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 THE UTILITY REFORM NETWORK ON RESIDENTIAL RATE DESIGN PROPOSALS

TURN
THE UTILITY REFORM NETWORK

Lower bills. Livable planet.

July 12, 2013

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Pursuant to the ALJ Ruling of March 19, 2013 and to the schedule adopted in subsequent ALJ Rulings, the Utility Reform Network (TURN) respectfully provides these comments in response to the residential rate design proposals submitted by fifteen parties on March 29, 2013.

1. Overview of Proposals Submitted by Other Parties

1.1. The IOU Tiered Rate Proposals Are Similar to TURN's Proposal, But TURN's Proposal Better Advances California's Environmental Goals

There is a surprising amount of commonality in the description of the problems associated with the current four and five-tiered electric rates as provided by both TURN and the investor-owned utilities (IOUs). The IOUs and TURN generally agree that current tier differentials and rate restrictions can cause undue bill volatility for certain customers and burden a portion of customers with the bulk of rate increases.

Both PG&E and SCE propose that the present tiered rate design be replaced with a modified two-tier (PG&E) or three-tier (SCE) rate design. The NRDC likewise proposes a default tiered rate design for customers with non-coincident demands below 7 kW. However, both PG&E and SCE include high fixed charges of $10 to $30 per month based on the claim that such charges result in more "cost-based" rates. The cost causation arguments supporting these fixed charges are based on flawed or and unverified assumptions concerning utility marginal costs.

The proposed fixed charges are unnecessary given California's revenue decoupling regime which protects utilities against revenue fluctuations or

revenue decline caused by conservation or weather. These fixed charges reduce the incentive to conserve and invest in energy efficiency that is provided by volumetric rates and would effectively undermine the achievement of California's primary energy policy goals.

Ultimately, the Commission must balance the goals of economic efficiency and alignment with marginal costs with the goals of conservation and energy efficiency. The preliminary bill calculator results indicate that TURN's proposed three-tier rate design with no fixed charges resolves the problems with existing tier differentials without the negative impacts on consumer behavior associated with high fixed charges.

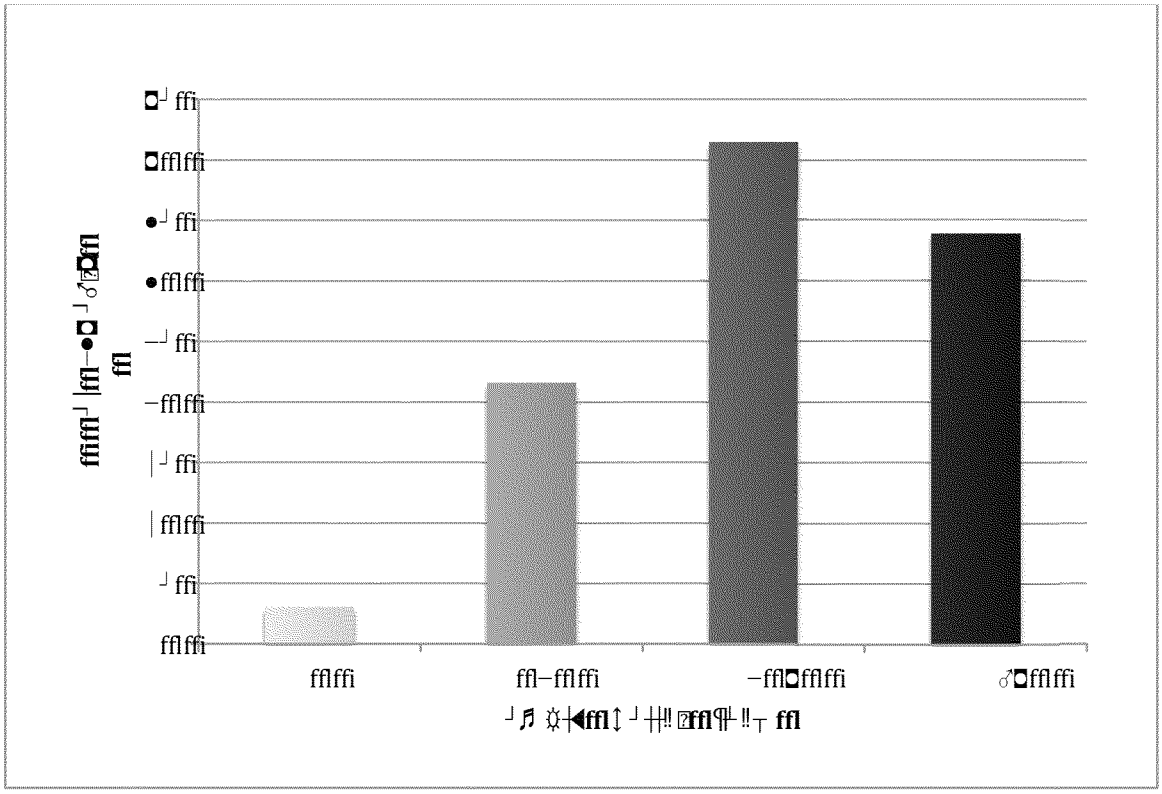
1.2. TOU Rates Will Increase Bill Volatility, and Parties Failed to Consider the Harmful Impacts of Summer Bill Spikes for Residents Who Rely on Air Conditioning in the Summer

