

March 1, 2017

Staff Report to Senator Hill

RE: PG&E customers with unexpectedly high December 2016 and January 2017 bills

Summary

Rate Structure:

- Residential gas bills are structured in two tiers: customers are charged at the Tier 1 rate, which is below the marginal cost of gas, until they reach a specified usage. Subsequent usage is charged at the Tier 2 rate, which is above marginal cost of gas.
- The difference between Tier 1 and Tier 2 winter gas rates is roughly 40%.
- The amount of usage allocated to Tier 1 is called the “baseline allocation” and is set to be 70% of the average customer use during the winter.
- The baseline allocations are calculated at different levels for different parts of Pacific Gas and Electric Co (PG&E) service territory to account for climate differences, allowing customers in colder climates larger baseline allocations than those customers in milder climates.

Findings:

Gas and electric bills submitted by customers of Pacific Gas and Electric Co. (PG&E) were analyzed to determine possible causes for unexpected bill increases in December and January.

- Bills were consistent with published rate schedules in all cases examined.
- PG&E system usage was higher in January 2017 than January 2016, likely because of more sub-40°F nights. Weather in December 2016 was similar to that in December 2015 and so unlikely a significant factor in any December bill increases (Figure 2).
- Large bill increases occur because many of the factors are not additive but multiplicative, such as:
 - Recent rate increases
 - Higher usage (21% system-wide increase)
 - Higher wholesale natural gas commodity prices
 - More usage leads to a higher percentage of use in Tier 2.
- Because these factors multiply, a 20% increase in usage from January 2016 to January 2017 can lead to a 40% higher bill.
- December and January billing periods have too low a baseline allocation—roughly 55% instead of 70%—so customers have an unnecessarily higher proportion of usage in Tier 2. This is because the baseline allocation is determined by the average customer usage from November to March, even though usage is significantly less in November and March than it is in December and January.
- Perhaps the largest factor contributing to bill shock is that thermostats and other temperature control devices operate without customer intervention, and so customers often don’t know that they’ll get a high bill until it is too late. This is not the case with other energy sources, such as gasoline. The CPUC has examined this challenge in electric rates but not in gas rates.
- *Why* some customers had soaring usage—hence soaring bills—was not determined, as bills explain how usage is translated to the money customers must pay, but bills do not explain *why* usage is high.

Recommendations:

This memo makes the following recommendations:

1. PG&E and the California Public Utilities Commission (CPUC) should re-examine Tier 1 allocations to ensure that they comport with the statutory mandate of between 60-70% of the average customer's usage during the winter.
2. PG&E and the California Public Utilities Commission (CPUC) should consider splitting the winter gas baseline period in two, which would likely
 - o Lower January and December bills—historically the highest usage months in Northern California—by increasing the Tier 1 rate usage allocation and lowering both Tier 1 and Tier 2 rates for those months
 - o Dampen bill volatility
 - o Better buffer customers against bill increases caused by abnormally cold wintersThis change would raise November and March bills by decreasing the Tier 1 rate usage allocation and increasing the rates.
3. PG&E and the CPUC should consider how to go beyond billing information to determine why some customers have consistently significant higher-than-average bills in order to help those customers reduce their usage, perhaps through onsite energy audits.
4. PG&E and the CPUC should consider how to better signal to customers when and how to reduce their usage to avoid receiving unexpectedly high bills at the end of winter months.
5. The CPUC should examine the extent to which PG&E customers use price alerts to manage their bills and how effective those alerts are. PG&E should develop metrics for customer engagement with their bills and consider setting goals for use in its executive bonus compensation program.

Methodology

PG&E customer gas and electric bills submitted to this office were analyzed to determine the reason for unexpectedly high utility bills in December 2016 and January 2017. Bill costs were confirmed against published rate data, and cases were simulated using Microsoft Excel. Tiered residential gas schedule G-1 and tiered residential electric schedules E-1, E-1 (all-electric), EL-1, and EL-1 (all-electric) were examined. Time of use schedules were not examined due to a lack of hourly data for comparison. Weather information was obtained from RAWS (remote automated weather system) data for Ben Bolt (El Dorado County, 904 ft. elevation, PG&E baseline territory "S") and Los Altos (Santa Clara County, 645 ft. elevation, PG&E baseline territory "X") stations.

