

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking on the
Commission's Own Motion to Conduct a
Comprehensive Examination of Investor
Owned Electric Utilities' Residential Rate
Structures, the Transition to Time Varying and
Dynamic Rates, and Other Statutory
Obligations.

Rulemaking 12-06-013
(Filed June 21, 2012)

**OPENING COMMENTS OF PACIFIC GAS AND
ELECTRIC COMPANY (U 39 E) ON RATE DESIGN
PROPOSALS**

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I. INTRODUCTION

Pursuant to the June 21, 2013, Administrative Law Judge's Ruling, Pacific Gas and Electric Company (PG&E) provides its opening comments on the rate design proposals in this proceeding. As discussed in more detail below, PG&E's comments make the following key points about the parties' rate design proposals:

- As a general matter, the rate design proposals demonstrate an important consensus that the current residential electric rate design structure is unfair and inequitable and requires significant reforms, including legislation authorizing the Commission to approve needed rate design reforms.^{1/}
- Most of the rate design proposals support replacing the current "tiered," steeply inclining block rate structure with some form of time-variant pricing in order to more efficiently and rapidly reduce the need for new power plants and to achieve

^{1/} See, e.g., TURN Proposal, pp. 3, 78; EDF Proposal, pp. 6-7, 9, 41; CLECA Proposal, pp. 2- 5, 14, 39; DRA Proposal, pp. 45- 46.

California’s ambitious energy and environmental goals.^{2/} However, some parties – notably the Sierra Club (Sierra Club) and Natural Resources Defense Council (NRDC) – continue to support steeply tiered rates.^{3/} These parties rely on flawed assumptions and unsupported theories about the conservation effects of tiered rates, and ignore the net improvement in conservation-related price signals to all customers that can result from flattening of existing tiered rates. PG&E supports flattening tiered rates as much as practicable and legally possible, subject to an adequate transition for existing customers and providing reasonable assistance to low-income customers for essential needs.

- TURN’s support for limited retention of “tiered” rates is based on theories and data regarding customer income and electricity usage that are flawed, selective or misinterpreted.^{4/} PG&E’s evaluation of more granular and comprehensive customer income and usage data throughout its service territory demonstrates that income and electricity usage are *not* significantly correlated for most moderate income customers with incomes below \$100,000, and therefore the current residential tiered rate structure is unfair and seriously hurts the economic well-being of millions of PG&E moderate income customers, especially working class families.
- Unfortunately, several of the rate design proposals appear to pay insufficient attention to a fundamental goal of electricity pricing and rate design: that prices and bills to residential customers must provide residential customers with simple and understandable choices that meet their different needs to save money and support their everyday uses. During the remainder of this proceeding, PG&E hopes that all parties will put “customer choice” and “simplicity” at the forefront

2/ See, e.g., generally, EDF Proposal, SCE Proposal, DRA Proposal, SEIA/Vote Solar Proposal, SDG&E Proposal.

3/ Sierra Club Proposal, pp. 2- 4; NRDC Proposal, pp. 2, 8- 12.

4/ TURN Proposal, pp. 14- 24.

of their recommendations for rate design reform.

- The Greenlining Institute and Center for Accessible Technology (Greenlining/CforAT) repeat several previous arguments against rate design reform and make new proposals that would further exacerbate the current broken rate structure.^{5/} The Commission already has ruled that changes to the eligibility and terms of service for CARE customers, such as Greenlining/CforAT’s proposed “arrearage management program,” are outside the scope of this proceeding, which is limited to considering rate design issues for both non-CARE and CARE customers.^{6/} Nonetheless, to the extent Greenlining/CforAT advocate for better targeting of CARE assistance and more effective assessment of low income customer needs, PG&E supports that request and will work with parties in the next CARE proceeding to consider reforms that would achieve better targeting of assistance, consistent with the cost-based rate design reforms proposed by PG&E and the parties in this proceeding.^{7/}
- The Solar Energy Industries Association (SEIA) and Vote Solar Initiative (Vote Solar), representing manufacturers and vendors of solar photovoltaic (PV) rooftop systems, argue that the schedule for transitioning solar customers to rates without the current extreme tiers should be delayed, because “they should not be subject to an immediate and substantial reduction in the cost-effectiveness of their investment [in rooftop solar systems].” (SEIA/Vote Solar Proposal, p. 7.) Likewise, they argue that solar customers should be exempt from a more accurate allocation of the fixed costs of electric service to residential customers because fixed cost charges “could undermine the stability of [their] customers’ investments in renewable DG.” (*Id.*, pp. 7- 8.) In light of the fundamental

5/ Greenlining/CforAT Proposal, pp. 48- 54, 59- 71.

6/ *Administrative Law Judge’s Ruling on Workshop*, R.12-06-013, January 31, 2013, pp. 7- 8.

7/ D.12-08-044.

principle of non-discriminatory and non-preferential rates, the SEIA/Vote Solar proposal for special treatment of their customers should be rejected. The goal of rate design reform should be to return rates closer to cost for *all* customers, not to exacerbate the existing problem by requiring other residential electricity customers to pay for costs of service that residential solar PV customers otherwise should pay.

- The parties who criticize the use of a fixed charge to recover fixed costs ignore a significant customer benefit of a fixed charge – a fixed charge moderates the volatility of many customers’ monthly bills due to extreme weather events, such as the extreme heat waves that California periodically experiences during summer months.^{8/}

II. THE RATE DESIGN PROPOSALS REPRESENT A CONSENSUS FOR LEGISLATIVE AND REGULATORY REFORM

PG&E appreciates that practically all the rate design proposals filed in this proceeding support the need to reform the residential electric rate design structure, including enacting legislative changes to allow the Commission to consider and approve those needed reforms. In addition to PG&E, SCE and SDG&E, a broad spectrum of other parties support fundamental rate design reform. Although PG&E and these parties do not agree on precisely what reforms should be adopted, it is notable that there is such universal agreement among normally adverse parties on the fundamental need for reform.

For example, The Utility Reform Network (TURN):

“[A]grees that the present rate design, with such large and uneven tier differentials, may not be sustainable if average rates continue to rise in excess of inflation. If average residential rates spiral upwards, the current rate design (assuming ongoing statutory restrictions on Tier 1 and 2) would yield tier differentials that place greater burdens on customers who regularly consume larger than average amounts of electricity. As a consequence, the larger tier differentials would significantly exacerbate bill volatility resulting from changes

8/ DRA Proposal, p. 32; Sierra Club Proposal, p. 10; NRDC Proposal, pp. 29- 34.

in consumption, especially changes caused by extreme weather events.”^{9/}

TURN also agrees that:

“...Under current law (as amended by SB 695 in 2009), there are specific binding restrictions on increases to non-CARE Tier 1 and 2 rates and on changes to CARE Tier 1, 2 and 3 rates. All of these statutory restrictions must be modified...”^{10/}

Similarly, the Environmental Defense Fund (EDF) makes the case for rate design reform as follows:

“California’s current rate structure leads to higher system costs, inflated consumer bills, negative environmental consequences and hinders innovation and investment in clean energy products and technologies...The existing tiered rate structure does not meet California’s efficiency, environmental, and consumer objectives ...[The] current tiered residential rate structure was put in place – and has evolved over time – to address California’s energy crisis, support low-income ratepayers and promote environmental and other goals. The current rate structure, however, is no longer the best means of accomplishing these, or other state-wide policy goals. With the near universal deployment of smart metering infrastructure, time-variant tariff structures that more closely align with cost causation and marginal cost principles can now be adopted. Rates that provide price signals reflecting the cost of production, which current flat rates cannot, harvest the environmental and economic benefits of California’s smart metering investments....In order for EDF’s full vision of a pure TOU, TVR, and dynamic rates system in the absence of tiers to be achieved, however, 739.9, implemented after the California energy crisis, may need Commission interpretation, change, or expiration.”^{11/}

The California Large Energy Consumers Association (CLECA), representing business customers, explained the basis for its support for reform of the residential rate structure:

“Why is a group of industrial customers interested in residential rate design? Residential rate design affects all customer classes for several reasons. Residential rate design affects residential usage patterns and thus overall system costs. California utilities now have low load factors and large summer peaks. This results in spreading fixed costs over relatively less load, raising rates. Residential rate design that rewards changing residential load patterns in ways that lower costs could benefit the entire system, as well as reducing costs to serve residential customers.

... Tiered rates fail to recover fixed costs or variable costs in the time periods they are incurred. Thus they fail on cost causation. They send incorrect price signals.

9/ TURN Proposal, p. 3.

10/ *Id.*, p. 78.

11/ EDF Proposal, pp. 6, 7, 9, 41.

Smaller users have less incentive to conserve. They provide no price signals as to when the incremental costs to serve load are high or when the system would benefit from reduced load. Large users pay disproportionate rates compared to costs at the margin. Increasing block rates are inefficient -- the marginal cost of one more unit of consumption is not much higher for the one kWh that puts a customer in a higher tier. Tiered rates provide no incentive for load-shifting like pre-cooling or reducing loads on over-loaded substations. Tiered rates provide no indication of temperature-driven system costs or local loading or to decrease usage during evening peaks.

...The following Public Utilities Code Sections are legal barriers that would hinder the implementation of CLECA's proposed residential rate design. [Listing, inter alia, portions of Public Utilities Code Sections 739, 739.1, 739.7, 739.9 and 745, including sections reformed by AB 327 (Perea)] ... Ideally, none of these restrictions would be in statute, and the Commission would be able to fully exercise its expertise and authority in setting just and reasonable utility rates for the residential class and all other customer classes."^{12/}

Although supporting continuation of a form of complicated tiered rates, DRA nonetheless endorses the need for legislative reform to allow the current rate design structure to be modified:

"DRA's proposed rate design structure would require modifications to the following three Public Utilities Code ("P.U. Code") provisions: §739.9(a), §739.1(b)(2) and §745(d). These P.U. Code provisions, drafted in response to the 2001 energy crisis and subsequently revised in 2009, are no longer necessary in their current form."^{13/}

These disparate parties, representing a broad spectrum of stakeholders – ranging from consumer groups to environmental groups to businesses – share with PG&E and the other utilities the consensus opinion that legislative reforms are needed to return to the Commission the ability to address the fairness and reasonableness of residential electricity rates.

III. CONTRARY TO SIERRA CLUB AND NRDC, FLATTENING OF TIERED RATES WILL PROVIDE IMPROVED CONSERVATION PRICE SIGNALS AND ENVIRONMENTAL BENEFITS COMPARED TO EXISTING TIERED RATES

As discussed above, many of the parties recognize that the existing residential tiered rate structure provides seriously distorted and unfair price signals to customers, because the vast majority (over 75%) of PG&E's residential electricity usage is delivered at Tier 1, Tier 2 or

12/ CLECA Proposal, pp. 2- 5, 14, 39.

13/ DRA Proposal, pp. 45- 46.

