sup> there is good cause for the Commission to modify D.09-03-026 by temporarily suspending future installations pending the completion of the Commission's investigation.

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<sup>61</sup> Commission Rule of Practice and Procedure 16.4(a); D.09-03-037, *In the Matter of the Application of Southern California Edison Company (U 338-E) for Authority to Lease Available Land*, 2009 Cal. PUC LEXIS 176, p. \*4 (March 27, 2009).

<sup>62</sup> Commission Rule of Practice and Procedure 16.4(e).

<sup>63</sup> Commission Rule of Practice and Procedure 16.4(e).

<sup>64</sup> See generally Baker, *Reports Shed Light on PG&E's digital meters*, San Francisco Chronicle (May 11, 2010); see also pp. 3-7, *supra*.

**IV. CONCLUSION**

For the reasons stated above, the Commission should grant the City's petition to modify Decision 09-03-26 by temporarily suspending PG&E's deployment of its SmartMeters.

Dated: June 17, 2010

DENNIS J. HERRERA  
City Attorney  
THERESA L. MUELLER  
Chief Energy and Telecommunications Deputy  
WILLIAM K. SANDERS  
AUSTIN YANG  
Deputy City Attorneys

By: \_\_\_\_\_ /S/ \_\_\_\_\_  
WILLIAM K. SANDERS

Attorneys for Petitioner  
CITY AND COUNTY OF SAN FRANCISCO  
City Hall Room 234  
1 Dr. Carlton B. Goodlett Place  
San Francisco, California 94102-4682  
Telephone:(415) 554-6771  
Facsimile: (415) 554-4757  
E-Mail: william.sanders@sfgov.org

**APPENDIX**

**PROPOSED MODIFICATIONS TO ORDERING PARAGRAPHS  
IN DECISION 09-030-026**

The City and County of San Francisco proposes that the following language be added to Ordering Paragraph 1 of Decision 09-03-026:

1. Pacific Gas and Electric Company (PG&E) is authorized to proceed with the proposed SmartMeter Upgrade, subject to the conditions and costs specified in this decision. Notwithstanding the foregoing, as of June , 2010, the Commission temporarily suspends PG&E's deployment of endpoints for its SmartMeter Program. This suspension shall remain in effect until further order of the Commission upon motion of PG&E. PG&E may file a motion to end the suspension no sooner than 15 days after the Commission has received a report from its independent evaluator The Structure Group.

**CERTIFICATE OF SERVICE**

I, **PAULA FERNANDEZ**, declare that:

I am employed in the City and County of San Francisco, State of California. I am over the age of eighteen years and not a party to the within action. My business address is City Attorney's Office, City Hall, Room 234, 1 Dr. Carlton B. Goodlett Place, San Francisco, CA 94102; telephone (415) 554-4623.

On June 17, 2010, I served **THE CITY AND COUNTY OF SAN FRANCISCO'S PETITION TO MODIFY DECISION 09-03-026 TO TEMPORARILY SUSPEND PACIFIC GAS AND ELECTRIC COMPANY'S INSTALLATION OF SMARTMETERS** by electronic mail on the CPUC Service List, Proceeding No. A0712009.

The following addressee(s) without an email address were served:

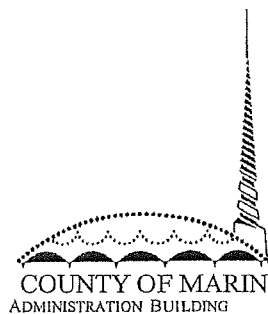
- BY UNITED STATES MAIL:** Following ordinary business practices, I sealed true and correct copies of the above documents in addressed envelope(s) and placed them at my workplace for collection and mailing with the United States Postal Service. I am readily familiar with the practices of the San Francisco City Attorney's Office for collecting and processing mail. In the ordinary course of business, the sealed envelope(s) that I placed for collection would be deposited, postage prepaid, with the United States Postal Service that same day.

Larry Nixon  
Pacific Gas and Electric Company  
77 Beale Street, MC B10A  
San Francisco, CA 94105

I declare under penalty of perjury that the foregoing is true and correct and that this declaration was executed on June 17, 2010, at San Francisco, California.

\_\_\_\_\_  
/s/  
**PAULA FERNANDEZ**

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THE BOARD OF SUPERVISORS OF MARIN

3501 CIVIC CENTER DR. SUITE 329
SAN RAFAEL, CALIFORNIA 94903-4193
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TTY (415) 499-6172
www.co.marin.ca.us/bos

July 20, 2010

Michael R. Peevey, President
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94012

Subject: PG&E Smart Meter Deployment in Marin County

Dear Mr. Peevey:

It has come to our attention that PG&E has recently begun installation of its Smart Meter wireless grid infrastructure in Marin. As of this date, per PG&E's website, approximately 3% of Marin's system has been installed. Complete system installation for the County of Marin is anticipated by spring of 2011.

It is our understanding that PG&E began significant deployment of Smart Meters in summer 2009, and soon after began receiving complaints from customers regarding billing accuracy and device malfunction concerns. In response, in October 2009, your commission ordered an independent evaluation/investigation to evaluate Smart Meters and PG&E's deployment of them. That investigation, being carried out by the Structure Group, is currently ongoing and expected to be completed later this year. The CPUC did not require suspension of deployment during the current investigation.

Given the unusually high rate of reported device failures, the cost of installation (\$2.2 billion), the concern and uncertainty expressed by the public regarding Smart Meter operational accuracy and the wireless technology employed by the system, it seems not only fiscally prudent, but appropriately protective of the public trust, to suspend installation of the Smart Meter system until your independent investigation is complete, and remedies implemented, if warranted.

VICE PRESIDENT

2ND VICE PRESIDENT

PRESIDENT

CLERK

SUSAN L. ADAMS
SAN RAFAEL
1ST DISTRICT

HAROLD C. BROWN
SAN ANSELMO
2ND DISTRICT

CHARLES MCGLASHAN
MILL VALLEY
3RD DISTRICT

STEVE KINSEY
SAN GERONIMO
4TH DISTRICT

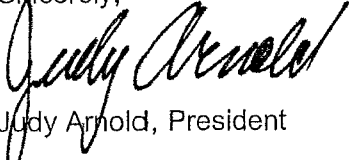
JUDY ARNOLD
NOVATO
5TH DISTRICT

MATTHEW H. HYMEL

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03

As such, we respectfully request that you immediately suspend deployment of the Smart Meter system in unincorporated County of Marin and throughout the PG&E service territory until the CPUC ordered independent investigation is complete, all elements of the system have been deemed to be working properly and it has been determined that the system is fair and accurate, and shown to the CPUC to protect the health and safety of energy users in the communities in which it is being installed.

Sincerely,



Judy Arnold, President

- c: Commissioner John A Bohn
- Commissioner Dian M. Grueneich
- Commissioner Timothy Alan Simon
- Commissioner Nancy E. Ryan
- Assemblyman Member Jared Huffman
- State Senator Mark Leno

---

VICE PRESIDENT

SUSAN L. ADAMS  
SAN RAFAEL  
1ST DISTRICT

HAROLD C. BROWN  
SAN ANSELMO  
2ND DISTRICT

CHARLES MCGLASHAN  
MILL VALLEY  
3RD DISTRICT

2ND VICE PRESIDENT

STEVE KINSEY  
SAN GERONIMO  
4TH DISTRICT

PRESIDENT

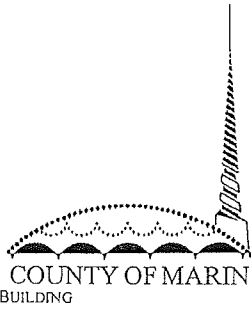
JUDY ARNOLD  
NOVATO  
5TH DISTRICT

CLERK

MATTHEW H. HYMEL

1B  
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# THE BOARD OF SUPERVISORS OF MARIN

## ADMINISTRATION

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July 20, 2010

David Chiu, President  
San Francisco Board of Supervisors  
1 Dr. Carlton B. Goodlett Place  
City Hall, Room 244  
San Francisco, CA 94102-4689

Dear President Chiu,

Please accept this letter supporting your Board's recent action to petition the California Public Utilities Commission to immediately suspend its authorization for PG&E to continue installing equipment and devices related to the Smart Meter system until the current, CPUC independent investigation of PG&E's Smart Meter deployment is completed.

Given the unusually high rate of reported device failures, the cost of installation (\$2.2 billion), the concern and uncertainty expressed by the public regarding Smart Meter operational accuracy and the wireless technology employed by the system, it seems not only fiscally prudent, but appropriately protective of the public trust, to suspend installation of the Smart Meter system until the independent investigation is complete, and remedies implemented, if warranted.

Our Board is also sending a formal letter of request to the CPUC asking for a temporary suspension of PG&E's deployment of Smart Meters until the CPUC investigation is complete.