Significant bill increases caused by rate increases, usage increases, and tiered pricing

PG&E gas bills are generally higher for this winter than they were last winter. For a customer with the same usage, this increase was 18-20% for December and roughly 10% for January. These increases are based on the increase in the wholesale cost of natural gas and on rate increases approved by the California Public Utilities Commission (CPUC) in 2016. Natural gas usage, however, was higher in January 2017 than in January 2016, and the inclining block tiered rate structure can turn a 20% increase in usage into a 40% increase in bill.

Bills provided to the office were compared to PG&E’s published gas and electric rate schedules. All bill costs were commensurate with usage listed on bills. Many bills had significant cost increases from prior billing periods and prior years.

Bill cost differences between months—for instance between November and December—are to be expected, as much more energy is generally used for heating in December than in November. To determine reason for unexpectedly high bills this winter, bills were modeled using published rate schedules and model usage data.

Gas and electric rates increased in 2015 and 2016

PG&E rates have increased through a number of cases in the past few years:

- PG&E’s 2014 General Rate Case, approved by the CPUC in August of 2014, led to an increase of 8.5% on the average electric bill and 4.1% on the average gas bill.
- PG&E’s 2015 Gas Transmission and Storage Rate Case, approved by the CPUC in June of 2016, led to a 14% increase on the average gas bill. The increase was primarily fueled by PG&E’s requests for funds to improve gas pipeline safety in the wake of the 2010 explosion in San Bruno.
- The lateness of the 2015 Gas Transmission and Storage Rate Case required the rate increase—intended to begin in January of 2015—to be spread over 2.5 years instead of 4 years, leading to a larger than expected rate increase in mid-2016.
- PG&E has a pending application before the Federal Energy Regulatory Commission to increase its electric transmission rates, which would appear in future electric bills.

Natural gas wholesale price increases have led to a 28.5% increase in the cost of gas for PG&E from January 2016 to January 2017, increasing the average bill by 4%

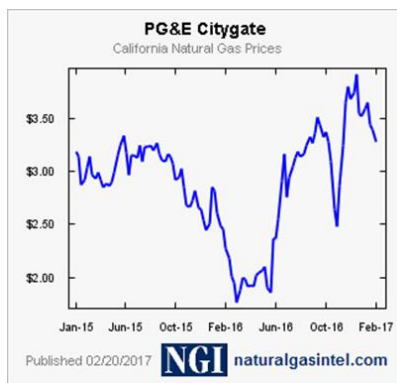


Figure 1: Wholesale natural gas commodity prices at PG&E’s Citygate hub.

Wholesale natural gas prices have been low for the past several years, but have nonetheless fluctuated significantly. PG&E’s weighted average cost of gas has increased 28.5% from January 2016 to January 2017, and this increase is passed on to customers. Customers have only been partially exposed to wholesale commodity price fluctuations, as PG&E has significant portions of its supply under firm contract. PG&E and its customers are partially insulated from seasonal fluctuations, as it uses its storage fields to supply winter gas.

While contracts and storage may temporarily prevent price spikes, if wholesale natural gas prices increase significantly and remain high for a significant stretch, customers could see higher prices in future winters.

Usage was 21% higher in January 2017 than it was in January 2016

Many of the bills examined had higher energy usage—particularly in January—this winter than last winter. PG&E data on gas usage for residential and small commercial customers is consistent with customer perception of greater usage. While the average daily gas usage was only 1.0% higher in December of 2016 than it was in December 2015, average daily gas usage in January was 21% higher

