

May 10, 2010

**Excerpts from PG&E's SmartMeter™ Reports to the
California Public Utilities Commission**

PG&E's SmartMeter™ Program is a Massive Technology Rollout

A note about this document: Some terms used in the utility industry may differ from the words' standard context. For example, the word “quarantine” as used in this industry means something that is removed or withheld from service, which is not the same context as its common use.

- PG&E's SmartMeter™ program is not only one of the first advanced metering programs in the United States, it is also among the largest technology rollouts ever. It is a \$2.2 billion dollar capital program in which we are replacing a 100-year-old technology, represented in 10 million gas and electric meters across a highly varied statewide geography.
- The highly detailed work papers that we are releasing today span roughly four years and reflect several different stages of this program, including two independent work-streams—IT development and meter deployment. We and our vendors developed the programming to support meter deployment, and during meter deployment started to develop further programming. As a result, you may see discussions of IT issues that arose during deployment. Those IT issues were independent of our deployment efforts.
- These work papers reflect challenges that we experienced over the course of the project. In fact, these documents reflect virtually all issues we have faced over this period and their real time discussion. As such, there are numerous references to “issues,” “risks,” “defects” and “delays.” These are normal events in a project of this scale and we have worked diligently with our vendors for a solution that minimizes their effect on our customers. In fact, references to “risks” are only hypothetical events, items that PG&E proactively recognizes as potential issues and that it monitors to ensure they do not occur.
- Similarly, while you may see “quarantines” or “holds” on groups of meters, in which either our vendors or PG&E discovered a problem, that generally means that only a part of our supply chain may need additional review.
- In addition, these work papers discuss “alarms,” which are essentially self-diagnostics that the meters themselves provide to highlight internal issues within the equipment. These do not necessarily correspond to problems with the meter or bill but provide PG&E with substantial information to address issues before they affect customers.

- In the document that follows, we highlight “sample texts” that describe a sample of issues that PG&E encountered and addressed. Such sample texts or variations of them may appear multiple times throughout the monthly reports.

Issue:

Limited Failure of Silver Springs Network’s Network Interface Card (“NIC”) Capacitor Component

Location in CPUC Report:

Sample Text: “Silver Springs Networks determined that a component in the NIC was failing, causing the meters to cease operating.” (March 2010, page 5)

Context:

- In March 2010, Silver Springs Network alerted PG&E that a component called a “capacitor” on its “network interface card” or “NIC” had failed in some cases. Silver Springs reported that this was neither a meter-accuracy nor a safety issue, but that the failed capacitor caused a small number of meters to stop working altogether.
- A “network interface card” is a computer hardware component designed to allow computers to communicate over a computer network. A “capacitor” is an electric component on the NIC that stores energy.

Resolution:

- Although PG&E had ordered a significant number of General Electric and Landis + Gyr meters containing this NIC, PG&E had only days earlier begun deploying these meters to customers’ homes.
- Consequently, the Company only installed approximately 7,800 such meters, and has closely monitored these meters since. If any of these meters fails, it is replaced immediately.
- As for the remainder of the meters that PG&E purchased, PG&E put approximately 290,000 meters on “hold” until they can be repaired.

Issue:

A Number of Landis + Gyr Meters Have Experienced Data Storage Issues

Location in CPUC Report:

Sample text: “Landis + Gyr Focus meters with firmware version 5.33 require a patch”
(March 2010, page 10)

Context:

- In March 2010, Landis + Gyr notified PG&E that one of its meter-types, under certain circumstances, stopped retaining or transmitting the meter’s otherwise-accurately-measured data.
- Landis + Gyr confirmed that there are no accuracy or safety issues associated with this issue.
- Not all of these meters exhibit the problem.
- Of the roughly 240,000 such meters that PG&E purchased, PG&E has deployed approximately 90,000, of which about 11,000 have exhibited this behavior.
- This issue results in an under-billing of impacted customers. PG&E will not seek to back-bill customers for these amounts.