Sincerely,

Judy Arnold, President

cc: San Francisco City Attorney Dennis Herrera  
Michael Peevy, President CPUC  
Commissioner John A Bohn  
Commissioner Dian M. Grueneich  
Commissioner Timothy Alan Simon  
Commissioner Nancy E. Ryan  
Assemblyman Member Jared Huffman  
State Senator Mark Leno

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VICE PRESIDENT		2ND VICE PRESIDENT		PRESIDENT		CLERK
SUSAN L. ADAMS SAN RAFAEL 1ST DISTRICT	HAROLD C. BROWN SAN ANSELMO 2ND DISTRICT	CHARLES MCGLASHAN MILL VALLEY 3RD DISTRICT	STEVE KINSEY SAN GBRONIMO 4TH DISTRICT	JUDY ARNOLD NOVATO 5TH DISTRICT		MATTHEW H. HYMEL

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July 15, 2010

Mr. Adam Politzer, City Manager  
City of Sausalito  
420 Litho Street  
Sausalito, CA 94965

RECEIVED

JUL 19 2010

CITY OF SAUSALITO

Dear Mr. Politzer:

I am writing to let you know that on July 14 the Board of Directors of the Marin Association of REALTORS® passed a motion calling for an immediate moratorium on the installation of Smart Meters by Pacific Gas & Electric Company. We have sent our request to the California Public Utilities Commission for their consideration.

Citing concerns about the impact that continued installation of Smart Meters may have on the quality of life in Marin, our Board of Directors believes it is wise and prudent to suspend additional installations until public concerns are fully addressed and issues surrounding the installations are completely resolved.

Among the concerns voiced by our members and the public that prompted our call for a moratorium are allegations that the Smart Meters result in over charging of rate payers; questions about the potential health effects of the radio waves that transmit data; and objections by residents who say they are forced to accept the meters over their own objections.

While both sides of the issue have raised important points about the pros and cons of the devices, our leadership team believes it is better to speak up now to help ensure our concerns and voices will be taken into consideration as debate over the Smart Meters continues in Marin.

Although some have urged that we come out against the installation of the meters altogether, we believe a moratorium is a more moderate approach. During this time-out, the public will have an added opportunity to carefully consider the controversial nature, unanswered questions and series of allegations that opponents to the Smart Meter have raised.

We will continue to do our homework on this important topic. This includes scheduling a special meeting of our governmental affairs committee to hear representatives from both sides of this controversial issue and providing briefing materials to committee and Board members.

Sincerely,

Bill McKeon  
President

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## Summary Discussion of RF Fields and the PG&E SmartMeter™ System (2005 Report and 2008 Supplemental Report)

Richard A. Tell  
Richard Tell Associates, Inc.  
1872 E. Hawthorne Avenue  
Colville, WA 99114

PGE's SmartMeter™ technology makes use of low-power radiofrequency (RF) transmitters to connect with customers and obtain their meter reads. These low power transmitters are found inside each power meter, in repeater units, and in access points that are typically located well above ground level at various locations within a neighborhood, usually high up on a power pole, street light, or other electrical tower. Access points allow for communication between PG&E and the many SmartMeter™ devices within a neighborhood.

A study of the RF produced by the transmitting components of this system demonstrates that they are in full compliance with Federal Communications Commission regulations by a very wide margin.<sup>1</sup> For example, immediately adjacent to a power meter, the RF field power density is less than 10 microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ), which is miniscule compared to the FCC limit of  $601 \mu\text{W}/\text{cm}^2$  for the 902-928 MHz band. Typical ground-level exposure to access points mounted 25 feet above ground is even lower – more than 15,000 times less than the limits that the FCC applies for such devices. The absolute greatest power density found in the analysis is approximately  $24 \mu\text{W}/\text{cm}^2$ , which would occur in the rare situation that a person is able to enter an area immediately adjacent to repeater units or an access point antenna. Even in this rare case, the level of exposure is many times lower than the FCC's allowable limits.

In comparison to the RF fields that many workaday devices produce in the everyday environment – for example, cellular telephones, microwave ovens, and wireless Internet services – SmartMeter™ devices generally produce far weaker RF. In all cases, even those of access points and/or repeater units, SmartMeter™ related RF is a tiny fraction of what regulatory rules and various international recommendations permit. A comparison of the expected RF densities near SmartMeter™ components and other non-SmartMeter™ items is provided in Table 1 below. Figure 1 illustrates how the RF field varies by proximity to PG&E's SmartMeter™ components.

Based on this analysis, PG&E's proposed SmartMeter™ technology, complies with all existing standards and regulations for RF-exposure.

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<sup>1</sup> PG&E's SmartMeter™ system operates in a frequency band of such low operating power and frequencies that the FCC does not require a license or subject the program to FCC rules on allowable limits. Nevertheless, the study applies the FCC limits, as they represent the most conservative values that any U.S. government agency applies.

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**TABLE 1**

<b>Examples of RF Fields Commonly Found in the Everyday Environment in Relation to SmartMeter™ System Operation</b>	
<b>RF Source</b>	<b>Power Density (μW/cm<sup>2</sup>)</b>
Immediately adjacent to a SmartMeter™ device (1 foot)	8.8
Immediately adjacent (1 foot) to a SmartMeter™ access point if elevated to height of transmitter	24
Adjacent to 25 foot high SmartMeter™ access point at ground level	0.03
Installed microwave oven- FDA allowable at 5 cm from door [FDA, 2009]	5,000
Typical RF field in kitchen with operating microwave oven [1 meter] [Mantiplly, et al. (1997)]	10
Cell phones (at head) [Mantiplly, et al. (1997)]	30 – 10,000
Cell phone base stations at ground level (maximum) [WHO (2006)]	1-12
Walkie-Talkies (at head) [Mantiplly, et al. (1997)]	500 – 42,000
Wi-Fi wireless routers, laptop computers, cyber cafes, etc., maximum (~1 meter for laptops, 2-5 meters for access points) [Foster (2007)]	10-20
Median exposure to FM radio and TV broadcast station signals [Tell and Mantiplly (1980)]	0.005

\* \* \* \* \*

**FIGURE 1**

**Maximum Power Density vs. Distance for SmartMeter Components**

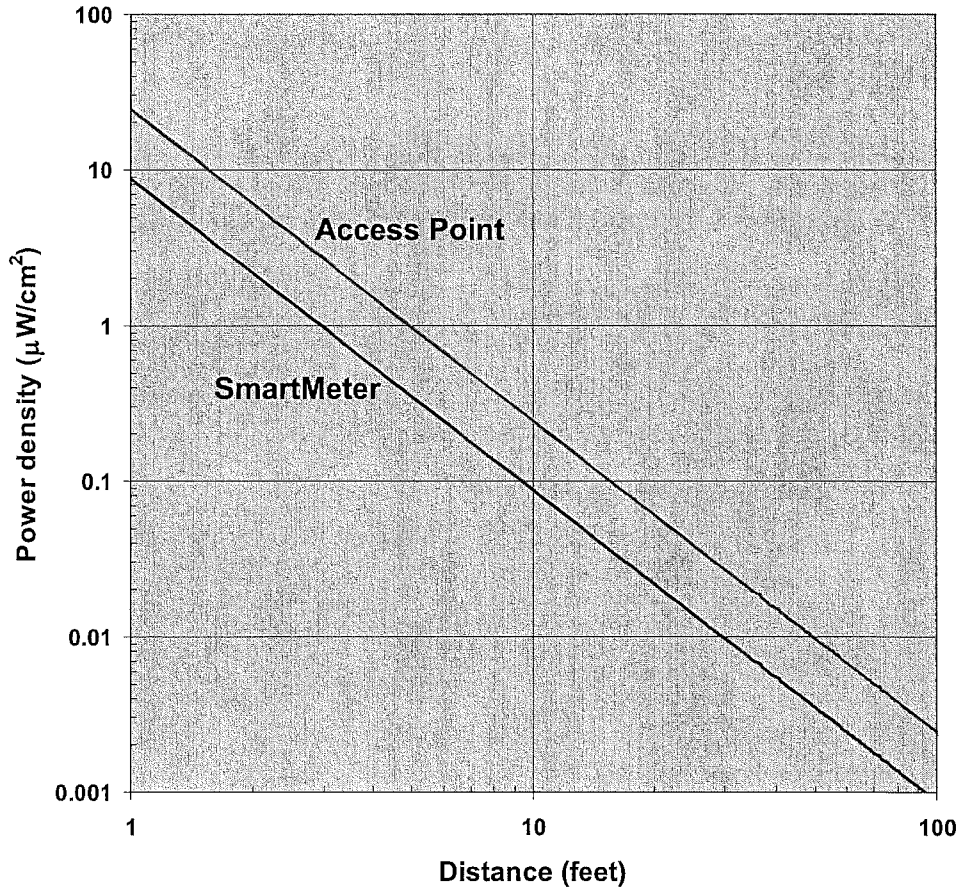


Figure 1. Maximum time-averaged power density associated with different components of the SmartMeter™ system including the SmartMeter™ device itself and access points that are used to communicate with the SmartMeter™ devices within a neighborhood. Repeater units may be installed in some areas and these units have the potential for producing RF fields similar to that of access points. For comparison, U.S. limits for radiofrequency (RF) exposure of the general public are set at 601 microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ) for RF emissions in the frequency band used by the SmartMeter™ devices and access points.

\* \* \* \* \*

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**REFERENCES**

FDA (2009). Code of Federal Regulations, Title 21, Volume 8, Revised April 1, 2009. Performance standards for microwave and radio frequency emitting products. U. S. Food and Drug Administration.