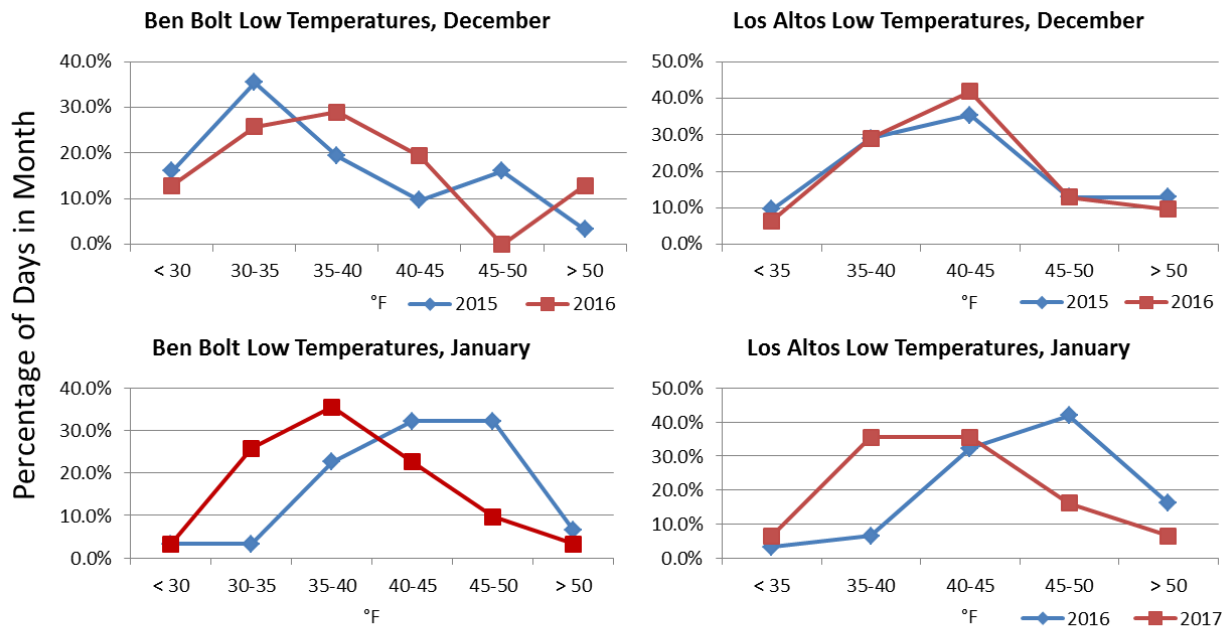


Figure 2: Low temperature ranges at Ben Bolt and Los Altos remote automated weather stations for December and January. While the distribution of low temperatures in December at both sites were similar both years, both sites had more colder January days in 2017 than in 2016.

year-over-year. In fact, January 2017 saw the greatest PG&E system gas usage since January 2013.¹ We are unable to definitively determine the cause for the increased usage, but a colder January is likely to have played a significant role.

More cold days in January 2017 likely to have led to increased gas usage over January 2016

Both temperature and humidity determine how much energy is required to heat or cool one's home to the desired temperature. To examine the difference of temperature and humidity between December and January this year and last year, atmospheric data from the Ben Bolt and Los Altos remote automated weather stations (RAWS) were examined. Ben Bolt station is located in western El Dorado County 15 miles southeast of El Dorado Hills, and Los Altos station is located one mile west of Foothills College in Los Altos Hills.

Humidity can increase heating costs, as energy is required not only to heat the air but also the water within the air. Average temperatures and average relative humidity were used to calculate the absolute humidity (relative weight of water to air) both December/January last year and December/January of this year. Though dependence on *average daily quantities* introduces assumptions in the calculations (as will be discussed below), no significant differences in the moisture content of air were found, suggesting that humidity did not likely contribute to higher energy usage.

Though average temperatures in December of in 2016 and 2015 differed by less than 1°F, the average temperature for January 2017 was significantly lower—by 4.0°F at Ben Bolt station and 3.6°F at Los Altos station. Averages, however, do not tell the whole story, as heating energy usage is more correlated to the number of cold days than it is to the average. As can be seen in **Figure 2**, both sites had considerably more cold low temperatures in January of 2017 than in January of 2016. The standard deviation in temperatures was greater in January of 2017 than in January of 2016, indicating a wider distribution of temperatures, suggesting that the difference in heating need between the two years is even greater than the difference in average temperatures would imply.