Resolution:

- PG&E stopped deploying the meters.
- PG&E put the remaining approximately 150,000 meters on “hold” in our warehouse.
- PG&E repaired and redeployed 34,000 of the meters.
- The remaining 117,000 meters could not be repaired and were sent back to Landis + Gyr under warranty.

Issue:

PG&E Paid Performance Recognition Awards to Its Employees

Location in CPUC Report:

Sample text: Appears as a line item entitled “Performance Recognition” (line item appears in each monthly report throughout 2008, beginning in February)

Context:

- In late 2007, PG&E switched from its existing mainframe system to a more modular architecture. This transition is a key enabler of the benefits that SmartMeter™ is providing to customers.
- The Company transferred to this system to enable it to process the hourly and quarter-hourly interval data that its digital SmartMeters™ would generate – in contrast to the one read per month that PG&E meter readers historically collected from analog, electromechanical meters.
- PG&E’s SmartMeter™ group worked particularly hard on this very important project.
- During the last few months of 2007, a team of more than 330 employees worked virtually every night and weekend to develop this new platform that would enable our SmartMeter™ deployment.
- In recognition of their loyalty and hard work, to compensate them for the extra hours that they had worked, and to thank them for their considerable effort, the Company paid them bonuses – on average, less than \$2,600 per person.
- This is a customary practice in most companies.
- No officers received this bonus
- This IT upgrade enabled approximately \$5 million in annual savings related to ongoing IT cost efficiencies
- This issue does not relate to the accuracy or safety of our SmartMeters™.

Issue:

PG&E Experienced Higher IT Costs at the Start of the Program

Location in CPUC Report:

Sample text: “Cost overruns may be up to \$166 million (beyond CPUC authorization) for IT and substation installations” (December 2007, page 3)

Context:

- PG&E’s SmartMeter™ launch necessitated considerable IT work in the early years of the program.
- Moving from a nearly 100 year old technology to a modernized, digital system represents a considerable IT challenge.
- Indeed, this program required a tremendous IT commitment to enable actual meter deployment.
- As a result, you will see in the early monthly reports that we initially exceeded our IT budget by roughly \$166 million. However, we have made up those costs through other savings and efficiencies in the project.

Resolution:

- To a certain degree, however, we anticipated this. In the business case that PG&E submitted to the CPUC, the Company submitted a contingency amount that anticipated a strong possibility for IT overruns.
- That contingency, which was roughly \$129 million, was to cover several possible costs, but primarily IT.
- Today, PG&E’s SmartMeter™ program is on budget. From month to month in any particular report, there may be budget overruns and shortfalls for a variety of reasons, including unanticipated IT costs, but they generally offset against savings from added efficiencies.
- This issue does not relate to the accuracy or safety of our SmartMeters™.

Issue:

In Some Cases, SmartMeter™ Devices Interfered With Customers' GFI Circuit Breakers

Location in CPUC Report:

Sample text: "Pilot test to identify common causes for interference revealed multiple causes." (May 2009, page 9)

Context:

- PG&E has seen instances where the Silver Spring Networks Electric SmartMeter™ device can interfere with certain types of GFI (ground fault interrupter) circuit breakers in meter panels adjacent to the meters.
- The interference causes the circuit breaker to trip, causing a partial interruption in power to the customer's premise.
- This was first observed by Modesto Irrigation District in its smart meter deployment and generally is indicative of meter panels that do not meet UL standards.
- This issue does not relate to the accuracy or safety of our SmartMeters™.

Resolution:

- PG&E began working with SSN to develop a solution to enable meter-installation despite such proximity between the meter and the panel.
- During this time, our installers bypassed 21,600 customer premises with this proximity issue to avoid any interruption in service.
- We now have developed a solution for this concern, and will resume SmartMeter™ deployment to these 21,600 customer premises.

Issue:

PG&E Ceased Sending Customer Letters in 2007 Before Resuming in 2009

Location in CPUC Report:

Sample text: “The requirement of sending letters to customers in advance of impending installs is cancelled, however door-hangers must continue to be installed at each visit.” (May 2007, page 11)

Context:

- PG&E made this decision at the start of SmartMeter™ device installation, at which time approximately 200,000 devices had been installed
- At that time, the company had received no customer inquiries or complaints.