Foster, K. R. (2007). Radiofrequency Exposure from Wireless LANS Utilizing Wi-Fi Technology. *Health Physics*, Vol. 92, No. 3, pp. 280-289.

Mantiply, E. D., K. R. Pohl, S. W. Poppell, J. A. Murphy (1997): Summary of Measured Radiofrequency Electric and Magnetic Fields (10 kHz to 30 GHz) in the General and Work Environment. *Bioelectromagnetics* 18:563-577.

Tell, R. A. and E. D. Mantiply (1980). Population Exposure to VHF and UHF Broadcast Radiation in the United States, *Proceedings of the IEEE*, Vol. 68, No. 1, pp.6-12, 1980.

WHO (2006). Electromagnetic fields and public health, base stations and wireless technologies. World Health Organization Fact Sheet No. 304, May.

\* \* \* \* \*





# PG&E SmartMeter

## The Plain Facts About Electric System Radio Signals

### An Advanced Mesh Network

SmartMeter™ electric meters include two low power radio frequency (RF) transmitters. One of the two transmitters uses RF signals to communicate with PG&E over the **SmartMeter** electric network. The other transmitter uses RF signals to communicate into the customer's home or business, a feature customers can use in the future to connect with a new generation of home energy management systems and radio-enabled smart appliances.

To communicate with PG&E, **SmartMeter** electric meters send signals over a sophisticated mesh network. In a mesh network, each electric meter also acts as a repeater, passing signals from nearby meters to a pole-mounted neighborhood network access point. The network access point gathers signals from many meters and communicates directly with PG&E over the public wireless network (i.e., a cell phone network).

**SmartMeter** network access points are typically mounted approximately 25 feet above ground level but are occasionally installed on building rooftops.

In addition to **SmartMeter** electric meters and network access points, the **SmartMeter** electric network includes pole-mounted network repeaters that assist in passing signals from meters to neighborhood access points.

### Low Power, Infrequent Signals

All of the components of the **SmartMeter** electric network – the **SmartMeter** electric meters, the network access points, and the network repeaters – emit radio signals common to everyday living, like those from AM or FM radio broadcasts, TV broadcasts (VHF, UHF), garage door openers, and remote-controlled car locks. The signals used by the **SmartMeter** network are much weaker than those from many common devices, such as microwave ovens and cell phones.

The strength of the radio signals used in the **SmartMeter** system are far, far below the exposure limits established by the government.

Furthermore, the strength of the **SmartMeter** radio signals decreases very rapidly with distance from the transmitter.

**Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information**



## The Plain Facts About Electric System Radio Signals

In addition to being very low power, radio frequency transmitters in **SmartMeter** electric system usually sit idle. The **SmartMeter** electric meter transmits radio signals to the **SmartMeter** network only once every 4 hours, with each transmission lasting less than one-tenth of a second. Each **SmartMeter** electric meter acts as a repeater on average only 2% of the time.

The pole-mounted **SmartMeter** network access point communicates with PG&E via the public wireless network less than a total of 4 minutes during each 4 hour period.

### Thorough Evaluation

The **SmartMeter** electric system uses an RF technology that is both well established and broadly deployed. To ensure customer safety, PG&E commissioned an independent evaluation of possible health impacts. This evaluation confirmed that our **SmartMeter** technology should have no adverse health impacts.

### The Bottom Line

**SmartMeter** radio transmissions are weak, infrequent and short. Customers should experience no adverse health impacts.

If customers are concerned about specific health issues, they should feel free to consult with their physicians and invite their physicians to contact PG&E for more information.

Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information

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## The Plain Facts About Gas System Radio Signals

**SmartMeter** gas meters use low power radio frequency signals to communicate with data collector units (DCU) located in the vicinity, typically on nearby streetlights or power poles.

### Low Power, Infrequent Signals

The radio signals used by our system are common to everyday living, like those from AM or FM radio broadcasts, TV broadcasts (VHF, UHF), garage door openers, and remote-controlled car locks. The signals we use are much weaker than those from many common devices, such as microwave ovens and cell phones.

The strength of the radio signals used in the **SmartMeter** system are far, far below the exposure limits established by the government.

Furthermore, the strength of the **SmartMeter** radio signals decreases very rapidly with distance from the transmitter.

In addition to being very low power, radio frequency transmitters in **SmartMeter** gas meters usually sit idle. The **SmartMeter** gas meter transmits radio signals only once every 4-6 hours, with each transmission only lasting between one and two-tenths of a second.

DCU transmissions occur no more than once every 15 minutes and last a maximum of between one and two-tenths of a second.

### Thorough Evaluation

The **SmartMeter** gas system uses an RF technology that is both well established and broadly deployed. PG&E is aware of no health impacts that have resulted from these previous deployments.

Furthermore, PG&E commissioned an independent evaluation of possible health impacts. This evaluation confirmed that our **SmartMeter** technology should have no adverse health impacts.

### The Bottom Line

**SmartMeter** radio transmissions are weak, infrequent and short. Customers should experience no adverse health impacts.

If customers are concerned about specific health issues, they should feel free to consult with their physicians and invite their physicians to contact us for more information.

Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information



# SmartMeter Ambassador Toolkit

Share the Message



How to read your meters—quick reference guide

Frequently asked questions

Customer installation: before, during and after

Program facts and benefits

Pacific Gas and Electric Company (PG&E) is dedicated to providing our customers with the best service possible. We're always looking for new and innovative ways to make daily interactions with us faster, easier and more convenient.

That's why we're implementing the PG&E SmartMeter™ program. Through our SmartMeter™ program, we are installing an automated gas and electric metering system for all our customers. With this new system, we are improving the way we obtain meter readings and providing new features and tools to help customers see how and when they use energy, better manage their energy use and save money.

Employee Incentive Program  
<http://pgeatwork/CUST/SmartMeter/>

Online SmartMeter  
[www.pge.com/smartmeter](http://www.pge.com/smartmeter)

For more information, please visit  
[www.pge.com/smartmeter](http://www.pge.com/smartmeter) or call 1-844-743-0243



This logo is for use at  
PG&E only. It is not  
to be used by other  
PG&E employees or  
customers.



## Program facts and benefits

Pacific Gas and Electric Company (PG&E) is dedicated to providing our customers with the best service possible. We're always looking for new and innovative ways to make daily interactions with us faster, easier and more convenient.

That's why we're implementing the PG&E SmartMeter™ program. Through our SmartMeter™ program, we are installing an automated gas and electric metering system for all our customers. With this new system, we are improving the way we obtain meter readings and providing new features and tools to help customers see how and when they use energy, better manage their energy use and save money.

We use an ongoing quality assurance process for all our SmartMeter™ devices to ensure they are properly measuring energy use. The main difference in the new meters is that a SmartMeter™ communication device, installed in or on the meter, automatically transmits meter reads to PG&E.

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### SmartMeter™ System Key Facts

#### What is the SmartMeter™ system?

- The SmartMeter™ system integrates automated wireless technology with gas and electric meters, enabling PG&E to read meters remotely.
- Remote access means faster response times to outages and service interruptions.

#### Why is PG&E using the SmartMeter™ system?

- The SmartMeter™ system is part of a statewide effort approved by the California Public Utilities Commission (CPUC) to upgrade California's energy infrastructure with automated metering technology.
- Policymakers and utilities in much of the country are focused on accelerating the transition to a Smart Grid. Modernizing the electrical system to be stronger, smarter and more efficient is essential to encouraging growth in renewable energy sources, empowering consumers to reduce their energy use if they choose, and laying the foundation for sustainable, long-term economic expansion.
- This technology will enable new programs that encourage California energy customers to use less energy and save money.

#### How does the SmartMeter™ system work?

- The SmartMeter™ system uses programmable, solid-state metering technology that provides one-way communication for gas modules and two-way communication for electric meters between the meter and PG&E using secure wireless network technology.
- Meter usage data is transmitted daily directly to our network.



SmartMeter™  
Customer Benefits

**Current benefits:**

- Customers can see how and when they use energy, giving them the power to control their energy use and costs.
- Customers can view their energy use online at [www.pge.com/myaccount](http://www.pge.com/myaccount) once their SmartMeter™ devices are activated on the SmartMeter™ system.
- Customers enjoy convenience because we no longer need to visit their property or interrupt their schedule to read the meter.

**Future benefits:**

- Customers can sign up to receive notifications from PG&E that provide information about energy usage and the likelihood of moving into higher pricing tiers.
- Customers will have access to new electric pricing plans that allow greater control over energy bills.
- Customers will receive faster power restoration because SmartMeter™ technology pinpoints power outages and locations, allowing PG&E to respond faster.
- Customers will be able to automate their energy use by installing home energy management systems that will communicate with automated appliances and electronic devices via PG&E's planned Home Area Network.
- Customers will enjoy smarter, cleaner energy supplies.

The ability to monitor energy usage gives customers the information they need to conserve or shift energy usage. When many individuals conserve, the results can include decreased pressure on the power grid, less need to build new power plants, and reduced carbon emissions.

SmartMeter™  
Employee Benefits

**Safety**

We'll collect meter data without having to set foot on the customers' property, mitigating safety risks for our field personnel.

**Faster power restoration**

We'll be able to resolve service problems more easily and provide current information to service personnel through the SmartMeter™ systems.

**Faster problem resolution**

We'll become more efficient by utilizing our SmartMeter™ technology on routine service requests.