¹ http://www.pge.com/pipeline/operations/historical_archives/mo_customer_class/index.page

Nonetheless, some of the customer bills analyzed appeared to be too high even in warmer months. Many of these customers are on a fixed income. Ultimately, the reasons for apparently high “normal” usage were undetermined, as bills tell how much energy was used, but they do not explain why. PG&E and the CPUC should find ways to look beyond bills to help customers figure out how to lower their energy usages, and they might not be able to do so without on-site energy audits.

Many customer gas usage increases were in Tier 2 rates, which are roughly 40% higher



Figure 3: Map of PG&E territories used to determine baseline allocation. Different letter territories have different baseline allocations. Courtesy of pge.com.

The Warren-Miller Lifeline Act of 1976 (Act) required the California Public Utilities Commission (CPUC) to create a “tiered” system by designating a baseline quantity of gas and electricity necessary to supply a significant portion of the energy of the average residential customer at below-average cost, while additional usage would be charged at above-average cost. The goal had been to provide equitable rates and encourage conservation. The Act required that the baseline quantity for electricity cover between 50% and 60% of average use and that for gas (and electricity, if electricity was also the heating source) to be between 60% and 70% of average usage.² PG&E, with the approval of the CPUC, has set the baseline gas level to be at the high end—70%—of average usage in the winter.³

Baseline amounts are set based on geographic territory, allowing customers inland and at higher elevations more baseline energy at the lower rate than customers on the coast, as climate leads to greater heating needs for the former than the latter (**Figure 3**).

The difference between Tier 1 (baseline) and Tier 2 (above baseline) rates in winter months has been largely constant at roughly 40%, though the difference in summer months is around 45%. **Figure 4** shows how gas usage is charged at the lower Tier 1 rate until the baseline allocation for the month is reached. After the baseline allocation is reached, the remaining usage is charged at the higher Tier 2 rate. For example, if a household consumes its baseline allowance halfway through the month, the second half of the month will be charged at a rate roughly 40% higher.

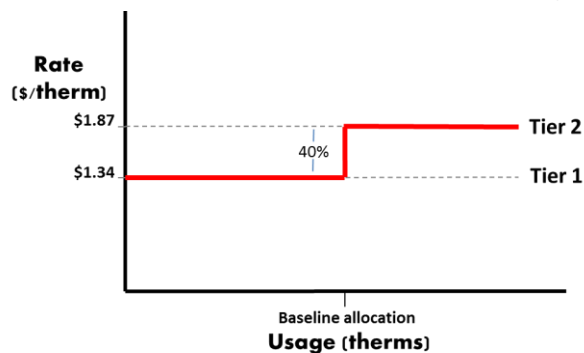


Figure 4: January 2017 gas rates. Tier 2 rates are 40% higher than Tier 1 rates

² Public Utilities Code § 739.

³ Settlement, 2014 PG&E General Rate Case, Phase II (Decision Application 13-04-012) , p. 7. <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M101/K125/101125976.PDF>

Winter baseline allocations are inconsistent with statutory requirements, leading to higher bills in the coldest months

The jump in bills that customers see between November and December is not solely attributable to increased usage, but also reflects artifacts of how the baseline allocation is calculated. Gas baseline allowances are calculated to be the statutory maximum of 70% of the average customer’s use in two

Month	% of Usage in Tier 1
November	88.5%
December	57.2%
January	56.6%
February	70.5%
March	92.4%

Table 1: “Average” user’s baseline allocation as a percentage of total usage (territory “S”)

seasons—summer and winter. Within the winter season, however, customers have dramatically different usages depending on the month, and so the “average” customer in the average year has significantly less of their usage in Tier 1 cold months as he or she does in warmer months. As can be seen in **Table 1**, when gas usage (and bills) are low, the “average” customer has nearly 90% of usage in the Tier 1. In December and January, on the other hand, the “average” customer has less than 60%. In fact, in no winter months is the baseline within the statutorily mandated range of 60-70%. The effect of this is to depress bills in November and March and cause them to spike December-January. As can be seen in **Figure 5**, November and December have had consistently different usage, but they have the same baseline allocation.

This effect is partially responsible for why customer bills jump from November to December, creates bill volatility, and leads to greater exposure to higher December and January bills during abnormally cold winters.