Several parties propose default TOU rates, though only the DRA provides meaningful bill impact analyses of such rates. The DRA's End-Use (or "cost-based") TOU Rate (with an on / off peak price ratio of 2.4) causes annual bill increases of *at least $120* for 26.6% of PG&E's non-CARE customers and 31.6% of SCE's non-CARE customers. The impacts on CARE customers are even larger. DRA's End-State TOU will increase the annual bills almost 60% of Bakersfield non-CARE customers by at least $120, and it will increase the annual bills of about 20% of Bakersfield non-CARE customers by at least $240. The bill impacts of any TOU rate with higher peak price differentials will be more severe. Parties such as EDF proposed TOU rates with on / off peak differentials above 5.0, meaning the summer on-peak rate is over five times the off-peak rate.

Residents of hot climate zones in the Central Valley have high summer electric demand due to air conditioner use.[1] The introduction of time-varying rates with higher on-peak prices will result in much higher summer bill impacts for these residents. Only the DRA provided limited data concerning the impacts of TOU rates on bill volatility and summer bills, and DRA's analysis was limited to its "Introductory TOU" rate design. TURN obtained additional data on the impacts of TOU rates on summer bills in climate zones W (PG&E) and 13 (SCE) through data requests. These data show that a TOU rate with a tier differential (on / off peak) of about 2.4 will cause almost 93% of Bakersfield's non-CARE customers to pay $10 or more in each and every month of the summer, and almost 60% will pay at least $30 more than under current rates in each of the six summer months. The results for Bakersfield's CARE customers are even worse, with fully 75% paying more than $30 each summer month, and about 25% paying more than $50 in each summer month, as compared to existing rates.

[1] See, TURN Proposal, Figure 5 (p. 19) and Figure 10 (p. 32).

Figure 1: Summer Month Bill Impacts – non-CARE in Climate Zone W, DRA Cost-Based TOU Rate[2]



The Commission should carefully consider whether the supposed "benefits" of TOU rates – providing closer alignment of rates with marginal costs – outweigh the bill impacts and bill volatilities resulting from TOU rates. The data suggest that this "unintended consequence" of time-varying rates may create a problem worse than any problem with existing tiered rates.

1.3. Overview of TURN's Comments

There are numerous important issues associated with designing the "ideal" rate for residential customers that best meets the competing goals of environmental sustainability, cost causation and relative affordability of basic electricity consumption. Fifteen parties submitted rate design proposals on May

[2] The Data for this Figure is provided in Table 2 at page 23.

29, 2013. TURN does not attempt to address each issue raised in those proposals. Rather, TURN focuses on several key issues and points out major failings or omissions in various proposals.