CARE prices which are significantly below cost, thus disincenting conservation and subsidizing inefficient consumption by those customers. In addition, many parties recommend some form of time-variant pricing, including as a more effective means of reducing the need for new power plants, and related environmental and land use impacts.^{14/} Most parties also support the core ratemaking principle that electricity prices that customers pay should reflect the cost of serving those customers – not more, not less – *except* where other social goals are transparently included in electricity prices, such as assistance to low-income customers.^{15/}

In contrast, Sierra Club and NRDC argue that tiered rates are necessary in order to provide adequate incentives for conservation.^{16/} NRDC states that “studies” and “analysis” show that “tiered rates work” and are necessary to address “excessive use” of electricity and to recognize the fact that “only a portion of the environmental costs are reflected in the utility revenue requirement.”^{17/} NRDC also states that “Tiered rates are generally found to be well-received by customers.”^{18/} Similar to NRDC, Sierra Club states that “Tiered rates create important incentives for energy conservation and DG PV” and “a combination of tiered and TOU rates is essential to maximize conservation outcomes and achieve state clean energy objectives.”^{19/} Sierra Club also states that “[f]lattening tiers are [sic] likely to result in increased consumption. Conservation estimates using constant elasticity estimates that purport to show conservation from flatter tiers are based on simplifying assumptions that are not supported by basic economic theory.”^{20/}

The problem with NRDC’s and Sierra Club’s support for tiered rates is that *there is no empirical support in this proceeding for their argument that tiered rates will increase conservation. In fact, the evidence in this proceeding supports the contrary conclusion – that flattening California’s tiered rate structure will result in the same and possibly greater*

14/ EDF Proposal, pp. 6, 9; DRA Proposal, p. 3.

15/ *See, e.g.*, DRA Proposal, pp. 10- 11; SEIA/Vote Solar Proposal, p. 4; CLECA Proposal, pp. 3- 5.

16/ Sierra Club Proposal, pp. 2- 4; NRDC Proposal, pp. 2, 8- 12.

17/ NRDC Proposal, pp. i, 35.

18/ *Id.*, p. 35.

19/ Sierra Club Proposal, pp. 2.

20/ *Id.*

conservation than the current tiered rates.

Neither NRDC nor Sierra Club provides any analysis or relevant studies specific to the residential electric rate structure currently in place in California. NRDC cites a report prepared for the United States Environmental Protection Agency by ICF International which fails to provide any empirical evidence on California's tiered rate structure, and very little empirical evidence at all from anywhere.^{21/} NRDC also cites a Wisconsin study involving only several hundred customers from the 1990s, and some other studies from the 1970s and 1980s, none of which appears relevant to California's existing steeply tiered rate structure, or even to tiered rates currently in place anywhere in the country.^{22/} NRDC does cite to a June, 2012 survey by CPUC staff that NRDC argues found "significantly higher elasticities [of demand] against the upper block price than the lower block price (meaning that the increased consumption in response to a lower first block would be much smaller than the decreased consumption in response to a higher second block)."^{23/} However, to the contrary, that CPUC survey found that several studies concluded that inclining block pricing policies may have less impact than theorized, in light of other factors affecting usage as well as relatively low elasticity of demand generally.^{24/} NRDC also cites a general statement by Ahmad Faruqui, an energy economist, that "based on empirical estimates of price elasticity from a number of different sources, inclining block rates can provide energy consumption savings in the 6% range over a few years and even higher savings over the long run."^{25/}

The key point NRDC seems to be missing is that these studies need to be taken in context, and that one cannot categorically conclude that tiers will always incent conservation. The Faruqui study cited by NRDC and others, was for a case study where the utility did not already have multiple steeply tiered rates. It was moving from a flat rate structure to a tiered

21/ NRDC Proposal, p. 36.

22/ *Id.*, p. 37.

23/ *Id.*, p. 38.

24/ *Electricity Use and Income*, CPUC Policy & Planning Division, June 21, 2012, pp. 10- 11, <http://www.cpuc.ca.gov/NR/rdonlyres/609BC107-EF3C-4864-AD56-E964884D51AC/0/PPDElectricityUseIncome.pdf>.

25/ NRDC Proposal, p. 40.

rates structure with more than one price, therefore creating a price signal to incent customers to conserve in the upper tier, while reducing the incentive to conserve in the lower tier. PG&E agrees that the number of rate tiers in a rate structure is one factor in determining overall energy usage. However, regardless of the number of tiers, overall energy usage can either increase or decrease depending also upon the distribution of usage across different tiers, the degree to which the prices change, and the price elasticities of demand. It is an empirical question that must be evaluated on a case-by case basis.^{26/}

PG&E has done that by estimating that moving from the current rate design to a flatter design will result in a reduction in overall usage (i.e., will be pro-conservation).^{27/} Specifically, PG&E estimated the effect on overall residential usage of moving from (a) the current four-tiered non-CARE and three-tiered CARE rate designs to (b) non-CARE and CARE rate designs with just two tiers each.^{28/} Initially, PG&E assumed that the price elasticity of demand is -0.20 in all tiers. Based on this assumption, PG&E estimated that moving to a flatter, two-tier rate design would reduce overall usage by 3.2 percent. However, as noted above, the effect on overall usage is a combination of decreased usage in tiers seeing price increases and increased usage in tiers seeing price decreases. Thus, the results depend on the percentage changes in prices in each tier (in either direction), the distribution of sales across tiers, and the price elasticities. Since there is a degree of uncertainty about the price elasticity estimates, PG&E also looked at four alternatives to its initial assumption that the price elasticity was constant at -0.20 for all tiers. Table 1 shows the scenarios studied. Scenario 1 represents the base case of a constant price elasticity of -0.20

26/ For example, in Phase 2 of PG&E's 2011 General Rate Case, Ahmad Faruqui testified that his evaluation of PG&E's proposed rate changes designed to reduce upper-tier rates, including reducing the number of tiers from four to three, showed that PG&E's proposed rate changes would result in decreased sales in some tiers and increased sales in others – but would reduce residential sales overall.

27/ Moreover, the tier-by-tier approach to estimating changes in sales when some tier prices increase while others decrease may not even be appropriate, as Koichiro Ito's research has found that customers respond to average prices and not individual tier prices (see PG&E's May 29 rate proposal at page 52). Ito's study on tiers is the only empirical research involving California customers.

28/ This elasticity analysis was based upon December 2012 residential rates and actual 2012 sales. The two-tier rate designs for non-CARE and CARE assume a 1.2:1.0 ratio between the Tier 2 and Tier 1 rates, and that CARE rates are discounted by 20% from their respective non-CARE levels. To observe the impact of tier collapsing on energy conservation in isolation, we did not apply other changes to the rate structure in this analysis.

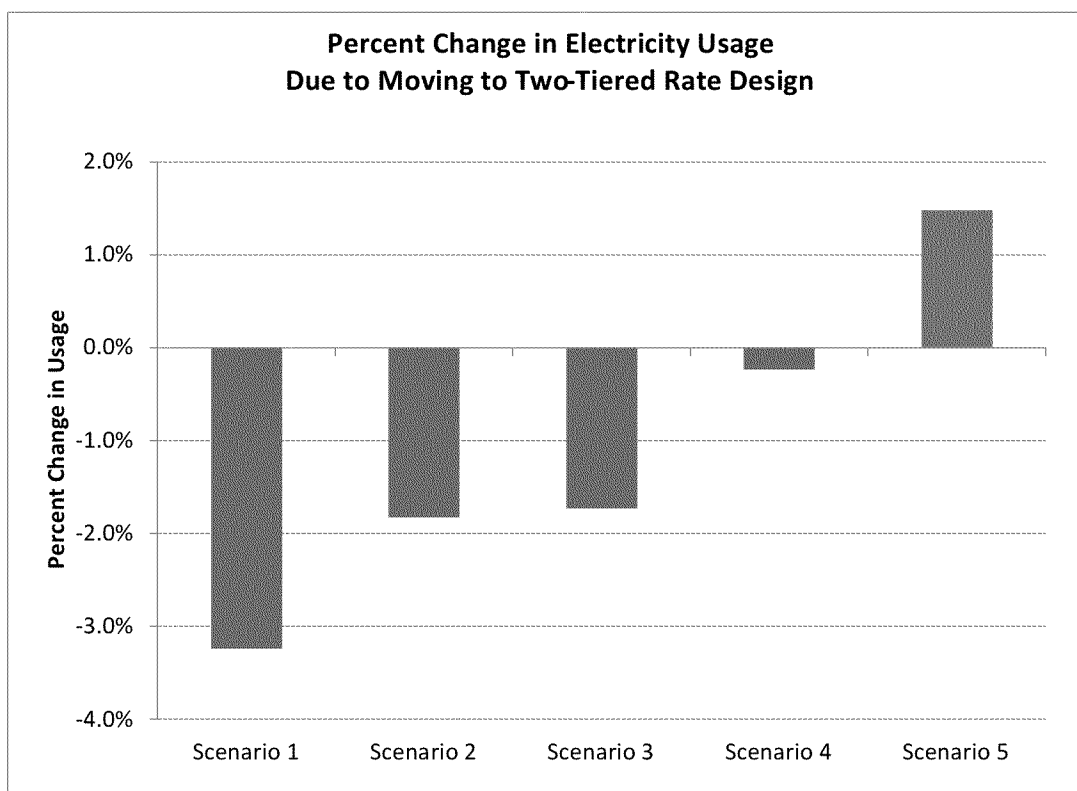
in every tier. Scenario 2 assumes this same -0.20 elasticity applies in Tier 1 and 2, but that the elasticity is twice as high, -0.40, in Tiers 3 and 4. Scenarios 3 through 5 represent other combinations of price elasticities in each tier, all of which show higher elasticities in the higher tiers. The expected effect of modifying the constant elasticity assumption in Scenario 1 and, instead, assuming higher elasticities apply in the upper tiers is as follows. In the upper tiers where the flatter, two-tier design results in decreased prices, the higher assumed elasticities will result in larger estimated increases in upper-tier sales relative to the constant elasticity case. This will have the effect of increasing overall residential sales relative to Scenario 1.

Table 1
Elasticity Scenarios Studied

Scenario	Tier 1	Tier 2	Tier 3	Tier 4
1	-0.20	-0.20	-0.20	-0.20
2	-0.20	-0.20	-0.40	-0.40
3	-0.13	-0.26	-0.26	-0.26
4	-0.10	-0.20	-0.30	-0.40
5	-0.01	-0.20	-0.30	-0.40

Figure 1 presents the results of the scenario analysis. As expected, the changed elasticity assumptions act to increase overall usage relative to the constant elasticity assumption. However, even with these modified elasticity assumptions, the effect of a flatter, two-tiered rate structure is to reduce overall residential usage in all but one scenario, Scenario 5. It is only when one assumes extremely steeply increasing price elasticities – where the Tier 2, 3 and 4 elasticities are, respectively, twenty, thirty and forty times as large as the Tier 1 elasticity – that the effect of PG&E’s rate proposal would actually be “anti-conservation” and increase overall residential usage.

Figure 1



Separately, Sierra Club cited economic theory in support of tiered rates, but stated that it has “insufficient data...to model the impact of all these ideas.”²⁹ In addition, Sierra Club made the unsubstantiated and rather startling claim that, despite paying upper-tier rates *more than double* the lower tier rates, upper-tier consuming households are somehow being subsidized by lower-tier consuming ones: “[t]he customers with highest consumption, and therefore highest cost causation, pay a rate that is below the average cost of service for residential customers overall, a cost recuperated from customers who consume the least energy. *In addition to being inequitable, this perverse outcome undermines the policy objectives of California’s loading order.*” (Sierra Club Proposal, p. 11, emphasis added.)

²⁹ Sierra Club Proposal, p. 12.