**Reduced access issues**

We'll no longer need to rely on customers to provide appropriate access, and estimated bills will decrease.

**Energy usage data**

We'll have fewer energy cost inquiries because customers can monitor their own energy usage online at [www.pge.com](http://www.pge.com).



# Customer installation: before, during and after

- 
- 11 Two to eight weeks prior to installation, the customer will receive:
- **Installation letter:** This letter explains what to expect during the installation process and identifies the meter(s) to be upgraded.
  - **Two-sided insert:** Included with the installation letter, the insert describes the short- and long-term benefits of SmartMeter™ technology.

- 
- 12 Day of installation
- A PG&E representative or an authorized contractor from Wellington Energy, Inc., will knock on the customer's door before starting the work.
    - The customer doesn't need to be home as long as the installer has access to the meter(s).
  - The installer will replace the existing electric meter with a digital electric meter and add a small module to the gas meter.
  - The installer will leave a door hanger after the installation is complete.

Note: The upgrade doesn't require an interruption in gas service, but electric service could be interrupted for approximately five minutes. If so, customers may need to reset digital clocks on their appliances or equipment.

- 
- 13 After installation
- PG&E meter readers will continue to read meters on a monthly basis until the SmartMeter™ device begins transmitting the meter reads automatically. Once their SmartMeter™ devices are connected to the system, customers will be able to log on to [www.pge.com/myaccount](http://www.pge.com/myaccount) to view and track their hourly electric and daily gas usage up to the previous day.

- 
- 14 Continued learning
- Once the SmartMeter™ installation is complete and the meter begins transmitting data, customers will receive a booklet filled with important information about how to use their SmartMeter™ technology to better manage their energy use and costs as well as about how it will enable our energy future.

For more information about PG&E's SmartMeter™ program, visit [www.pge.com/smartmeter](http://www.pge.com/smartmeter) or call our SmartMeter™ line at 1-866-743-0263.





## Frequently asked questions

**Q: Why is PG&E upgrading to SmartMeter™ technology?**

**A:** The PG&E SmartMeter™ program is part of a statewide effort, approved by the California Public Utilities Commission (CPUC), to upgrade California's energy infrastructure. SmartMeter™ technology will enable new tools and programs that can help our customers learn more about how they use energy, understand how their usage affects their bills and make changes to their usage habits to save energy and reduce costs.

**Q: What is a Smart Grid and what role does the SmartMeter™ program have in its development?**

**A:** A Smart Grid is an intelligent monitoring system that keeps track of all electricity flowing through the system using two-way digital technology that allows customers to see how and when they use energy. Modernizing the electrical system to be stronger, smarter and more efficient is essential to encouraging growth in renewable energy sources, empowering consumers to reduce their energy use and costs and laying the foundation for sustainable, long-term economic expansion.

The evolution to a Smart Grid is a vital step toward realizing California's vision for a low-carbon, clean-energy economy, and SmartMeter™ technology is the foundation for this change. We believe this technology is a sound and wise investment for our customers, our economy and our environment.

**Q: What are the benefits of the SmartMeter™ program?**

**A:** There are a number of benefits for SmartMeter™ customers, including the ability to view energy usage data online within a day of actual usage or in near real time on the meter, which helps customers better manage their energy use and costs. The technology will also give customers the ability to obtain electric service within minutes and will enable faster power restoration.

In addition, SmartMeter™ residential customers have access to pricing plans like SmartRate™ that reward energy reduction on peak days. A number of future capabilities are planned, including customer notifications via text and email to provide information about energy usage and the likelihood of moving into higher pricing tiers, and PG&E's Home Area Network that will enable customers to remotely manage a new generation of smart appliances in the home, like dishwashers and clothes dryers.

**Q: How does PG&E ensure that SmartMeter™ meters are accurate?**

**A:** Before PG&E began installing SmartMeter™ technology, our manufacturing partners rigorously tested the new technology. Each meter is tested at the factory, with a number of meters being spot tested again prior to installation. In addition, PG&E randomly inspects and field tests meters during and after installation. If a customer asks to have their SmartMeter™ device tested, we will work with that customer to investigate the situation, test the meter and provide all the information needed to resolve the issue.

**Q: Why is the CPUC randomly testing SmartMeter™ meters?**

**A:** The CPUC is conducting an independent assessment of PG&E's SmartMeter™ program to provide additional verification of the accuracy of SmartMeter™ technology—including the meters, the communications system and PG&E's billing software—for our customers' reassurance. PG&E is committed to ensuring the accurate measurement of our customers' energy use and welcomes this third-party testing.

**Q: If SmartMeter™ devices are accurate, why do some customers have higher bills?**

**A:** A number of factors can increase a customer's bill from month to month, including hot or cold weather, being at home more often, having visitors or additional people living at the home and getting a new electronic device, such as a TV or computer.

Recent rate increases or failing to re-enroll in financial assistance programs that provide discounted electric rates can also cause a customer's bill to increase. With California's tiered pricing system, people pay more for electricity as they reach certain levels of consumption. In some cases, increased energy use could disproportionately increase a customer's monthly energy bill.



**Q: Is SmartMeter™ technology the cause of the bill increases in Bakersfield?**

**A:** No. A number of factors contributed to the perceived connection between SmartMeter™ devices and bill increases, including an increased number of extremely hot days during the month of July, which led to higher energy use (greater than 95 degrees), a previously scheduled rate increase taking effect and customers who didn't realize that they needed to re-enroll in financial assistance programs to continue receiving discounted electric rates.

Of the 230 complaints from customers at Bakersfield and Fresno Town Hall meetings, PG&E has contacted 95 percent of these customers to resolve their issues - 101 customers experienced higher usage during the summer, 44 had similar or lower usage but were impacted by rate increases, 14 didn't actually have a complaint, 13 had not re-enrolled in the CARE program, 12 did not have a SmartMeter™ device, 10 had a complaint that wasn't related to SmartMeter™ technology and five had an estimated bill issue, which we addressed.

**Q: How are electric rates set?**

**A:** PG&E's electric rates are set through a process overseen by government regulatory agencies, with full public input. Rates include authorized costs to provide electricity generation, transmission and distribution services, including a fair rate of return on capital provided by PG&E investors. They also factor in state-approved incentives to encourage energy efficiency and renewable energy, and funding for programs to help lower-income customers afford electricity.

**Q: Why does California have a tiered-rate system for residential electric customers?**

**A:** By California law, all electric utilities must charge more per energy unit as the customer's energy use increases. This policy gives customers a financial incentive to conserve energy. Currently, energy use is divided into five tiers, with higher prices for each higher tier of use.

**Q: Does PG&E earn more money by selling more electricity?**

**A:** No. PG&E collects a fixed level of revenue, determined by independent regulators, regardless of actual energy sales. If energy sales are higher than the approved level, the excess revenues go back to customers. If sales are lower than the approved level, the shortfall is recovered the next year through a rate adjustment. PG&E actually earns incentives by achieving energy efficiency targets that may reduce sales. This system has helped California keep per-capita energy use flat over the past 30 years, while the rest of the nation has seen a 50 percent increase.

**Q: Is SmartMeter™ technology and the network it uses to communicate safe?**

**A:** Yes. SmartMeter™ technology is safe and more than 76 million meters are in use around the world each day. In fact, the radio frequency (RF) fields generated by SmartMeter™ technology are generally far weaker than the levels produced by many devices found in everyday environments, such as cell phones, microwave ovens and wireless Internet services.

The World Health Organization has reviewed this issue in-depth and has not concluded that low-level, long-term RF exposure causes negative health impacts. A study of RF fields produced by the transmitting components of SmartMeter™ devices shows the devices comply with applicable Federal Communications Commission regulations by a very wide margin.

**Q: Is the customer's personal information secure with SmartMeter™ technology?**

**A:** Yes. PG&E has done extensive testing and preparation to ensure that the SmartMeter™ network is protected and that customer data is safe. We require our vendors to meet strict security guidelines and work quickly if any potential security issues arise.

**Q: Does the SmartMeter™ device allow PG&E to see which appliances a customer is using and when?**

**A:** No. SmartMeter™ technology transmits the customer's total energy use at 15-minute or hourly intervals for billing purposes only. PG&E can see the customer's energy use, but keeps this information private. The goal is to encourage customers to use this information so they can adjust their energy use and save money.

**Q: Will my neighbors be able to see my energy usage patterns?**

**A:** No. the technology that communicates a customer's data back to PG&E is private and secure. It can be compared to a phone network that shares many calls but keeps them all separate.

**Q: Can PG&E customers opt out of the SmartMeter™ program?**

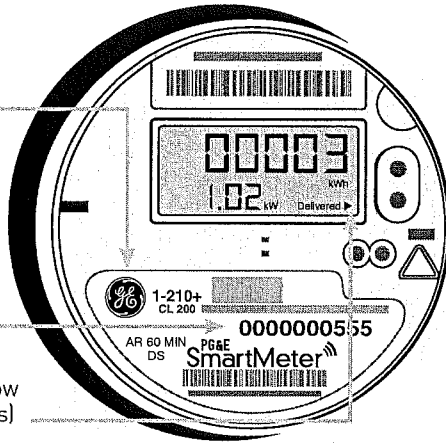
**A:** PG&E's SmartMeter™ program was approved by the CPUC for all PG&E customers and does not have an opt-out option. We work with our customers on a case-by-case basis regarding any concerns they may have.