Due to the desire of the Commission to move towards time-varying rates, TURN addresses the potential bill impacts of proposed time-of-use (TOU) rates in Section 2. **The data show significant potential bill impacts from TOU rates which were not even addressed by most of the parties.**

In Section 3 TURN addresses the arguments and data concerning the impacts of fixed charges and tiered rates on conservation and energy efficiency. The IOUs arguments that fixed charges are irrelevant for conservation are unsupported. And while tiered rates may not result in the most "economically efficient" use of electricity, they do promote the State's environmental goals of reducing pollutant and GHG emissions, and they also promote the economics of upgrading the efficiency of all residential appliances and residential lighting. In contrast, time of use rates promote only the economics of efficient air conditioner and load shifting energy management systems.

In subsequent sections TURN addresses a number of other arguments concerning the relationship between income and residential electricity consumption, the economic and environmental benefits of TOU rates, and the use of residential rate design to promote rooftop solar installation.

Due to time constraints TURN has focused on the proposals and arguments advanced by PG&E, SCE, the DRA and EDF. However, we appreciate that many other parties likely provided interesting proposals supported by significant policy arguments and factual information. In particular, TURN notes that the proposals of the NRDC and the Sierra Club contain sophisticated and

well-researched analyses of the issues related to using residential rate design to promote California's energy policy goals. Likewise, the proposal by CforAT / Greenlining advances several proposals designed to promote rate affordability for all customers, and especially for lower income customers.

The rate designs proposed by NRDC (tiered for small, TOU for large) and the Sierra Club (three-tiered TOU rate) attempt to reap the best of both worlds – conservation from tiered rates and load shifting from large users. TURN appreciates the intent behind these proposals. However, based primarily on concerns about customer understanding and potential unintended consequences, TURN still recommends as a default rate design the reformed three-tiered rate design put forth in TURN's proposal.

2. Bill Impacts of Proposed TOU Rates

2.1. Summary

Several parties proposed different types of TOU rates, and some parties proposed that TOU rates be the default rate.[3] However, no party aside from the DRA used the bill calculators to provide accurate bill impact analyses of TOU rates and comparisons to present rates.[4] And no party provided any analysis of the seasonal or geographic impacts of TOU rates.[5] Thus, it is difficult to generalize concerning the relative bill impacts of tiered rates versus TOU rates,

[3] The following parties proposed a default TOU: DRA, CFC, EDF, SEIA / Vote Solar, CLECA and DECA. The Sierra Club proposed a tiered TOU default rate, and the NRDC proposed a default TOU only for large (above 7 kW) customers.
[4] The EDF did provide interesting theoretical analyses showing the impacts of changing peak price ratios and on peak time periods, but it is difficult to project from EDF's analysis to actual bill impacts from proposed rates.
[5] DRA did provide limited analysis of the seasonal impact of its proposed "Introductory TOU" rate, but not of its "End-State TOU" rate.

especially on different categories of customers, differentiated by usage size or climate zone.

The bill impacts of any TOU rate are significantly impacted by both the on / off peak ratio ("peak price ratio") and the duration of the peak period, as illustrated graphically by EDF.[6] The calculations provided by the IOUs and DRA primarily model the impacts of TOU rates that have peak price ratios of less than 1.5. DRA's End-State TOU has a peak price ratio of 2.4, and DRA's modeling shows that this peak price ratio produces significant bill impacts. However, no party has even modeled the potential impacts of TOU rates with higher peak price ratios, as proposed by some parties.

TURN discusses the average annual bill impacts in Section 2.2 below. In Section 2.3 TURN discusses the available data concerning the summer bill impacts of TOU rates, especially for customers living in hot climate zones. TURN's analysis is based on data obtained from the proposals and data responses, primarily from DRA, PG&E and SCE. TURN notes at the outset that SDG&E's bill impact analysis, which was requested by the Commission after SDG&E's original proposal omitted an actual rate design proposal, was apparently designed to obfuscate the true impact of moving from todays' rates to SDG&E's proposed end state. Since it was impossible to assess the actual bill impacts of SDG&E's proposal, TURN requested data from SDG&E concerning cumulative bill impacts but has not yet received any meaningful bill impact data.[7] Likewise, while TURN obtained limited data on seasonal and geographic bill impacts from SCE and PG&E, both utilities claimed they were unable to

[6] EDF Proposal, pp. A-10 and A-11, Figures 1 and 2.
[7] SDG&E has promised to provide responses prior to the filing date for reply comments.

provide actual bill impacts of their proposed optional TOU rates on differentiated by season and climate zone.