PG&E and the CPUC should consider creating a transition baseline season between summer and winter that includes November and March. By splitting the winter into two baseline seasons, customers would benefit from lower rates and higher baseline allocations in the coldest months in exchange for lower allocations and higher rates in the transition season. The effect can be seen in **Table 2**, in which baselines and rates were changed to keep the seasons approximately revenue-neutral (given the use of “average” data). The Tier 1 usage for the average customer in baseline territory “S” under the transition season scenario is much closer to 60-70% statutory requirement.

Though no similar analysis was performed for the baseline allocations for homes using electric heating (“all-electric”), the December/January volatility and bill spike could be even worse as the winter season also includes April. Such an increase may, however, be masked by other electric usage in a single large bill. Changing the winter season for gas would also suggest changes in the all-electric baselines and rates.

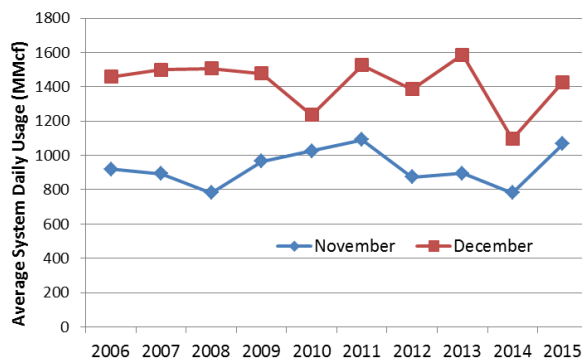


Figure 5: Average Residential & Small Commercial Usage, 2006-2016

* “Average” use for the purpose of the following calculation is approximate, as data for average use per baseline territory and the number of customers in each baseline territory was unknown at the time of this report. Calculations assume the baseline allocation territory “S” is at its stated 70% of average use and is a good proxy for the weighted average baseline in all PG&E territories. Roughly 3% error in the calculations can be expected.

Table 2: Gas Bill Leveling Through Adoption of Transition Baseline Season

Average Bill, Baseline Territory "S"	Today's 5-Month Winter			Proposed 3-Month Winter, 2 Month Transition				
	Daily Baseline (therms)	Bill (\$)	% Usage in Tier 1	Daily Baseline (therms)	Bill (\$)	% Usage in Tier 1	Bill Difference (\$)	Difference %
November	1.92	\$83.77	88.5%	1.49	\$97.08	68.5%	\$13.31	15.9%
December	1.92	\$149.62	57.2%	2.21	\$140.06	65.9%	-\$9.56	-6.4%
January	1.92	\$159.88	56.6%	2.21	\$149.99	65.1%	-\$9.89	-6.2%
February	1.92	\$113.21	70.5%	2.21	\$105.27	81.1%	-\$7.94	-7.0%
March	1.92	\$71.35	92.4%	1.49	\$80.81	71.5%	\$9.45	13.3%

PG&E has proposed a similar change in its 2017 General Rate Case application to alleviate high electric bills due to air conditioning in hot regions, proposing to reduce the summer electric season from 6 months to 4 months to “dampen the volatility in the Central Valley, especially Kern County,” also noting that “[n]ot only is bill volatility significantly dampened, bills drop by an average of 7 percent during the four most extreme months, June-September.”⁴ PG&E has not, however, proposed to change the baseline seasons for natural gas.⁵ The CPUC should also consider how PG&E’s proposed increase of the “winter” electric rate season from six to eight months might affect the December through February bills of all-electric customers (who rely on electricity for heating), as it is likely to lower their baseline allocation December through February, putting them at even greater risk for higher bills in the coldest months.

In consideration of a possible baseline transition season, PG&E and the CPUC would need to use PG&E’s extensive customer data to consider not just the effect on the “average” customer under average weather (usage) conditions, but the effect on many types of customers under a variety of scenarios.

Customers have limited ability to understand their usage and its cost implications until after their bill comes, which is too late

Unlike with gasoline in an automobile, in which customers buy fuel in increments, see the price immediately upon purchase, and have a gauge 18-inches from their view to monitor usage, gas and electric customers generally do not have signals that would help correlate their behaviors to their usage to the price they need to pay for utility service except in the form of a bill that comes at the end of the month, after the usage has occurred. Additionally, utility customers such as gas have highly seasonal usage patterns, and receiving November’s gas bill provides little guidance to how to keep usage (hence cost) low for December.