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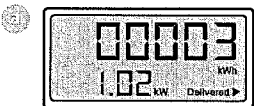
# How to read your meters—quick reference guide

## How to read your GE-brand electric meter

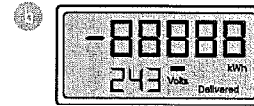
- GE Logo:**  
Confirm you have a GE-brand meter
- Meter Number:**  
This is the number shown in the Electric Account Detail of your energy statement under the heading Meter #
- Digital Display Window:**  
Check your energy use (see below and right for display descriptions)



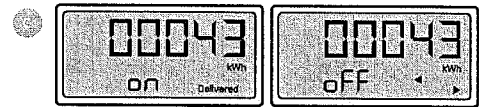
Your GE SmartMeter™ electric meter automatically cycles through four displays.



The **five-digit number at the top** is the amount in kilowatt hours (kWh) of energy you have used to date since the installation of the meter. For reference, if you leave a 100-watt light bulb on in your home for one hour per day for 30 days, the energy used is 100 watts × 30 hours = 3,000 watt hours, or 3 kWh. The **three-digit number at the bottom** is the actual amount of energy you're using right now. For instance, 1.02 means you're using 1.02 kilowatts—or 1,020 watts.



The **number 888888** with all the elements lit verifies that the display is working properly. The **three-digit number at the bottom** is the actual voltage (or electrical potential) right now.



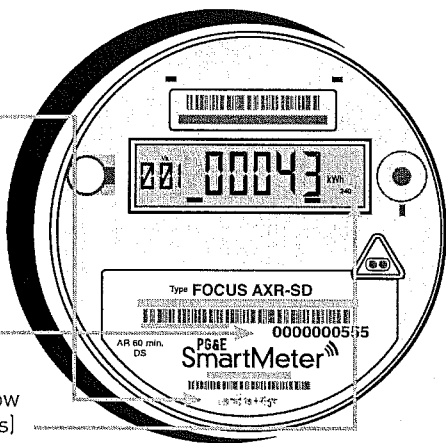
**On** indicates the switch is closed, and power is being delivered. **Off** indicates the switch is open, and power is not being delivered.



**AdI** (for Advanced Distribution Infrastructure) displays when the meter is communicating with the on-board SmartMeter™ module. **Delivered**, at the bottom right of the displays, indicates use. If there is no power being used, it doesn't display.

## How to read your Landis+Gyr-brand electric meter

- Landis+Gyr Logo:**  
Confirm you have a Landis+Gyr-brand meter
- Meter Number:**  
This is the number shown in the Electric Account Detail of your energy statement under the heading Meter #
- Digital Display Window:**  
Check your energy use (see below and right for display descriptions)



Your Landis+Gyr SmartMeter™ electric meter automatically cycles through either three or five displays, depending on your model.



This **five-digit number** is the amount in kilowatt hours (kWh) of energy you have used to date since the installation of the meter. If you leave a 100-watt light bulb on in your home for one hour per day for 30 days, the energy used is 100 watts × 30 hours = 3,000 watt hours, or 3 kWh.



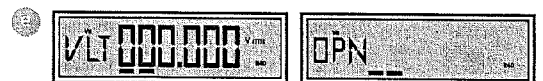
The **number 888888** with all the elements lit verifies that the display is working properly.



This **six-digit number** is the actual amount of energy you're using right now. For instance, 001.939 means you're using 1.939 kilowatts—or 1,939 watts.



**VLT** indicates voltage (or electrical potential) is being delivered. **CLS** indicates the switch is closed and power is being delivered. *These displays are not available on all models.*



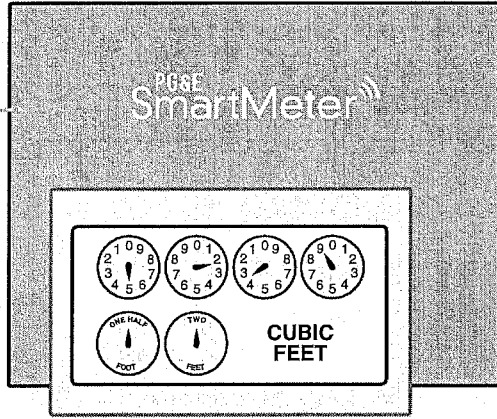
**VLT reading of zeros** indicates voltage is not being delivered. **OPN** indicates the switch is open and power is not being delivered. *These displays are not available on all models.*

Read the bottom section on the back to find out how to track your hourly electric use online.

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## How to read your SmartMeter residential gas meter

The SmartMeter™ gas module added between the meter and the rotary dials records daily meter reads and then transmits the reads to PG&E.



The odometer-like mechanical dials on your gas meter measure the therms of gas that have traveled through the meter into your home.

Your gas meter uses multiple clock hands and typically has four dials to read. The first and third dials spin counter clockwise, while the second and fourth dials spin clockwise. When reading the meter, if the dial is between two numbers, use the lower number. For instance, the meter pictured here reads 5, 2, 3, 9.

The two dials without numbers are used by PG&E when testing the meter for accuracy.

Read the next section to find out how to track your daily gas use online.

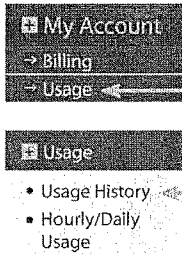
## How to track your energy use online

Now for the first time ever, you can see exactly how much gas and electricity you're using up to the previous day and when you're using it. Knowing how much energy you're using puts you in control of your energy use, and allows you to make smarter energy choices.

With SmartMeter™ technology, you can track your energy use history online. If you don't already have an online account, you can set one up in just a few minutes:

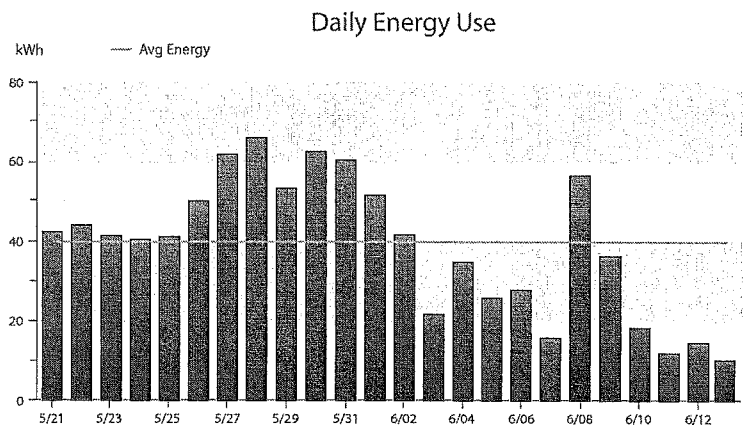
- 1 Go to: [www.pge.com/myaccount](http://www.pge.com/myaccount)
- 2 The first time, you will click on 'Sign Up'
- 3 Fill in the required information. You'll need your PG&E account number and the primary phone number on your account.

Once you've established your online account, you can 'Login' and access your gas and electric energy use history right up to the previous day at [www.pge.com/myaccount](http://www.pge.com/myaccount).



Once you've logged in, click on 'Usage' on the left navigation bar.

Select 'Usage History' to see your month-by-month energy use and compare your monthly bills. Clicking on 'Hourly/Daily Usage' will show you hour-by-hour electric or day-by-day gas energy use information (example shown below).



For more information about the SmartMeter™ program, visit [www.pge.com/smartmeter](http://www.pge.com/smartmeter) or call 1-866-743-0263.

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CDR-0210-0391



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**Supplemental Report on An Analysis of  
Radiofrequency Fields Associated with Operation  
of the PG&E SmartMeter Program Upgrade  
System**

**October 27, 2008**

**Prepared for**

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## NOTE

This supplemental report extends the findings contained in an earlier report for PG&E "Analysis of RF Fields Associated with Operation of PG&E Automatic Meter Reading Systems" prepared April 6, 2005. In that report, radiofrequency (RF) fields that could be produced by several different automatic meter reading (AMR) systems were evaluated relative to applicable human exposure limits. This report addresses similar RF fields that could be associated with operation of an additional system that would provide AMR capability for PG&E customers as well as more advanced features that could allow customers to monitor their own electricity usage and program various electric power consuming devices in their homes to operate only during certain times, depending, for example, on electric energy cost at different times of day. The previous report should be consulted for more detail on terminology, methods of evaluation, human exposure limits and specific terminology.

# Supplemental Report on An Analysis of Radiofrequency Fields Associated with Operation of the PG&E SmartMeter Program Upgrade System

## Summary

Use of new SmartMeter Program Upgrade technology by Pacific Gas and Electric will make use of low power radiofrequency (RF) transmitters for automatic electric power meter reading. The SmartMeter Program Upgrade technology will also allow customers the possibility of controlling their own use of electricity based on energy rates during the day. A study of RF fields produced by the transmitting components of the system shows that potential exposure of individuals will comply with applicable Federal Communications Commission human exposure regulations by a very wide margin. For example, immediately adjacent to a power meter, the RF field power density will be  $8.8 \mu\text{W}/\text{cm}^2$  compared to the exposure limit of  $601 \mu\text{W}/\text{cm}^2$  appropriate to the 902-928 MHz band. Typical exposure to access points that are mounted 25 feet above ground will be even lower, more than 15,000 times less than the exposure limit. Exposure to RF emissions associated with the 2.45 GHz signals from a home area network feature of the system will also be similarly small fractions of the allowable human exposure limit. The absolute greatest power density found in the analysis is  $24.4 \mu\text{W}/\text{cm}^2$  for the rare situation of a person located immediately adjacent to an access point antenna. When compared with RF fields produced by many devices found in our everyday environment, such as radio and television broadcast stations, cellular telephones, and microwave ovens, RF exposures resulting from the SmartMeter Program Upgrade will very much weaker.