Sierra Club also proposes a set of rates where lower-tier consuming households pay summer on-peak rates that are lower than the off-peak rates paid in both summer and winter by upper-tier consuming households.^{30/} Costs vary by time-of-use period, but they do not increase with amount of cumulative usage a customer has during the month, and TOU rates should thus, as PG&E and EDF have proposed, be untiered.

None of NRDC's or Sierra Club's studies or sources on tiered rates has analyzed the specifics of California's tiered rate structure, where more than three-quarters (in the case of PG&E) of current residential electricity usage is priced *significantly below cost* and these customers therefore have an insufficient incentive to conserve, and the inclining block prices in the higher tiers represent less than a majority of all usage. As PG&E pointed out in its rate design proposal, this basic fact means that flattening tiered rates is likely to result in *reduced consumption overall* due to the increased incentive to conserve in the lower tiers where most of the sales occur (even if some increased consumption may result from reducing prices to the minority of usage priced at the upper tier rates).^{31/}

In addition to the lack of empirical support, NRDC and Sierra Club fail to take into account the results of customer research on tiered rates. As DRA concedes in its own transitional tiered-rate proposal:

“A caveat, however, must be made about the level of economic efficiency that can be promoted by [tiered rates.] The effective efficiency of both DRA's Introductory TOU and end-state TOU rates is reduced to the extent that customers do not understand their bills. Indeed, PG&E has several customer research surveys that indicate that many customers do not appear to understand the relationship between their bill and how they use electricity. This is partly because the energy bill is a small fraction of the average household's expenditures, and thus customers do not spend much time figuring out how the bill is calculated.”^{32/}

Similarly, the Environmental Defense Fund (EDF), an environmental group with similar goals as Sierra Club and NRDC, concludes that time-variant pricing, rather than tiered rates, is

30/ NRDC's proposed rates have a similar problem.

31/ PG&E Rate Design Proposal, pp. 51- 54.

32/ DRA Proposal, p. 31.

the preferable rate design structure to achieve California's environmental and conservation goals:

“The existing tiered rate structure does not meet California's efficiency, environmental, and consumer objectives ... With the near universal deployment of smart metering infrastructure, time-variant tariff structures that more closely align with cost causation and marginal cost principles can now be adopted. Rates that provide price signals reflecting the cost of production, which current flat rates cannot, harvest the environmental and economic benefits of California's smart metering investments.”^{33/}

DRA and EDF support the conclusion that California's tiered rate structure needs to be replaced by a time-variant pricing structure with flatter or no tiers and a transparent discount for low income customers. NRDC and Sierra Club have provided no evidence or analysis to support the opposite contention that continuing the existing 4-tiered rate structure would provide more conservation and more environmental benefits than the flatter, time-variant pricing structure proposed by PG&E and other parties in this proceeding.

PG&E has analyzed the impacts of simplifying the current multi-tiered rate structure into a structure with two tiers and a less steeply inclining block structure, and the question of conservation is an empirical one, not a theoretical one. NRDC and Sierra Club have cited no empirical evidence to support their theory that California's existing tiered rates would provide more conservation benefits than the flatter, more cost-based rates proposed by PG&E and other parties in this proceeding. To the contrary, the empirical evidence cited by PG&E indicates that it is likely that flatter rates in California will maintain or even improve conservation benefits compared to the existing rate structure.

IV. CONTRARY TO TURN, INCOME AND ELECTRICITY USAGE OF PG&E RESIDENTIAL CUSTOMERS IS NOT SIGNIFICANTLY CORRELATED, AND THUS MILLIONS OF PG&E MODERATE INCOME CUSTOMERS ARE UNFAIRLY HURT BY TIERED RATES

TURN presented tables in its proposal purporting to show that there is a significant correlation between income and the average rates paid by non-CARE residential customers, in order to justify its position that multi-tiered rates represent a sound rate design structure.^{34/} In the

33/ EDF Proposal, pp. 6, 7, 9.

34/ TURN Proposal, pp. 14- 24.

analysis shown in its proposal, TURN presented information on the average rates and average (median) incomes of a handful of cities in PG&E's and SCE's service territories (the 15 cities with the highest average rates and the 15 cities with the lowest average rates).^{35/} Based on this very limited data set, TURN argued that there is a strong correlation between income and usage. PG&E notes that TURN did not present any *individual household level* income to usage correlation estimates, an analytical error already noted by the CPUC in its own analysis of income-usage correlation. (See *Electricity Use & Income*, CPUC Policy & Planning Division, June 21, 2012, "Measures of central tendency, such as an average, reduce the variation observed for the variable. Therefore, it is possible that, the correlation between income groupings and average electricity use appear to be more significant than correlation between actual income and electricity use.")^{36/}

In contrast, in its proposal filed on May 29, 2013, PG&E *did* look at individual household income and usage, and found that the correlation between income and usage in the PG&E service territory is quite weak. TURN's arguments rely in large part on aggregated city-level data and obscure the true income-usage relationships at the individual customer level. Moreover, TURN's analysis focuses only on a very small sample of 30 cities – those with the highest and lowest average rates – while ignoring the remaining 186 cities in PG&E's service area. As described below, TURN's approach has a number of problems, and PG&E's results, based on more representative data, are far more credible.

The primary problem with TURN's aggregated city-level analysis is that it effectively assumes that a single average rate and a single median income value are representative of the customers in that city. But PG&E has calculated the annual average rates for all customers in all cities, and found that there are wide distributions of average rates across households, even in the

35/ *Id.*, pp. 21- 23. These 15 high and 15 low average rate cities each represent only about one percent of the population in PG&E's service area, so TURN's analysis ignores 98 percent of the population living in the other 186 cities.

36/ *Electricity Use and Income*, CPUC Policy & Planning Division, June 21, 2102, p. 1, fn. 1, <http://www.cpuc.ca.gov/NR/rdonlyres/609BC107-EF3C-4864-AD56-E964884D51AC/0/PPDElectricityUseIncome.pdf>.

highest and lowest income cities. In other words, there are significant numbers of customers with low average rates (and thus low usage) even in the highest income cities, and there are customers with high average rates (and thus high usage) even in the lowest income cities. It is simply not accurate to assume that all customers in a city are fairly represented by the *average* figure for that city. TURN’s approach eliminates all the variation in usage and income at the individual household level – yet it is at the individual household level that one can see the degree to which inclining block rates penalize many low income customers while rewarding many high income customers.

To better understand the problems inherent in TURN’s approach, consider the following illustrative example: Suppose there are three cities, each with three customers, with the combinations of annual income and annual average rate shown in Table 2 below:

Table 2

Customer	City A		City B		City C	
	Avg Rate	Income	Avg Rate	Income	Avg Rate	Income
1	\$0.150	\$50,000	\$0.150	\$80,000	\$0.200	\$64,900
2	\$0.200	\$60,000	\$0.250	\$70,000	\$0.225	\$65,000
3	\$0.250	\$70,000	\$0.350	\$60,000	\$0.250	\$65,100
Correlation	1.00		-1.00		1.00	

For the three customers in City A, the average rate increases with income, and the correlation between income and average rate is 1.00 (i.e., perfect positive correlation). In City B, in contrast, average rate decreases with income, and the correlation is -1.00 (i.e., perfect negative correlation). In City C, average rate once again increases with income (although the differences in income are less pronounced than in City A), and the correlation is 1.00. If you ignore the customer’s city, and simply calculate the correlation between income and average rate for all nine customers, the result is a correlation coefficient of -0.06, very close to zero, and you would conclude that there is no correlation between the two variables. But TURN’s approach would, instead, first average the income and average rates across customers in each city, essentially

removing all the variation at the individual household level, and producing the results shown in Table 3, below:

Table 3

City	Avg Rate	Avg Income
City A	\$0.200	\$60,000
City B	\$0.250	\$70,000
City C	\$0.225	\$65,000
Correlation	1.00	

Using TURN’s approach, the correlation you would calculate between these city averages is 1.00, *leading to the wrong conclusion that there is perfect correlation – when the individual household data shows the correlation is actually close to zero.*

This example demonstrates the fundamental problems with TURN’s choice to focus on city-level average data; later in this section PG&E presents correlation results at the appropriate individual household level that shows the lack of correlation. But even if one believed that an analysis of city-level data could be meaningful, TURN appears to have biased its results by focusing only on the two “extremes” of the average rate distribution. Although PG&E’s service area has 216 cities, TURN shows results for just 30 of these – ignoring the other 186 cities.^{37/} PG&E analyzed what would be the results if TURN’s flawed approach were expanded to apply to all 216 cities.

These results are shown in the following sections. As explained earlier, PG&E does not believe the approach focusing on city-level data is appropriate, but presents these results simply to show that – even if you believed it was appropriate – once you expand the analysis to include all the cities, that TURN’s results do not hold up.

PG&E expanded the narrow sample of cities TURN showed, to PG&E’s broader service territory, to further show how one cannot draw the correct conclusions from TURN’s analysis. Figure 2 shows the results for all 216 cities served by PG&E. The green curve (corresponding to

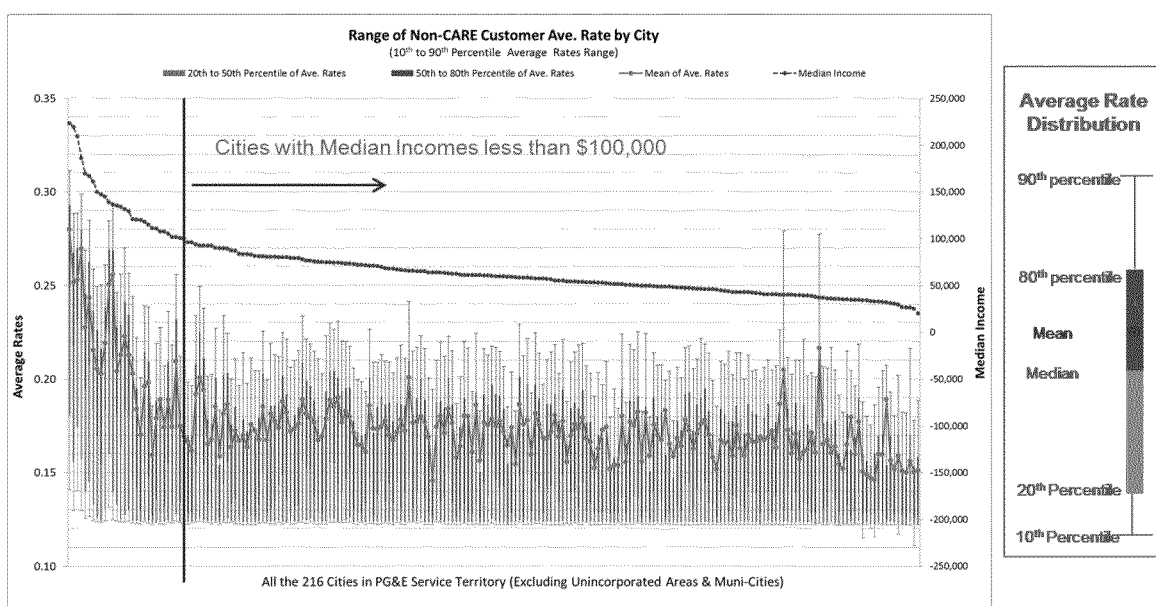
37/ It is not clear whether TURN simply ignored these other cities or, alternatively, did analyze them but chose not to present those results. PG&E intends to pursue clarification with TURN informally.

the right-hand side axis) shows the median incomes of each city, sorted from highest to lowest median income. The corresponding non-CARE city level average rates are shown in Figure 2 in red (corresponding to the left-hand side axis).^{38/} There are 29 cities with median incomes in excess of \$100,000 per year. These high-income cities do generally show higher average rates than the other 187 cities, although even within this group average rate bounces around a lot and does not uniformly drop as income drops. But for the vast majority of the cities, the 187 where the median income is less than \$100,000 per year, average rates show no discernible pattern as income declines (and they bounce around a lot, also).