While the ability to store natural gas in both storage fields and in the pipeline largely eliminates the operational concerns that drive time-of-use pricing in electricity markets, the poor price signaling of tiered rates is clearly at work in gas bills, leading to the surprise of many customers at seeing such high gas bills.

⁴ PG&E 2017 General Rate Case Phase II (A.16-06-013), prepared testimony, Exhibit PG&E-1, Volume 1, Chapter 4, p. 4-6. <https://pgera.azurewebsites.net/Regulation/ValidateDocAccess?docID=378136>

⁵ *Id.* p. 4-11.

To mitigate this problem, PG&E offers a “balanced payment plan” that spreads the expected cost of high gas and electric usage months over the entire year with the goal of making bills more constant from month to month as well as price alerts to provide notification to customers when they reach an expected gas bill cost threshold. Customers can sign up for an alert through their online account and can receive notifications via text, email, or a phone call. This alert system can only be considered effective if a significant number of customers have signed up for these alerts. Even so, alerts have drawbacks. A price/usage alert set for a low-heating month such as June is irrelevant to a winter month like December, as is the reverse. Additionally, those participating in the SmartMeter opt-out program have no access to usage information except to read their meters themselves or wait for their bills.

Electric tiers have undergone dramatic changes since the beginning of the last decade. Before the electricity crisis, PG&E had only two tiers for electricity. After the crisis, it had five tiers. PG&E is now at three tiers, and customers can enroll in one of two time-of-use pricing schedules, with “peak” rates higher than “off-peak” rates, meant to incentivize customers to shift their electricity usage from high to low system demand. Part of the rationale for time-of-use electricity pricing is that many believe that tiered rates don’t actually encourage conservation, as customers have poor signals to tell them when their bill will be high. The state’s 2008 Energy Action Plan Update highlighted this problem in the context of electric rates, stating that

“Although [consumers] are encouraged to conserve energy overall through tiered tariffs where higher usage costs more, there is no time dimension to their prices that would help encourage reducing usage at peak times when electricity is the most expensive.”

PG&E and the CPUC should consider how to better signal to gas and all-electric customers when and how to reduce their usage to avoid unexpectedly high bills at the end of winter months. PG&E has allocated 25% of its 2017 employee bonus compensation program to customer measures—15% to a customer survey and 10% to a reliability measure.⁶ PG&E should consider setting a goal for customer engagement with their bill—through price alerts, balanced payment plans, or by some other means—and adding this goal to its 2018 bonus compensation program.

⁶ Called the “Short Term Incentive Program.” <http://d18rn0p25nwr6d.cloudfront.net/CIK-0001004980/f6d39e70-f48c-49a4-ae1b-1c4937b1e1e7.pdf>

Appendix: PG&E’s average daily system use for core (residential and small commercial) customers from the 2006-07 year until this February.⁷

Table 3: Average Daily Residential/Small Commercial PG&E System Gas Use (MMcf)

	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Average
November	920	894	783	966	1,025	1,092	873	895	781	1,066	827	920
December	1458	1,500	1,508	1,478	1,237	1,526	1,385	1,586	1,097	1,427	1,441	1422
January	1690	1,632	1,318	1,388	1,459	1,425	1,659	1,197	1,254	1,262	1,532	1438
February	1231	1,283	1,234	1,109	1,374	1,178	1,288	1,059	866	920		1154
March	803	907	960	979	1,061	1,082	825	746	651	792		881
April	695	758	712	862	748	770	600	659	616	563		698
May	564	526	507	615	657	543	494	475	536	491		541
June	504	442	430	455	518	448	433	434	416	394		447
July	443	418	397	428	428	423	419	397	367	388		411
August	441	410	408	462	446	438	413	393	362	421		419
September	475	442	435	443	460	475	438	412	386	417		438
October	614	530	588	554	564	539	602	467	412	506		538

Blue boxes indicate winter baseline months. Red boxes indicate summer baseline months.

⁷ From http://www.pge.com/pipeline/operations/historical_archives/mo_customer_class/index.page