RF transmitting components of the system include 1 watt, or less, transmitters contained within the glass envelope of a power meter, in repeater units, and within access points. The system constitutes a sophisticated mesh network wherein each meter can act as a repeater for assisting in delivering outgoing data to access points or other nearby meters from whence the data is further relayed.

Based on this analysis for the system as proposed by PG&E, SmartMeter Program Upgrade related RF exposure of individuals who live and/or work in or around structures that are equipped with the SmartMeter Program Upgrade system will be compliant with existing standards and regulations for safe exposure.

## Introduction and Background

Automatic Meter Reading (AMR) technology is being adopted by the Pacific Gas & Electric Company (PG&E). This technology allows for remote reading of electricity

usage by customers without the traditional deployment of field personnel for obtaining monthly readings from individual meters. Beyond the capability that AMR technology brings to the company, PG&E is implementing advanced features that will allow individual customers to monitor their own usage of electric energy and even control devices within their homes based on dynamic electric energy charges during the day by programming such appliances as hotwater heaters, furnaces and air conditioning systems to operate only when electric energy rates are less costly. This program is referred to as the SmartMeter Program Upgrade by PG&E and the equipment that will be used makes use of radiofrequency signals for communicating the data associated with meter readings and making electricity rates available to customers. This supplemental report addresses the RF fields that may be produced by the system's operation in relation to the potential for exposure of individuals in the vicinity of the various transmitting portions of the system. Maximum permissible exposure (MPE) values have been adopted by the Federal Communications Commission (FCC) or recommended in various standards that specify maximum safe levels of exposure.

The system which would be implemented by PG&E is provided by Silver Spring Networks<sup>1</sup> and consists of a number of different components, each that make use of RF signals from low power transmitters. Figure 1 provides a simplified illustration of how the SmartMeter Program Upgrade will be configured with the Silver Spring Networks equipment. In this system, so-called endpoint devices consist of the electric power meters which contain two low power transmitters.

One of the two transmitters is used for connectivity for the AMR function, sending meter reading data to an access point from where the data is transmitted back to the company via a wireless wide area network (WAN) (somewhat similar to using a cell phone for voice communications). The AMR transmitter is rated at one watt maximum power output, operates within the license free frequency band 902 to 928 MHz, and uses an internal antenna inside the meter with a nominal gain of 0 dBi (decibels relative to an isotropic radiator). Also contained within the glass envelope of the meter is a second transmitter that operates in the license free 2.40-2.4835 GHz frequency band (hereafter referred to as the 2.4 GHz band) and is used to provide potential communications with a home area network that the customer may elect to install for purposes of monitoring power consumption. This second transmitter is rated at a power of approximately 0.1 watt and also uses an internal antenna having a nominal gain of 0 dBi. The 1 watt transmitter is configured to transmit data approximately once every four hours back to the company so its duty cycle is very small (the actual data transmission duration during any four hour period will vary, however, depending on how often a particular meter transmitter acts as a repeater for other nearby meters). The lower power 2.4 GHz transmitter is designed to transmit only when instructed to by the customer's home area network.

The Silver Spring Networks equipment is configured as a mesh network. This means that the AMR transmitter inside each power meter is designed to communicate with each other meter transmitter within its range if necessary to get the data signal back

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<sup>1</sup> Silver Spring Networks, 575 Broadway Street, Redwood City, CA 94063.



to an access point. In essence, each meter transmitter can also act as a repeater. In the event that a given power meter can't directly reach the nearest access point, the data can be handled by a closer meter and relayed to the access point or to yet another meter or a specific relay transmitter for ultimate communication with the access point. Thus, the grouping of a large number of meters with their internal transmitters forms the mesh network, the various meters simulating the interconnection points (or nodes) similar to a screen mesh. Through the mesh approach, more distant meters can still communicate with an access point through the help of its neighbors and an access point can communicate with the more distant meters that may be out of direct range of the access point. Actual dedicated relay transmitters are used in some locations to facilitate the communications and these transmitters also operate with one watt of power but use more efficient antennas with gains of about 2 dBi (approximately the gain of a dipole antenna). While the meter transmitters are constrained to where the power meters are located, repeaters will typically be mounted outdoors and elevated approximately 25 feet above ground<sup>2</sup>. The duty cycle of repeaters is also small since they will only operate when necessary to relay signals on to an access point. The duty cycle of a dedicated repeater may be greater than that of a given individual meter, however, since it may be required to relay data from more meters during any four hour period than a power meter installed on a house.

The data from each power meter must eventually get back to the PG&E management system and this requires that the signal from each power meter ultimately reaches an access point. Each access point has a similar one watt transmitter inside it that communicates in the 902 to 928 MHz band with the power meters or intermediary repeaters but it also contains another transmitter similar to an AirCard used with laptop computers for wireless connection to the Internet. The AirCard transmitter will operate in the band used by the particular company providing the wireless wide area network (WAN) service. This will typically be in the 800-900 MHz range or in the 1.9 GHz range. For purposes of this analysis, the lower frequency range has been assumed since it has the more stringent MPE associated with it.

In the deployed system, the goal is for one access point to handle data transmissions from as many as approximately 5,000 meters. Hence, the duty cycle of an access point will be greater than typical electric power meter transmitters. Access points will typically be mounted at approximately 25 foot above ground level but may, on occasion, be installed on building rooftops. The AirCard transmitters operate with a power in the range of 250 milliwatts to no greater than one watt.

### Radiofrequency Exposure Limits

Several guidelines or standards exist that recommend safe upper limits for human exposure to RF fields. These include limits developed by the Institute of Electrical and Electronics Engineers (IEEE, 1999), guidelines published by the International

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<sup>2</sup> Approximately 95% of access points and relays within the SmartMeter Program Upgrade system will be mounted high above ground. The remaining 5% may be mounted on building rooftops.

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Commission on Non-ionizing Radiation Protection (ICNIRP, 1998) and those promulgated by the Federal Communications Commission (FCC, 1997) relative to human exposure to RF fields<sup>3</sup>. The exposure guidelines of the FCC are most relevant to the evaluation of potential exposure because the AMR system equipment is regulated by the FCC in their rules and regulations<sup>4</sup>. The FCC maximum permissible exposure (MPE) values are expressed in terms of the plane wave equivalent power density of the RF field or the strength of the electric and/or magnetic field components of the RF field. Power density is expressed as power per unit area and is most commonly given in units of milliwatts per square centimeter ( $\text{mW}/\text{cm}^2$ ) or microwatts per square centimeter ( $\mu\text{W}/\text{cm}^2$ ). The FCC exposure limits are, strictly, applied to FCC licensees such as operators of radio and television broadcast stations, two-way radio communications systems, cellular telephone base stations, etc.

Although the Silver Spring Networks AMR transmitters operate in the “license free” band of 902-928 MHz, and while these low power devices are not directly affected by the FCC rules on human exposure, the FCC MPEs for the general public are well recognized by most RF operators and these exposure limits are among the most stringent of those that exist. It is, therefore, relevant to use the FCC MPEs as bench marks for evaluating potential human exposure to the AMR system to be deployed by PG&E. For purposes of this evaluation, the MPE values established for members of the general public have been applied. For emissions at 902 MHz, the FCC MPE for the general public is equivalent to  $601 \mu\text{W}/\text{cm}^2$ . The MPE at 2.45 GHz, for example, is equal to  $1,000 \mu\text{W}/\text{cm}^2$ . The smaller figure of  $601 \mu\text{W}/\text{cm}^2$  has been used as the benchmark for evaluating potential RF field exposure due to the operation of the PG&E SmartMeter Program Upgrade system for the AMR function and the AirCard transmissions from access points within the mesh network. The larger figure of  $1,000 \mu\text{W}/\text{cm}^2$  was used for evaluating the internal meter transmitter designed for connectivity to a home area network. It is relevant to note that the MPE values described above contain safety factors of 50; this means that the MPE is not set at the exact demarcation between hazard and no hazard but a factor of 50 times less than the presumed hazardous exposure level.

### Maximum Likely RF Fields from System

RF fields that might be associated with emissions from the various transmitting components of the SmartMeter Program Upgrade system were calculated following the methodology outlined in a prior technical report.<sup>5</sup> That method includes the conservative approach of accounting for the possibility of ground reflections that can enhance the local RF field strength at any given location. The principal difference between the results of the earlier analysis and the present one is caused by the implementation of a mesh

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<sup>3</sup> Safe exposure limits are specified by the FCC in terms of Maximum Permissible Exposure (MPE) limits that vary with frequency. MPE limits for the general public include at safety factor of 50.