Moreover, TURN's approach tells nothing about the distribution of average rates within each city – since TURN only focuses on the single average rate for each city. PG&E has calculated the average rate paid by individual households in all of its cities, and these results also are shown in Figure 2, with the vertical colored bars providing much additional detail regarding the distribution of individual households' average rates in each city. For each city, the orange bar shows the range of average rates between the 20th and 50th percentiles, and the blue bar shows the range between the 50th and 80th percentiles (where those two bars meet is the 50th percentile, or median, average rate). The vertical bar below the yellow bar similarly shows the range of average rates between the 10th and 20th percentiles, while the vertical bar above the blue bar shows the range between the 80th and 90th percentiles. The obvious conclusion to be drawn from this figure is that there is a wide range of average rates paid by households in *every* city. Even in the cities to the left in the figure with median annual incomes above \$100,000 , there are significant percentages of customers paying low average rates.

38/ The non-CARE average rate in each city is calculated as the total non-CARE residential revenue for that city divided by the total non-CARE sales.

Figure 2



The results in Figure 2 emphasize the need to look at the income-usage relationship at the individual household level. PG&E has done that, using data from the California Energy Commission’s 2009 Residential Appliance Saturation Survey (RASS). The RASS is a random survey of a very large sample (nearly 10,000) of residential households, where information is collected on each household’s appliance mix, square footage, annual income, and other variables. For a large percentage of the households in the RASS sample, PG&E is able to obtain matching monthly billing data and calculate average rates to match to income – and thus have matching income and average rate data at the level of the individual household. Given the large number of cities in PG&E’s service area, many have just small numbers of RASS sample customers (and some have none at all). Although PG&E’s full analysis includes all of its service territory, Table 4 here shows the city-specific correlations between individual households’ average rates paid and their annual income for the for the cities with sample sizes sufficient to yield reasonably accurate estimates (i.e. with at least 50 RASS sample customers). Table 4 shows the results, with cities sorted from largest to smallest sample size. The correlations are generally positive, but weak,

with many in the range from 0.20 to 0.40. While there are a couple of cities with correlations above 0.50, there are also three cities with correlations below 0.10 (one of which is very slightly negative).^{39/}

Table 4
Correlation at Customer Level Within the Cities

City	RASS Sample Counts	Correlation within a City	90% CI Lower Bound	90% CI Upper Bound
SAN FRANCISCO	165	0.21	0.13	0.29
SAN JOSE	223	0.25	0.16	0.33
OAKLAND	134	0.35	0.22	0.47
FRESNO	132	0.35	0.22	0.47
BAKERSFIELD	117	0.27	0.12	0.41
SANTA ROSA	111	0.29	0.14	0.43
FREMONT	84	0.26	0.08	0.42
STOCKTON	79	0.28	0.10	0.44
WALNUT CREEK	75	0.45	0.28	0.59
SUNNYVALE	64	0.07	(0.14)	0.27
BERKELEY	62	-0.01	(0.22)	0.20
SAN MATEO	58	0.51	0.33	0.66
CONCORD	56	0.58	0.41	0.71
SAN RAFAEL	55	0.10	(0.13)	0.32
SAN LEANDRO	52	0.29	0.06	0.49

TURN’s selective and faulty use of partial income and usage data undermines its argument that residential income and usage are significantly correlated in California. PG&E’s analysis of the complete data indicates the contrary conclusion – that in fact, income and usage are only weakly correlated, especially at annual incomes below \$100,000. Thus, steeply tiered rates cause significant harm to many moderate and low income customers with higher usage levels and, conversely, reward many high income customers with lower usage levels.

PG&E’s detailed analysis of income and usage data is attached as Appendix A to these comments.

^{39/} While the city-specific income versus average rate correlations shown in Table 3 are limited to cities with reasonably large sample sizes, the overall PG&E system income versus usage correlation results presented in PG&E’s May 29 proposal are based on a much larger sample of all RASS customers in any city reporting income for whom matching usage data were available.

V. SIMPLICITY AND CUSTOMER CHOICE SHOULD BE PRIORITIES FOR ALL RATE DESIGN PROPOSALS

Several of the rate design proposals recommend complex rate structures that continue to mix multiple tiers with a time of use rate structure without taking into account the key rate design goals of simplicity and understandability.^{40/} Market research conducted over the past several years has clearly indicated that customers do not understand how their energy use behavior translates to their bill under a multiple-tiered rate structure.^{41/} In addition, the Residential Rate OIR Customer Survey Research showed that customers prefer simple rate structures, such as two-tier and two-period TOU rates.^{42/}

To their credit, three parties, DRA and SEIA/Vote Solar, expressly recognize the need for simple and understandable rate designs that enable customers to make informed choices among different rate options. For example, as discussed above, DRA states that “The effective efficiency of both DRA’s Introductory TOU and end-state TOU rates is reduced to the extent that customers do not understand their bills. Indeed, PG&E has several customer research surveys that indicate that many customers do not appear to understand the relationship between the bill and how they use electricity.”^{43/} Similarly, SEIA/Vote Solar state that:

[T]he current residential IB and TOU rates are complicated and confusing. This complication thwarts customers’ efforts to make rational decisions about their energy usage and may present barriers to customer acceptance of TOU rates. By simplifying both the TOU and IB rate offerings, customers would be better able to choose the rate option that works best for them, while having the confidence that their selected rate option will not have unintended consequences. This could well result in a greater level of migration to TOU tariffs.^{44/}

Although PG&E disagrees with the details of DRA’s and SEIA/Vote Solar’s rate design proposals, PG&E appreciates that these parties raise simplicity and customer choice as priorities for the reform of residential rate designs. The simple point is that *overlaying a time-of-use*

40/ See, e.g., NRDC Rate Proposal, Sierra Club Rate Proposal, DRA Rate Proposal.

41/ “Residential Rate Tier Survey,” King Brown Partners, June, 2012.

42/ “RROIR Customer Survey, Key Findings,” Hiner & Partners Inc., April 16, 2013.

43/ DRA Proposal, p. 31.

44/ SEIA/Vote Solar Proposal, p. 6.

structure on top of multiple tiers only adds more complexity. The parties supporting multi-tiered TOU rate structures seem to think by having fewer tiers combined with fewer TOU periods than current rates somehow satisfies the simplicity principle. But PG&E's research indicates that just having fewer components does not come close to satisfying customer needs for simple, understandable rates – customers still preferred the simplest of rates structures – flat, two tiers or two TOU periods. Any combination of these immediately crosses over the line from simplicity to excessively complex, regardless of how it compares to today's totally broken rate structure.

PG&E's current E-6 schedule, for example, has five time-of-use periods (two in the winter, three in the summer), combined with four tiers, which results in 20 potential kWh prices a customer could face during the year. Further, since tiers are implemented on a monthly basis, a customer has little information on a daily basis, even with a SmartMeter, to understand their forecast monthly bill. A residential customer who actively chooses one of PG&E's time-varying rate plans (also including E7, EV9A/B and SmartRate), is engaged and more likely to spend the time to work through the complexity of such specialized rates. But even for these sophisticated customers, the required underlying tier structure severely inhibits understandability. In addition, under Rule 12, residential customers on a time varying rate can choose to return to their previous rate schedule, with the requirement that they remain on that schedule for twelve months.

There is no basis to conclude that, because a very small number of residential customers have opted into a TOU rate that is currently required to incorporate multiple tiers, a similar rate structure would be appropriate as the standard rate for all customers. In fact, PG&E's end-state residential rate design proposal that allows choice between a two-tiered standard rate and a non-tiered TOU rate provides the best mix of choice and understandability.

V. GREENLINING/CFORAT'S PROPOSALS TO INCREASE SUBSIDIES TO LOW INCOME CUSTOMERS ARE OUTSIDE THE SCOPE OF THE PROCEEDING AND PREVIOUSLY HAVE BEEN REJECTED IN OTHER PROCEEDINGS

For the most part, Greenlining/CforAT want to maintain the status quo on tiered rates despite the fact that the status quo significantly violates the core principle of cost-based rates. Greenlining/CforAT's rate design proposal would leave the existing tiered rate structure in place and continue to ban implementation of fixed charges.^{45/} PG&E has opposed and continues to oppose Greenlining/CforAT's rate design proposals for the same reasons cited in PG&E's rate design proposal and in the record of other CPUC proceedings.^{46/} PG&E will not repeat its previous critique here.

However, Greenlining/CforAT included two items in their proposal that PG&E believes are outside the scope of this proceeding:

First, Greenlining/CforAT propose that utilities be required to implement "arrearage management programs" under which the past due bills of low income customers are "forgiven" in return for the customer signing up for a future payment plan.^{47/} Greenlining/CforAT concede that they and TURN have previously proposed forms of "Arrearage Management Programs" in other proceedings, but the Commission declined to adopt such programs.^{48/} Fundamentally, such programs would constitute a new form of low income assistance that would need to be funded *in addition to* other existing low income rate assistance programs, such as CARE and FERA. The costs of "forgiving" customers' unpaid bills would be borne by other customers. So such a program would effectively create a new low income assistance program, subsidized by customers generally. As such, Greenlining/CforAT's proposal is outside the scope of this proceeding and should be considered, if at all, in other Commission proceedings that address the utilities' credit and collection practices and the level of current low income assistance programs,

45/ Greenlining/CforAT Proposal, pp. 32- 48.

46/ PG&E presented evidence rebutting parties' policy arguments against a fixed charge in its 2011 GRC Phase 1 proceeding (A.10-03-014), *see* citations in PG&E's December 20, 2010 Opening Brief at pp. 31 – 34 and PG&E's January 10, 2011 Reply Brief at pp. 12 – 13.

47/ *Id.*, pp. 65- 71.

48/ *Id.*, p. 67.

such as General Rate Cases and CARE proceedings.

Second, Greenlining/CforAT propose to expand the current “high usage” eligibility criteria applicable to CARE customers to non-CARE customers. They argue that the same restrictions on “excessive” CARE assistance to customers with usage at or above 400% of baseline usage should apply to non-CARE customers even though non-CARE customers do not receive CARE assistance and already pay significantly over the cost of their electricity.^{49/} Greenlining/CforAT cite the need to “encourage conservation and energy efficiency” to justify the proposed “high usage surcharge.”^{50/} However, Greenlining/CforAT present no empirical evidence that the “high use surcharge” would result in greater conservation than other pricing levels or structures, such as time-variant pricing. Nor do they acknowledge that the high usage CARE restriction is not a pricing mechanism, it is simply a condition on eligibility for a rate subsidy that is funded by other customers. A CARE customer who wishes to avoid the CARE restriction can simply decline to participate in the CARE program (or install energy efficiency equipment or otherwise make stronger behavioral efforts to conserving energy). In contrast, Greenlining/CforAT’s “high use surcharge” on non-CARE customers would be mandatory and unavoidable.