Resolution:

- After PG&E experienced customer service issues in the Summer of 2009, the company substantially modified its customer-facing communications processes including, but not limited to:
 - A detailed welcome kit;
 - Community meetings prior to implementation;
 - Establishment of Answer Centers in areas including Bakersfield, Fresno and Oakland.
- This issue does not relate to the accuracy or safety of our SmartMeters™.

Issue

PG&E's Steering Committee Reports Reflect Periodic Project Delays and Issues Encountered While Developing and Rolling Out the Underlying SmartMeter™ Information Technology Capabilities

Location in CPUC Report:

Sample Text: "Delay in project completion due to revisions in test plans and approach; requires contingency draw" (October 2009, page 4)

Context:

- The IT-development work associated with the implementation of advanced AMI capabilities on the scale that PG&E has undertaken – 10 million meters – is unprecedented in the industry.
- Implementing this technology on such a massive scale necessitated addition of operational systems to receive, manage, process and analyze the enormous volume of data that SmartMeter™ devices provide.
- To put this in perspective, these advanced meters provide hourly- and quarter-hourly interval data, whereas we read our traditional electromechanical meters just twice monthly.
- This systems-development work makes this data available to customers via the Internet, enables its use in billing to permit time-based pricing, and facilitates the improvement of the reliability and efficiency of the electric grid.
- Through the course of this project work, PG&E partnered with such key vendors as Oracle, Ecologic Analytics, SSN, and Aclara to design, develop, test and deploy these advanced capabilities.
- The reports represent the SmartMeter Steering Committee's real-time discussions, as reflected in these detailed work papers, regarding the issues that the Company encountered and overcame throughout the development of these systems.
- The systems had to meet high quality and reliability standards before deployment. Rigorous testing plans were developed and continuously enhanced. Like any major IT-initiative in any industry, we closely monitored the progress of these initiatives, and adjusted plans and schedules as appropriate in order to ensure system-deployment with a high level of quality and reliability.
- Through the hard-work and dedication of PG&E employees and technology partners, these issues have consistently been overcome, enabling the current and future delivery of the smart grid's benefits to our customers.

Issue:

PG&E Experienced Communication Difficulties With Its Earlier-Generation Electric SmartMeter Technologies: DCSI and Aclara Electric.

Location in CPUC Report:

“Poor read performance (< expected 96%) on ~ 13,674 of the installed Aclara electric meters.” (May 2009, page 9)

“High defects relating to DCSI code in TNG 1.6.” (September 2007, page 6)

Context:

- PG&E found that its earlier-generation electric SmartMeter™ technologies, both DCSI and Aclara Electric (also known as Hexagram Electric) did not communicate at the high level that we expected.
- For example, our reports reflect “Poor read performance (< expected 96%) on ~ 13,674 of the installed Aclara electric meters.” This read performance is lower than the 99+% read rates that we have experienced with our current technology: Silver Springs Network.
- While Aclara Electric’s technology provided adequate performance for basic functionality, PG&E discontinued the use of the Aclara Electric technologies and began phasing it out in 2009.
- Moreover, DCSI’s initial technology, called power-line carrier (“PLC”), which we selected based on available market technologies in 2005, was in practice more expensive than we initially believed and was not going to be able to provide the advanced functionality that later technologies were able to provide.
- The initial AMI order anticipated this likelihood, requiring PG&E to monitor for such advancement in AMI technologies and evaluate transitioning to those technologies (“referred to as “Technology Monitoring” in the AMI Order). PG&E did exactly that, leading it to propose an upgrade to the new Silver Springs network technology.
- With the approval of PG&E’s upgrade-proposal, PG&E began to transition to the SSN-based technology presently in place – which is meeting the expectations of advanced AMI capabilities and represent a significant improvement over the previous technologies.