<sup>4</sup> 47 CFR 15.247, Federal Communications Commission.

<sup>5</sup> *Analysis of RF Fields Associated with Operation of PG&E Automatic Meter Reading Systems* prepared for Pacific Gas and Electric by Richard A. Tell, Richard Tell Associates, Inc., and J. Michael Silva, Enertech Consultants, April 6, 2005.

network that will increase duty cycles of transmitters used in the system. Figure 2 illustrates the results of this analysis showing the maximum expected power density from the 902-928 MHz emissions that might exist in the vicinity of one of the power meters and in the vicinity of an access point or relay and the power density of the internal 2.4 GHz meter transmitter for home area network applications. Immediately adjacent to a power meter, for example, the power density is calculated to be  $8.8 \mu\text{W}/\text{cm}^2$ .

The values of power density shown in Figure 2 are based on the expected duty cycles for the various units. Arriving at exact values for these duty cycles is a complex task for mesh networks of the type to be implemented by PG&E. For example, the transmitter in the power meter will transmit data approximately once in each four hour period. The duration of this data transmission is extremely short, approximately 50 milliseconds (0.050 seconds). This means that the fraction of the time that the transmitter is actually active during any four hour period, for transmitting its data, is only about 0.00000347. To obtain values of power density that are relevant to human exposure limits, the signal level from the transmitter at any distance must be multiplied by this duty cycle value. However, since the meter transmitters are a part of the mesh network and will, from time to time, relay data from other meters, the transmitters will actually be active for more than just 50 milliseconds as they handle the traffic for some of the other meters as may be necessary. The actual duty cycle of the meter transmitters will only be known once the system is in place and statistics can be obtained on its operation but based on communications with Silver Spring Networks, a conservative assumption is that the maximum duty cycle of a meter transmitter could be approximately 4% for a heavily loaded meter due to its use in relaying data between other meters and access points (more typically, a duty cycle of approximately 2% is expected during normal operation). Hence, a meter transmitter four-hour duty cycle of 0.040 (4%) has been applied in this analysis. The duty cycle associated with operation of the 2.4 GHz home area network transmitter internal to the meter has been assumed to be 100 times the basic duty cycle of the meter AMR transmitter (0.000347), though this may be an overstatement of actual usage.

For an access point, both the AMR metering transmitter and the AirCard transmitter will produce RF fields. Based on information provided by Silver Spring Networks, an access point that is communicating with up to 5,000 meters could be expected to exhibit a long-term duty cycle of about 5.3%. The AirCard, which provides the RF connection with a WAN, will be a significant contributor to the average RF field found near access points since it will be transmitting aggregated data from as many as 5,000 meters every four hours. With a nominal transmission time of 50 milliseconds for each meter, this represents a total transmission time of approximately 250 seconds during each four-hour period. This represents a duty cycle of 0.0174 or 1.74%. This value has been used in calculating the time-averaged power density of the AirCard emissions from the access point. The maximum power density immediately adjacent to an access point, although access to this location may be impossible due to its high mounting point on a light pole, for example, is calculated to be  $24.4 \mu\text{W}/\text{cm}^2$ .

Dedicated relay units<sup>6</sup> will produce RF fields similar to that of a power meter since the transmitters are the same but use somewhat more effective antennas. The RF fields produced by these relay units will fall between the values shown for a power meter and an access point in Figure 2.

The distance scale of Figure 2 represents the straight line distance from the electric power meter or the access point locations. Generally, relay transmitters and access points will be located on poles at a distance of approximately 25 feet above ground. Hence, the indicated values of power density are, generally, highly conservative since most exposure situations will result in a minimum distance of closest approach of 25 feet and the power densities shown for closer distances will not be relevant to most conditions.

Figure 2 also shows the estimated RF field power density associated with the 2.4 GHz transmitter contained within the meter for use in connecting to a possible home area network in the customer's home or business. The figure shows that the power density from this transmitter will be substantially less than that of the AMR meter transmitter.

### **Perspective on RF Fields**

The RF field power densities that will be produced by the SmartMeter Program Upgrade system operated by PG&E will be very weak, even very close to the various RF transmitting components of the system. When compared to limits established for safe human exposure, Figure 2 indicates that the resulting RF fields will be substantially less than the MPEs set for the general public. For example, in the area immediately adjacent to a power meter, the power density will be at least 68 times less than the public MPE. At greater distances, the power density becomes even less with an increasing margin between the RF field and the exposure limit.

While the RF fields near an access point will be greater due to the AirCard transmitter on-time, even in this case, the fields are small in comparison to the limits. For typical exposure distances associated with access points mounted on poles at 25 feet above ground, the power density will be approximately 15,000 times less than the public exposure limit. For the more rare case of an access point being installed on a building rooftop or other location where individuals may have access, the field will still be substantially less than the public limit, being approximately 25 times less than the limit for the case of a person being immediately proximate to the access point.

These power densities can be put in some perspective by comparing them to those fields that are produced by operation of conventional microwave ovens used in residential kitchens. All microwave ovens leak small amounts of RF energy during their normal operation (a tiny fraction of the allowable leakage set by the Food and Drug Administration of  $5,000 \mu\text{W}/\text{cm}^2$ ). Most microwave ovens produce RF fields within

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<sup>6</sup> Each power meter will function as a relay device for other nearby meters but, in addition, dedicated relay units will exist in the geographic vicinity of the network, as seen in Figure 1, for the purpose of providing relay service for data transmissions.

several meters of the oven in the range of a few to several microwatts per square centimeter at the microwave oven frequency of 2.45 GHz, similar to the frequency band used by parts of the SmartMeter Program Upgrade system.

WI-FI systems, commonly found today at so-called hotspots, for wireless access to the Internet, produce RF fields in the range of 1-2  $\mu\text{W}/\text{cm}^2$ .<sup>7,8</sup> Similar values of power density are found near wireless routers that are commonly used in homes for distributing Internet connectivity to personal computers. All of these values are orders of magnitude less than the limits set for safe human exposure.

Should a customer elect to install a home area network for communication with the SmartMeter Program Upgrade equipment at their home, RF exposure of the customer or other individuals within the home would likely be dominated by the wireless router being used by the customer, not the RF transmission components inside the power meter. Such exposure would be principally driven by distance between the customer and their in-home home area network equipment rather than proximity to the power meter.

This study focused on the SmartMeter Program Upgrade system proposed by PG&E including the potential installation of devices that a customer may elect to install on various electrical appliances that would allow communication between these devices and the SmartMeter system via a home area network. However, the study does not take into account the potential for RF fields that may be produced by the many other devices or systems that are not a part of the SmartMeter Program Upgrade. Such devices or systems include the cellular telephones, cellular telephone base stations, broadcast radio and television stations, microwave ovens used in the home or any other source of RF energy.

## Conclusions

An analysis of RF fields that may be produced during operation of different components of the PG&E SmartMeter Program Upgrade system shows that the intensities of these fields are small fractions of the present RF exposure limits established for the general public. Weak RF fields in the frequency range of 902-928 MHz and near 2.4 GHz will be produced on an intermittent basis during its normal operation. These fields may have power densities that, for the most part, range from as great as 8.8  $\mu\text{W}/\text{cm}^2$  to levels thousands of times less. The present exposure limits for members of the public to the 902-928 MHz and 2.45 GHz bands are 601  $\mu\text{W}/\text{cm}^2$  and 1,000  $\mu\text{W}/\text{cm}^2$  respectively. In a worst case scenario of a person able to get immediately next to an access point, despite the difficulty, the maximum power density expected would be 24.4  $\mu\text{W}/\text{cm}^2$ .

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<sup>7</sup> Foster, K.R. (2007). Radiofrequency exposure from wireless LANS utilizing WI-FI technology. *Health Physics*, Vol. 92, No. 3, March, pp. 280-282.

<sup>8</sup> Schmidt, G. et al. (2007). Exposure of the general public due to wireless LAN applications in public places. *Radiation Protection Dosimetry*, Vol. 123, No. 1, Epub June 11, pp. 48-52.

Based on this analysis for the system as proposed by PG&E, SmartMeter Program Upgrade related RF exposure of individuals who live and/or work in or around structures that are equipped with the SmartMeter Program Upgrade system will be compliant with existing standards and regulations for safe exposure by a wide margin.

Interference due to operation of the mesh network system is unlikely to occur because all units use very low power and operate in radio frequency bands reserved by the FCC for devices of this type.