Like the proposed “Arrearage Management Programs,” the “high usage surcharge” appears to be outside the scope of this proceeding, because it requests that eligibility criteria for rate assistance to CARE customers be applied to the basic rate design for non-CARE customers, without any showing that the Commission’s general rate design principles, such as providing incentives for conservation, will be supported by the surcharge. This item in Greenlining/CforAT’s rate design proposal should be rejected because it is outside the scope of this proceeding.

49/ *Id.*, pp. 48- 54.

50/ *Id.*, p. 48.

VII. SEIA/VOTE SOLAR’S PROPOSALS TO EXEMPT SOLAR PV SYSTEM CUSTOMERS FROM COST OF SERVICE RATES APPLICABLE TO OTHER RESIDENTIAL CUSTOMERS WOULD BE DISCRIMINATORY AND WOULD UNFAIRLY SHIFT COSTS TO OTHER CUSTOMERS

SEIA/Vote Solar generally support the same rate design principles as adopted by the Commission and proposed by PG&E and other parties to be used for needed residential rate design reforms.^{51/} SEIA/Vote Solar also cite Public Utilities Code Section 2827(g) as statutory support for their argument that residential rate design policies must not unduly discriminate against solar customers.^{52/} However, ironically, SEIA/Vote Solar then turn these core principles on their head by advocating that retail solar customers be uniquely exempted from the rate design reforms that would apply to other residential customers.^{53/} According to SEIA/Vote Solar, rate design reforms should exempt or grandfather existing solar customers, because rate design reforms must “respect” the long-term investments that solar customers have made in renewable distributed generation facilities.^{54/} In addition, SEIA/Vote Solar argue that fixed charges should be limited because they “could undermine the stability of customers’ investments in energy efficiency and renewable DG.”^{55/}

SEIA/Vote Solar’s proposed exemption of existing solar customers from cost-based, non-discriminatory rate design reforms is contradictory and transparently parochial. On the one hand, SEIA/Vote Solar urge the Commission to adopt rate design reforms that do not discriminate against solar customers. On the other hand, SEIA/Vote Solar argue that the Commission should discriminate against other customers by exempting solar customers from the same rate design structure applicable to those other customers. Likewise, SEIA/Vote Solar argue that rates should be based on the “drivers” of long-term costs, including the costs of non-renewable resources, but then turn around and advocate that solar customers should be exempt from paying the fixed and/or unavoidable costs incurred by utilities on behalf of those solar

51/ SEIA/Vote Solar Proposal, pp. 4- 8.

52/ *Id.*, p. 6.

53/ *Id.*, pp. 7- 8.

54/ *Id.*, p. 7.

55/ *Id.*, pp. 7- 8.

customers.

Needless to say, no rate design principle gives solar or other customers the vested right to be exempt from changes in cost-based rates that the Commission adopts prospectively in order to ensure that rates are just, reasonable and not unduly discriminatory. No customer has a right to be exempt from rate changes because they somehow “relied” on existing rates under the assumption that the rates would never change.

PG&E appreciates that SEIA/Vote Solar endorse the rate design principles of cost-based, non-discriminatory rates. However, the Commission should reject SEIA/Vote Solar’s proposed exemption of solar customers as contrary to those very same rate design principles.

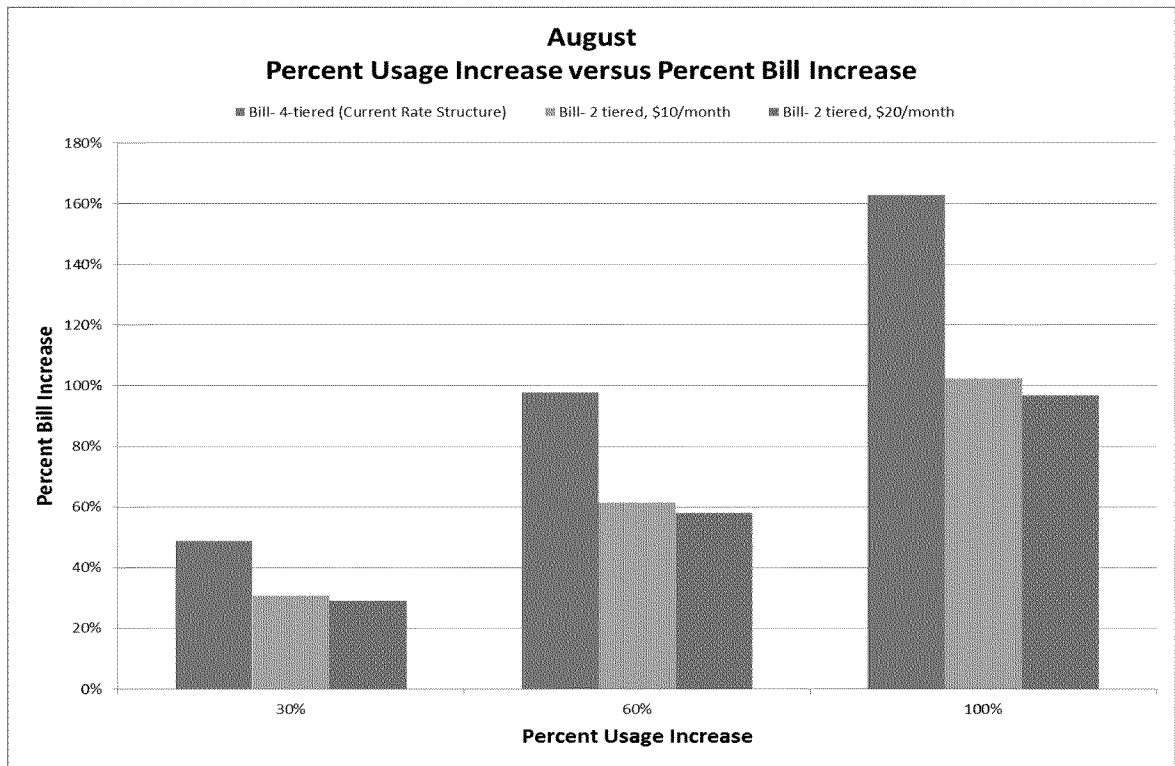
VI. SEVERAL PROPOSALS IGNORE THE CURRENT PROBLEM OF CUSTOMERS EXPERIENCING SEVERE BILL VOLATILITY IN HOT SUMMER MONTHS DUE TO STEEPLY INCLINING TIERED RATES

In considering various rate structures for its proposal, PG&E analyzed rate structures with two, three and four tiers, both with and without a fixed monthly fee, to study the impact of the number of rate tiers and fixed monthly charges on customer bills. Figure 4 below shows how bill volatility that typically occurs in the summer months is moderated with the collapse of tiers and the addition of a monthly fixed charge, when compared to the current rate structure.

Under today’s steeply-tiered rates, when a Central Valley household consuming in Tier 4 increases its usage, say due to a prolonged period of hot weather, its bill will increase by a disproportionate percentage. As shown by the red bars below, a heat-wave induced 30 percent increase in August usage can produce a bill increase of nearly 50 percent. Similarly, a 60 percent increase in usage can cause the bill to increase by nearly 100 percent, and a 100 percent increase in usage can cause the bill to increase by over 160 percent. This excessive bill volatility is due to the steeply inclining block rate design, and approximately one million non-CARE customers in the Central Valley experience this volatility to varying degrees today.^{56/}

56/ PG&E selected this customer from the RASS sample to illustrate usage profiles based on actual 2011 usage by a typical customer in San Joaquin County .

Figure 4



The blue and green bars, though, show how this bill volatility can be substantially mitigated under PG&E’s rate proposal. The blue bar shows the much lower bill increases due to heat waves if, instead, customers were billed under a two-tiered rate structure with a modest tier differential and a \$10 per month customer charge. The green bar shows some additional mitigation of bill volatility under a similar two-tier design but with a \$20 per month customer charge. Fewer tiers with a fixed monthly fee can better match increases in usage to the resulting increases in bills increases, to help make customer bills more predictable and understandable, especially in hot climates like the Central Valley.

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IX. CONCLUSION

PG&E appreciates the detail and diligence provided by most of the parties who filed rate design proposals in this proceeding. For the reasons stated in PG&E's comments above, PG&E respectfully requests that the Commission reject the proposals that fail to provide real reform of the current rate design structure, and instead approve PG&E's rate design proposal in order to provide significant relief to millions of PG&E's residential electric customers.

Respectfully Submitted,

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Dated: July 12, 2013

Attorneys for
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APPENDIX A

Correlation between Residential Average Rates and Incomes

Analysis and Rates
July, 2013





Key Takeaways

➤ **Review of the analysis by TURN**

Although TURN presented a handful of cities (top 15 and bottom 15 cities by average non-CARE rates) that tend to imply significant positive correlation between income and average rate, PG&E's analysis shows that the correlation is poor if the analysis is done for the cities with median income less than \$100K (moderate income range). 87% of the cities fall in this category.

➤ **Analyzing correlation using the median income at the city level (TURN's approach) does not show the true correlation at customer level.**

PG&E has analyzed correlation at the customer level and found that the correlation is low. RASS sample with 2009 usage, income, and billing data was used for this study. Our analysis focuses on Non-CARE customers.



The Correlation at City Level Does Not Represent the True Correlation at Customer Level

Illustrative Example

Correlation
Is perfectly
positive
=1

<u>City One</u>	
Individual Rate	Individual Income
\$ 0.15	\$ 50,000
\$ 0.20	\$ 60,000
\$ 0.25	\$ 70,000

Correlation
is perfectly
negative
=-1

<u>City Two</u>	
Individual Rate	Individual Income
\$ 0.18	\$ 80,000
\$ 0.25	\$ 70,000
\$ 0.32	\$ 60,000

TURN's Approach

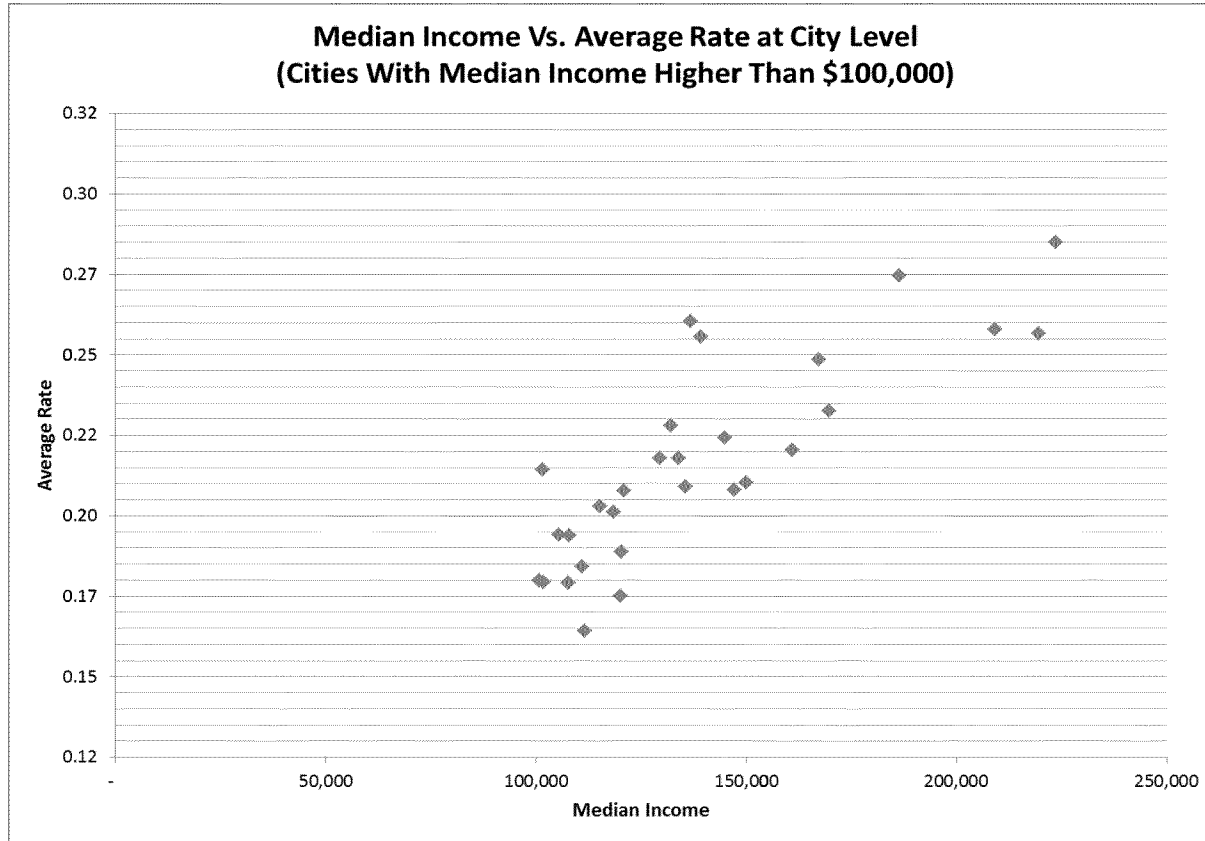
	Ave. Rate	Median Income
City One:	\$ 0.20	\$ 60,000
City Two:	\$ 0.25	\$ 70,000

Correlation
is perfectly
positive
=1!



Reviewing TURN's Approach: Correlation between Average Rates and Median Incomes by City for High Income Range

Among top "rich" cities, whose median incomes are higher than \$100,000, there is a **high correlation** (0.83) between average rates and incomes.



- Top 10 Cities with Highest Income**
- ATHERTON
 - LOS ALTOS HILLS
 - HILLSBOROUGH
 - WOODSIDE
 - PIEDMONT
 - PORTOLA VALLEY
 - ORINDA
 - LOS ALTOS
 - TIBURON
 - SARATOGA

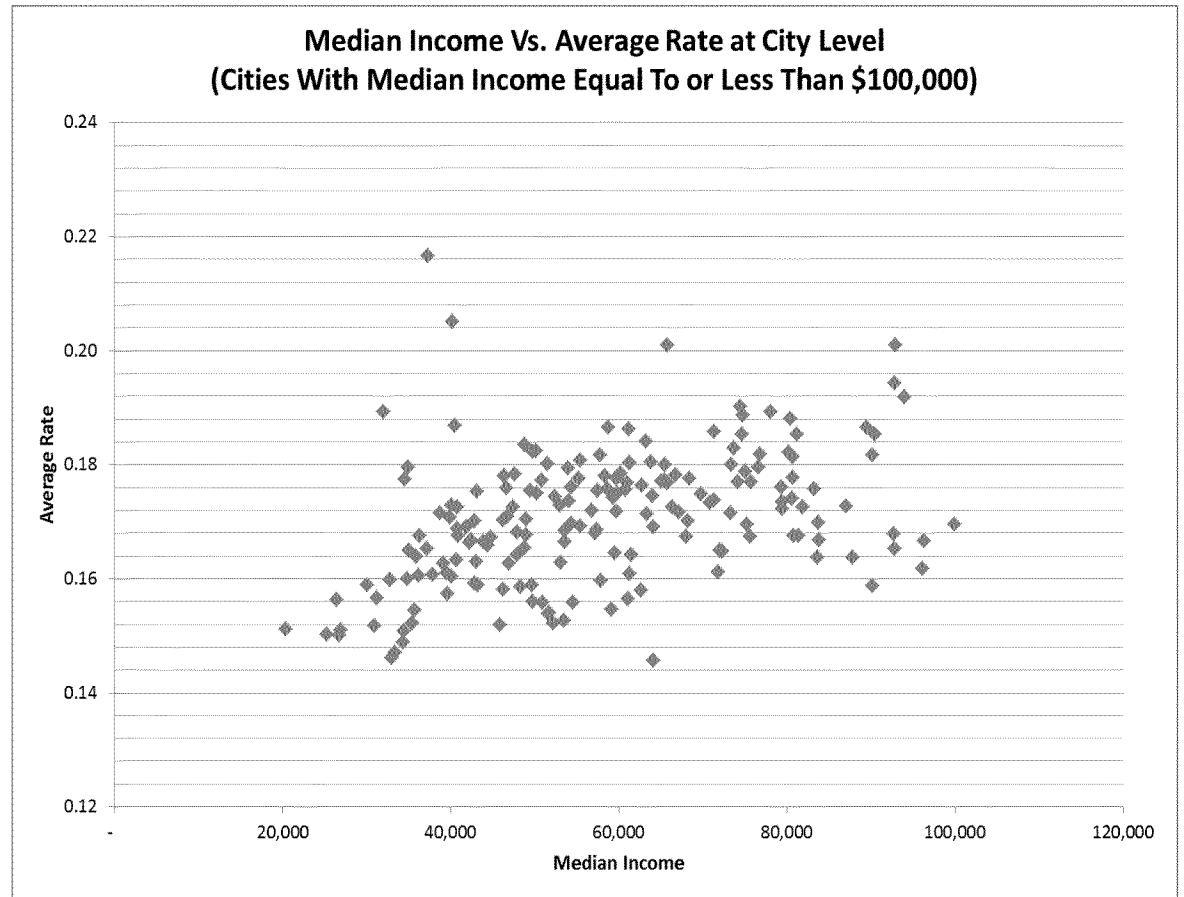
Notes:

1. Income per city is from US Census data for 2010. It is available at <http://quickfacts.census.gov/qfd/states/06/0600674.html>.
2. Each dot in the chart represents a city. There are 29 out of 216 cities in this chart.
3. Data Source: Average rates by city are from PG&E's Rate Data Analysis Section. Unincorporated areas & 12 cities with municipal utilities are excluded; DA/CCA and NEM customers are excluded.



Reviewing TURN's Approach: Correlation between Average Rates and Median Incomes by City for Moderate Income Range

Among cities whose median incomes are equal to or less than \$100,000, there is a **low correlation (0.40)** between average rates and incomes. These cities constitute 87% of all the cities in PG&E territory (excluding unincorporated areas & cities with municipal utilities).

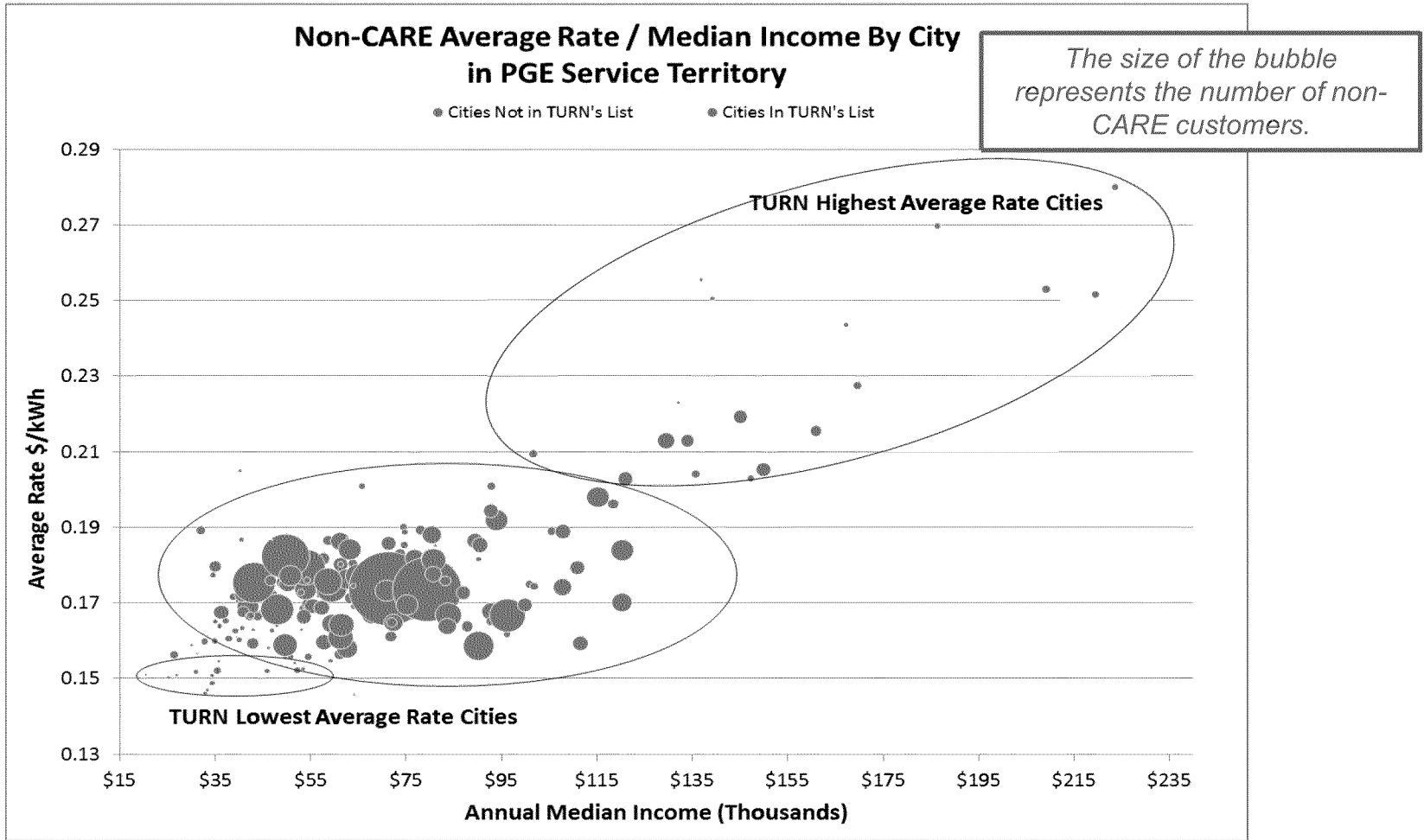


Notes:

1. Income per city is from US Census data for 2010. It is available at <http://quickfacts.census.gov/qfd/states/06/0600674.html>.
2. Each dot in the chart represents a city. There are **187** out of 216 cities in this chart.
3. Data Source: Average rates by city are from PG&E's Rate Data Analysis Section. Unincorporated areas & 12 cities with municipal utilities are excluded; DA/CCA and NEM customers are excluded.