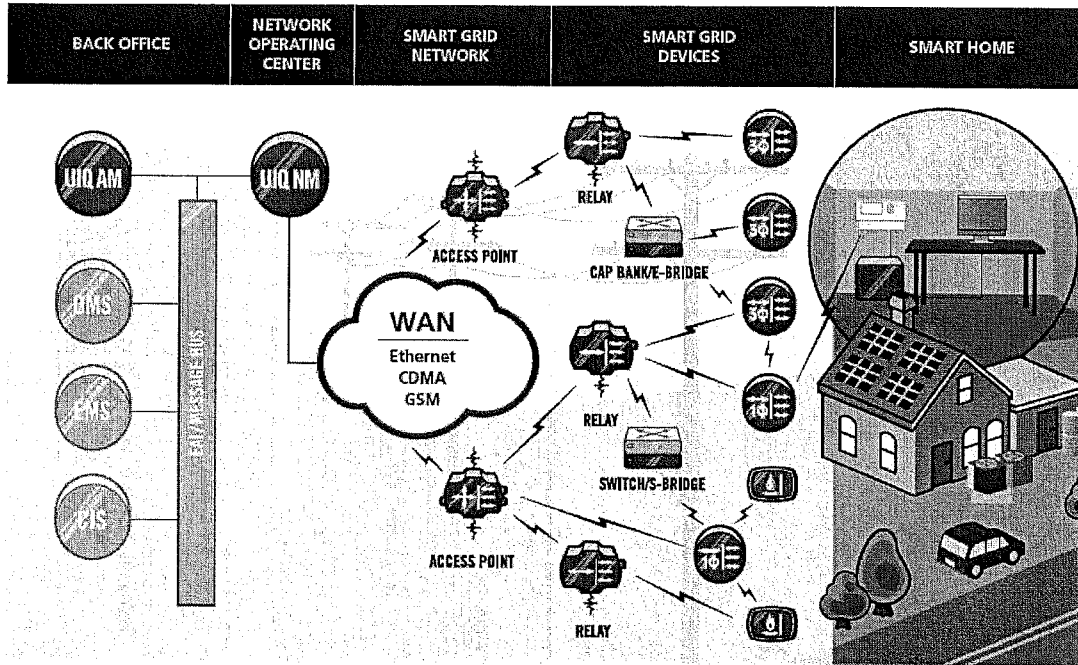


Figure 1. Illustration of components of the PG&E SmartMeter Program Upgrade showing the use of radiofrequency (RF) signals for communications among electric power meters, relays, access points and, ultimately, the company's enterprise management systems. (From Silver Spring Network sales literature).

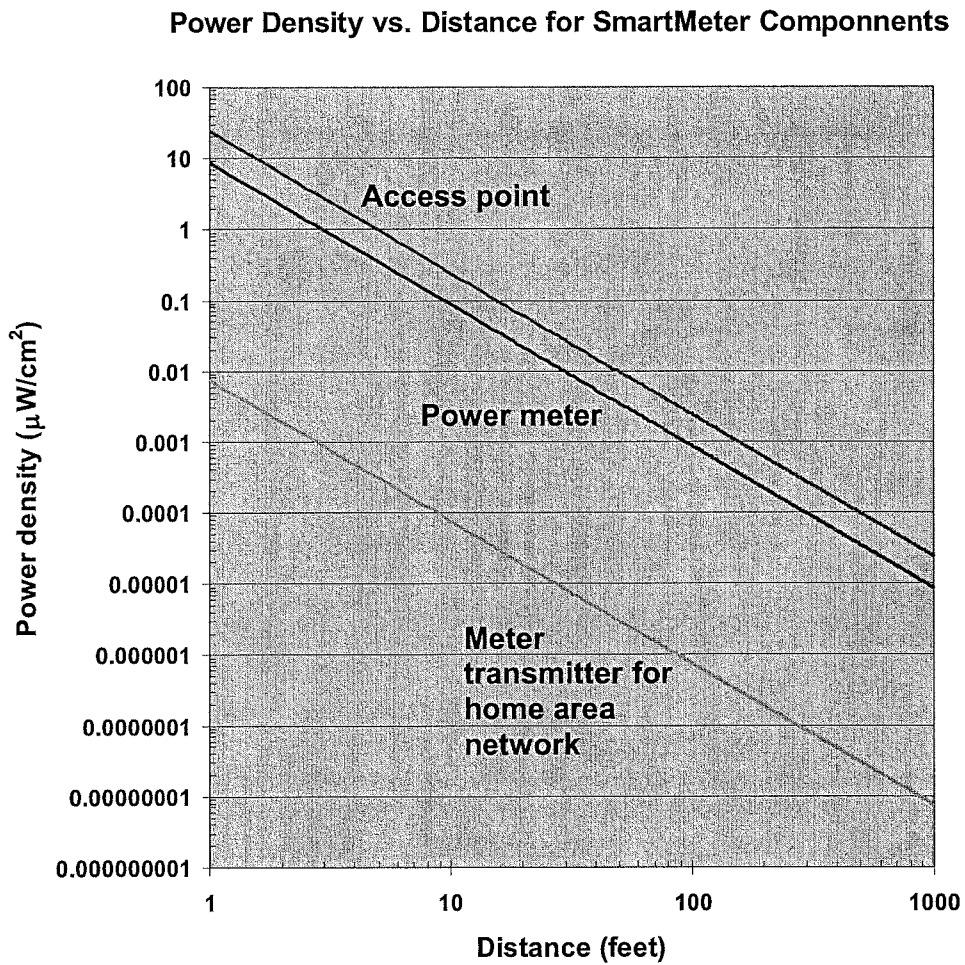


Figure 2. Calculated RF power density vs. distance for the SmartMeter Program Upgrade meters, access points, and internal meter home area network transmitter. Repeater units would produced RF fields greater than the power meter curve and less than the access point curve.





# PG&E SmartMeter

## The Plain Facts About Electric System Radio Signals

### An Advanced Mesh Network

SmartMeter™ electric meters include two low power radio frequency (RF) transmitters. One of the two transmitters uses RF signals to communicate with PG&E over the **SmartMeter** electric network. The other transmitter uses RF signals to communicate into the customer's home or business, a feature customers can use in the future to connect with a new generation of home energy management systems and radio-enabled smart appliances.

To communicate with PG&E, **SmartMeter** electric meters send signals over a sophisticated mesh network. In a mesh network, each electric meter also acts as a repeater, passing signals from nearby meters to a pole-mounted neighborhood network access point. The network access point gathers signals from many meters and communicates directly with PG&E over the public wireless network (i.e., a cell phone network).

**SmartMeter** network access points are typically mounted approximately 25 feet above ground level but are occasionally installed on building rooftops.

In addition to **SmartMeter** electric meters and network access points, the **SmartMeter** electric network includes pole-mounted network repeaters that assist in passing signals from meters to neighborhood access points.

### Low Power, Infrequent Signals

All of the components of the **SmartMeter** electric network – the **SmartMeter** electric meters, the network access points, and the network repeaters – emit radio signals common to everyday living, like those from AM or FM radio broadcasts, TV broadcasts (VHF, UHF), garage door openers, and remote-controlled car locks. The signals used by the **SmartMeter** network are much weaker than those from many common devices, such as microwave ovens and cell phones.

The strength of the radio signals used in the **SmartMeter** system are far, far below the exposure limits established by the government.

Furthermore, the strength of the **SmartMeter** radio signals decreases very rapidly with distance from the transmitter.

Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information

July 2009

# PG&E SmartMeter

## The Plain Facts About Electric System Radio Signals

In addition to being very low power, radio frequency transmitters in **SmartMeter** electric system usually sit idle. The **SmartMeter** electric meter transmits radio signals to the **SmartMeter** network only once every 4 hours, with each transmission lasting less than one-tenth of a second. Each **SmartMeter** electric meter acts as a repeater on average only 2% of the time.

The pole-mounted **SmartMeter** network access point communicates with PG&E via the public wireless network less than a total of 4 minutes during each 4 hour period.

### Thorough Evaluation

The **SmartMeter** electric system uses an RF technology that is both well established and broadly deployed. To ensure customer safety, PG&E commissioned an independent evaluation of possible health impacts. This evaluation confirmed that our **SmartMeter** technology should have no adverse health impacts.

### The Bottom Line

**SmartMeter** radio transmissions are weak, infrequent and short. Customers should experience no adverse health impacts.

If customers are concerned about specific health issues, they should feel free to consult with their physicians and invite their physicians to contact PG&E for more information.

Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information

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## The Plain Facts About Gas System Radio Signals

**SmartMeter** gas meters use low power radio frequency signals to communicate with data collector units (DCU) located in the vicinity, typically on nearby streetlights or power poles.

### Low Power, Infrequent Signals

The radio signals used by our system are common to everyday living, like those from AM or FM radio broadcasts, TV broadcasts (VHF, UHF), garage door openers, and remote-controlled car locks. The signals we use are much weaker than those from many common devices, such as microwave ovens and cell phones.

The strength of the radio signals used in the **SmartMeter** system are far, far below the exposure limits established by the government.

Furthermore, the strength of the **SmartMeter** radio signals decreases very rapidly with distance from the transmitter.

In addition to being very low power, radio frequency transmitters in **SmartMeter** gas meters usually sit idle. The **SmartMeter** gas meter transmits radio signals only once every 4-6 hours, with each transmission only lasting between one and two-tenths of a second.

DCU transmissions occur no more than once every 15 minutes and last a maximum of between one and two-tenths of a second.

### Thorough Evaluation

The **SmartMeter** gas system uses an RF technology that is both well established and broadly deployed. PG&E is aware of no health impacts that have resulted from these previous deployments.

Furthermore, PG&E commissioned an independent evaluation of possible health impacts. This evaluation confirmed that our **SmartMeter** technology should have no adverse health impacts.

### The Bottom Line

**SmartMeter** radio transmissions are weak, infrequent and short. Customers should experience no adverse health impacts.

If customers are concerned about specific health issues, they should feel free to consult with their physicians and invite their physicians to contact us for more information.

Go to [pge.com/smartmeter](http://pge.com/smartmeter) for more information

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