Reviewing TURN's Approach: The Cities TURN Picked Represent a Small Portion of All Customers. Some Rich Cities Also Pay Below Average Rates



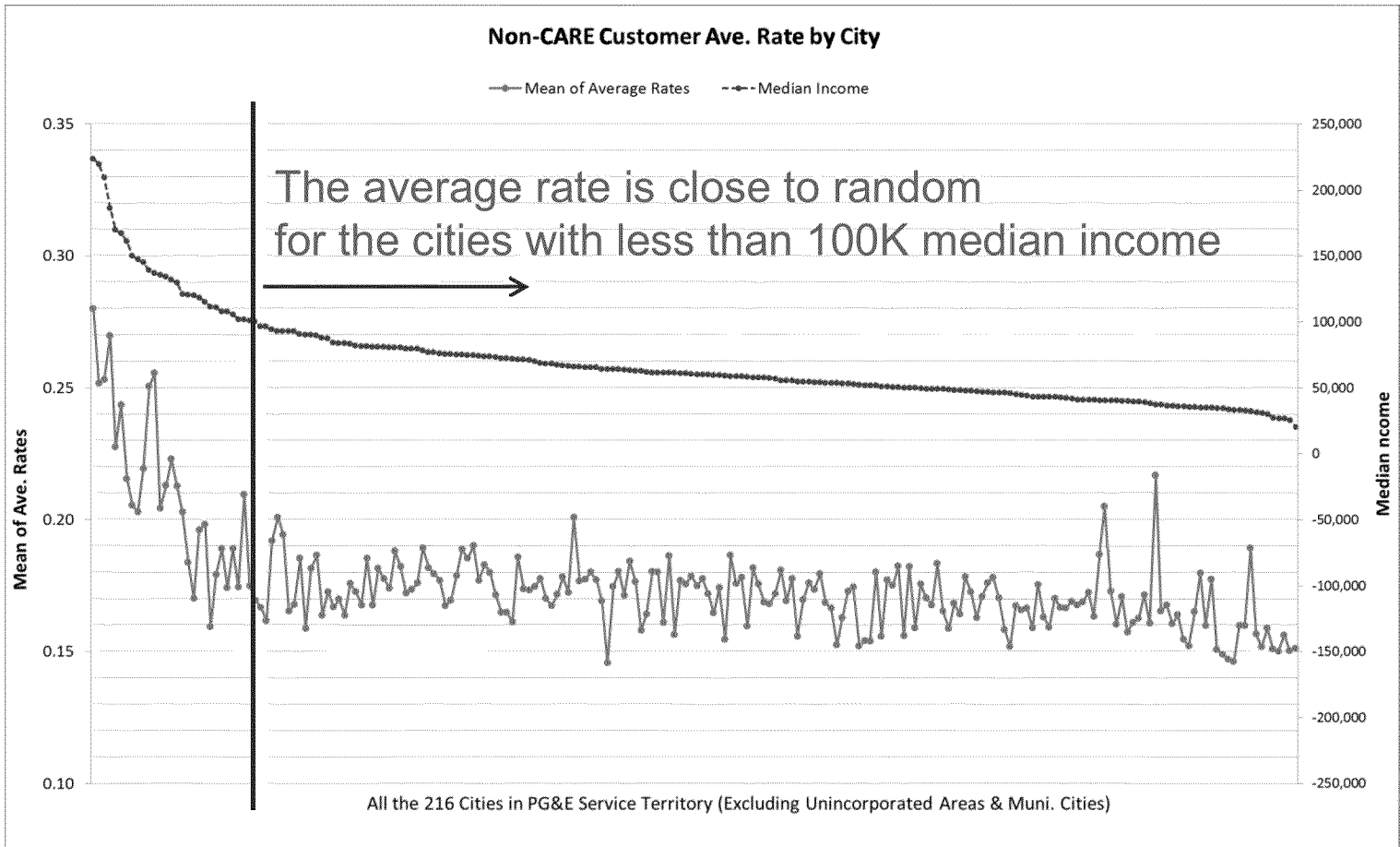
Notes:

1. Average rates and customer counts are from PG&E's Rate Data Analysis Section; DA/CCA, NEM and Public Power cities customers are excluded.
2. Median Non-CARE incomes are from US Census data for 2010.



Reviewing TURN's Approach: City Level Average Rates Vs. Incomes (Sorted by Descending Income Levels)

All 216 cities are laid out with descending median incomes from left to right. The average rates do not decrease from left to right.



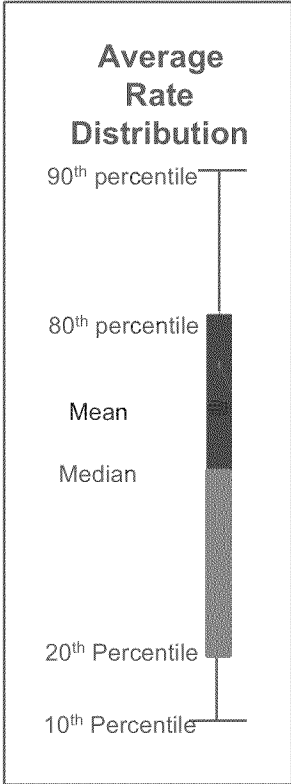
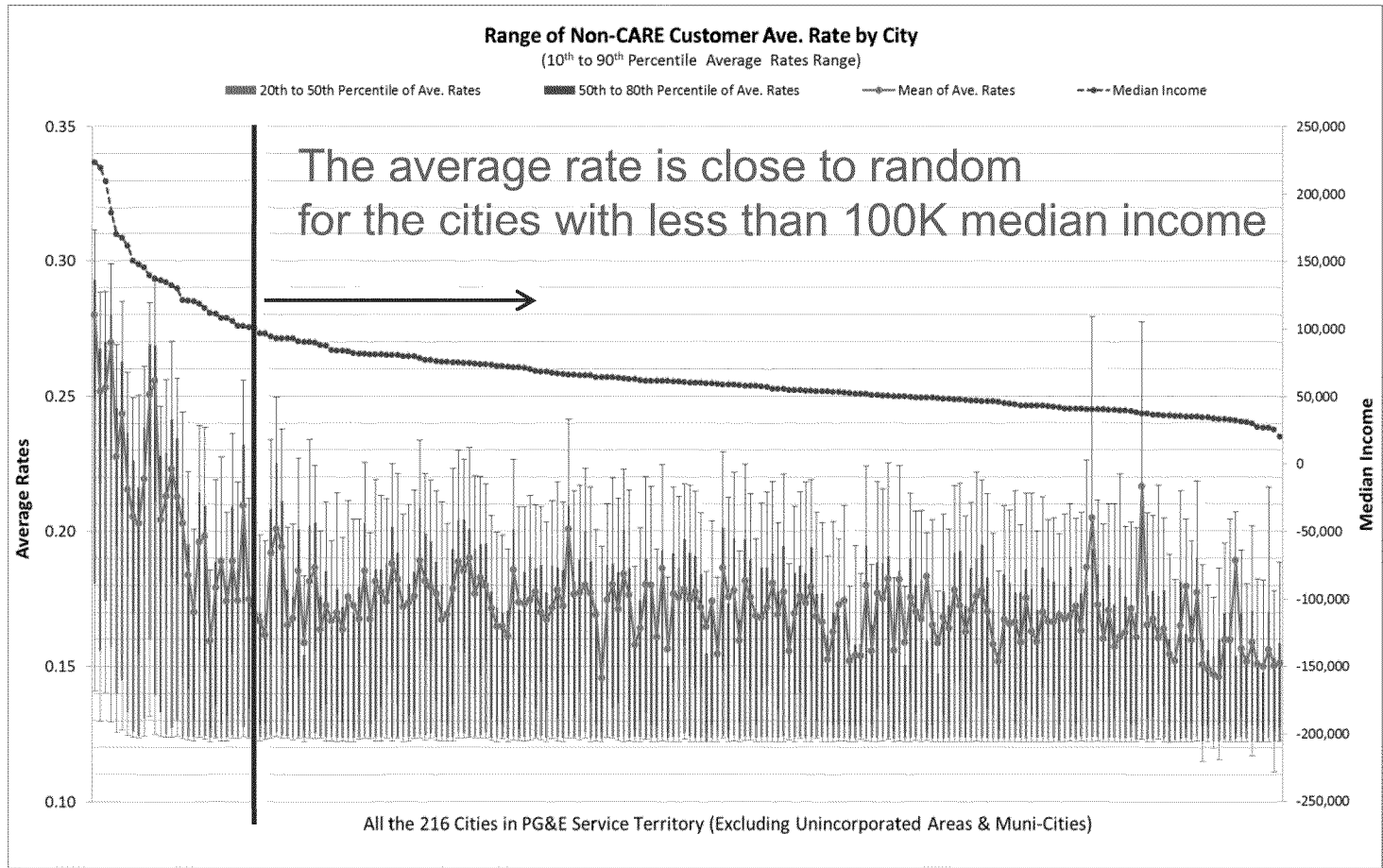
Notes:

- 1. Green line shows the median income per city, which is from US Census data for 2010.
- 2. Data Source: Average rates by city are from PG&E's Rate Data Analysis Section. Unincorporated areas & 12 cities with municipal utilities are excluded; DA/CCA and NEM customers are excluded.



Reviewing TURN's Approach: Individual Customers' Average Rates Distribution by City (Sorted by Descending Income Levels)

All 216 cities are laid out with descending median incomes from left to right. The average rates do not decrease from left to right.



Notes:

1. Green line shows the median income per city, which is from US Census data for 2010.
2. Data Source: Average rates by city are from PG&E's Rate Data Analysis Section. Unincorporated areas & 12 cities with municipal utilities are excluded; DA/CCA and NEM customers are excluded.



Correlation Between Individual Non-CARE Customers' Average Rates and Incomes within a City Using RASS Sample Data

Among the following 15 cities with RASS income data for at least 50 households, most of the correlations are low. Based on the results, we cannot conclude that there is a significant correlation between income and average rates.

City	RASS Sample Counts	Correlation within a City	90% CI Lower Bound	90% CI Upper Bound
SAN FRANCISCO	363	0.21	0.13	0.29
SAN JOSE	323	0.25	0.16	0.33
OAKLAND	134	0.35	0.22	0.47
FRESNO	132	0.35	0.22	0.47
BAKERSFIELD	117	0.27	0.12	0.41
SANTA ROSA	111	0.29	0.14	0.43
FREMONT	84	0.26	0.08	0.42
STOCKTON	79	0.28	0.10	0.44
WALNUT CREEK	75	0.45	0.28	0.59
SUNNYVALE	64	0.07	(0.14)	0.27
BERKELEY	62	-0.01	(0.22)	0.20
SAN MATEO	58	0.51	0.33	0.66
CONCORD	56	0.58	0.41	0.71
SAN RAFAEL	55	0.10	(0.13)	0.32
SAN LEANDRO	52	0.29	0.06	0.49

Notes:

1. Both income and average rates are from RASS sample data.
2. Customers with very low usage for whom the minimum bill applies are excluded; DA customers are excluded



Correlation Between Individual Non-CARE Customers' Average Rates and Incomes in TURN's Top & Bottom Cities Using RASS Sample Data

TURN's Listed Cities	Sample Counts	Correlation	90% CI Lower Bound	90% CI Upper Bound	Wtgd. Average Rates	Median Income
Top Avg. Rate Cities	173	0.39	0.28	0.49	0.24	175,000
Bottom Avg. Rate Cities	88	0.11	(0.07)	0.28	0.15	67,500

TURN's Top 15 Cities

- Atherton \$ 223,611
- Woodside \$ 186,359
- Ross \$ 147,345
- Hillsborough \$ 209,231
- Los Altos Hills \$ 219,485
- Monte Sereno \$ 165,484
- Portola Valley \$ 164,479
- Piedmont \$ 169,674
- Belvedere \$ 119,511
- Saratoga \$ 145,023
- Orinda \$ 160,942
- Lafayette \$ 134,000
- Danville \$ 129,515
- Scotts Valley \$ 101,673
- Los Altos \$ 149,964

TURN's Bottom 15 Cities

- Arvin \$ 32,949
- Avenal \$ 32,736
- Lakeport \$ 42,774
- San Joaquin \$ 53,764
- Mendota \$ 25,109
- Parlier \$ 33,110
- Orange Cove \$ 27,642
- Huron \$ 22,969
- Sonora \$ 34,944
- Greenfield \$ 52,321
- Grass Valley \$ 35,385
- Placerville \$ 52,216
- Gonzales \$ 48,957
- Colfax \$ 41,210
- McFarland \$ 35,615

- Cities with NO RASS non-CARE sample points.
- Cities with at least one RASS non-CARE sample points

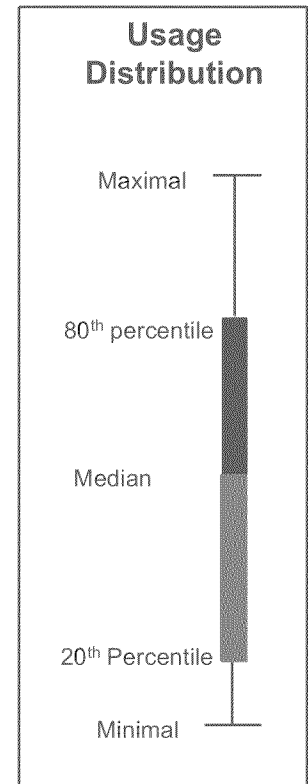
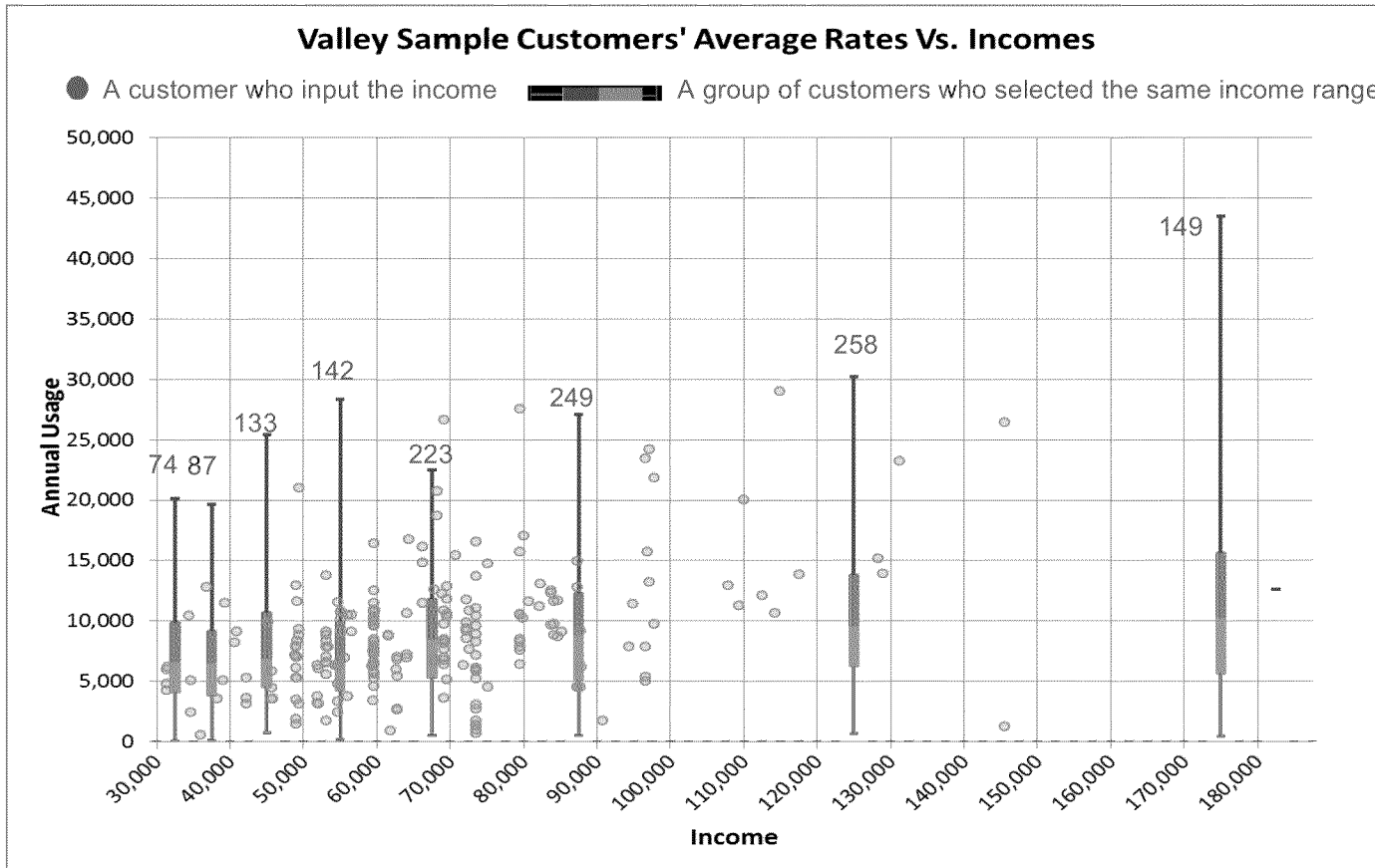
Notes:

1. Both income and average rates are from RASS sample data.
2. According to TURN's reply to our Data Request on June 28, 2013: TURN used census city level median incomes as their *Annual Household Median Incomes*, which do not differentiate income between CARE and Non-CARE customers.
3. Customers with very low usage for whom the minimum bill applies are excluded; DA customers are excluded



Valley Individual Non-CARE Customers' Annual Usage and Incomes in RASS Sample Data

The following chart displays all the RASS sample points for Non-CARE customers from the valley, which includes climate zone S, P, R, W, Y and Z. It again shows the weak correlation (less than 0.3) between usage and incomes.



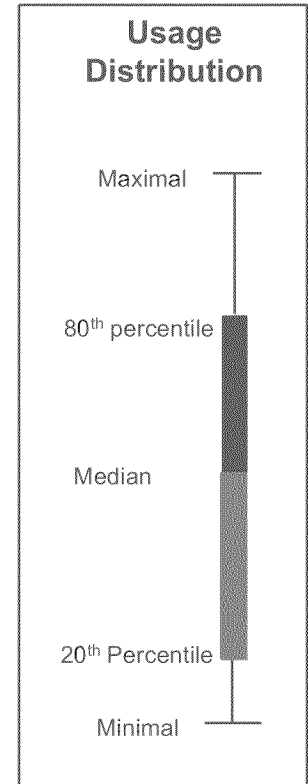
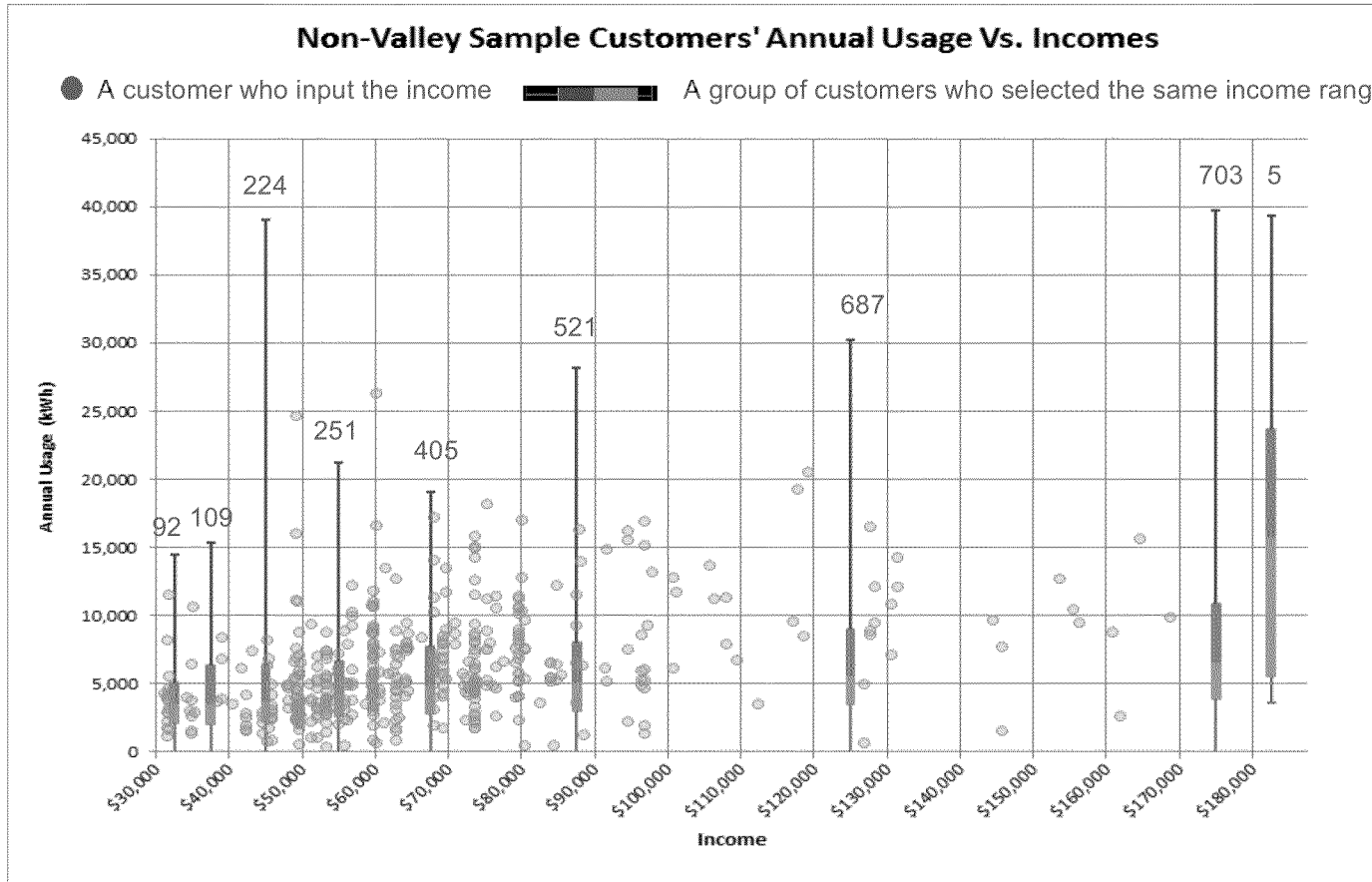
Notes:

- 1. Both income and annual usage are from RASS sample data.
- 2. Customers with very low usage from whom the minimum bill applies are excluded; DA/CCA customers are excluded.
- 3. Some individual incomes are calculated by KEMA using regression.



Non-Valley Individual Non-CARE Customers' Annual Usage and Incomes in RASS Sample Data

The following chart displays all the RASS sample points for Non-CARE customers from the non-valley area, which includes climate zone Q, T, V, and X. It again shows the weak correlation (less than 0.3) between usage and incomes.



Notes:

1. Both income and annual usage are from RASS sample data.
2. Customers with very low usage from whom the minimum bill applies are excluded; DA/CCA customers are excluded.
3. Some individual incomes are calculated by KEMA using regression.