2.2. TOU Rates Increase Average Monthly Bills for a Significant Number of Customers

2.2.1. PG&E Analysis

PG&E provided bill impacts for its end state 2-tier rate and its optional TOU rate. Those results showed that for non-CARE customers the percent bill impacts were remarkably similar.[8] Of course, PG&E's optional TOU had an on / off peak differential of 1.7 and a $10 fixed charge, while PG&E's End-State Default tiered rate had two tiers of 15.2 and 18.2 cents / kWh (a tier differential of less than 1.2) and a $10 customer charge. In essence, both of PG&E's rates were fairly close to a flat rate with a customer charge; hence it is not surprising that their bill impacts are not dissimilar.

2.2.2. SCE Analysis

TURN used SCE's bill calculator to model the bill impacts by usage level for SCE's proposed 3-tier rate design (with a $5 customer charge and tier differentials of 1.25 and 1.5), SCE's proposed TOU rate design (with fixed charges of $20 / $30 and a on / off peak tier differential of 6.6), and TURN's proposed three-tiered rate design (with no fixed charges and tier differentials of about 1.3 and 1.6). The bill impact results are presented below. These results show that the TOU rate results in much higher percentage bill increases (71% and 227%) for very low usage customers (below 300 kWh / month), and much higher percentage bill reductions (31% and 40%) for high usage customers (above 1300 kWh / month). TURN's proposed rate results in more limited increases and

[8] PG&E Proposal, "Rate-Transition_All Years -2014-2020_V2.2, p. 17-18.

decreases at either end of the usage spectrum as compared to SCE's tiered rate. TURN has not been able to perform sufficient model runs to determine the relative impacts of the high customer charge versus time-varying rates.

Average Monthly kWh %	Customer Number	% Monthly Change	% Monthly Change	% Monthly Change
LE 100	73,753	58.60%		227.4%
100 to 300	590,618			71.3%
300 to 500	766,658			31.2%
500 to 700	633,668			5.1%
700 to 900	355,765			-11.6%
900 to 1100	197,266			-16.9%
1100 to 1300	102,829			-23.9%
1300 to 1500	65,555			-31.1%
GE 1500	79,956			-39.7%
Group Total	2,866,068			-4.4%

2.2.3. DRA Analysis

The DRA likewise modeled the average annual bill impacts of both its Introductory and End-State (or "cost-based") TOU rates for both PG&E and SCE. The Introductory TOU rate includes three tiers and very minimal peak price ratios, while the End State TOU rate provides a baseline credit, thus mimicking a two-tiered rate. Both include a minimum charge, but no fixed charge.

DRA's Introductory TOU includes a 4 cent / kWh on-peak surcharge, resulting in on / off peak differentials ranging from 1.16 for tier 4 / 5 to 1.34 for tier

1.[9] DRA's End State TOU is designed to keep summer on-peak to part-peak and part-peak to off-peak ratios "as close to 1.5 as possible."[10] The result for PG&E is an on / off peak ratio of approximately 2.4 times for the End State TOU rate.[11]

On an annual basis, 69% of PG&E non-CARE customers[12] on DRA's Introductory TOU would see *monthly* bill increases of between $0 and $10, and only 2% of non-CARE customers would see monthly bill increases greater than $10.[13] About 8% of CARE customers would see monthly bill increases larger than $10.[14] The bill impacts of the Introductory TOU rate result largely from the collapsing of PG&E's four tiers into three tiers, rather than from the somewhat limited on / off peak differentials due to the TOU surcharge.[15] In other words, DRA's tiered Introductory TOU rate does not really provide much indication of the true bill impacts of TOU rates.

The real impact of a TOU rate is reflected in DRA's End State TOU, with it higher differentials and more limited tiering. Over one-quarter (26.6%) of non-CARE customers face average monthly bill increases of over $10 under the End-State TOU, as compared to only 2% under the Introductory TOU rate.[16] For customers in Bakersfield in climate zone W, almost 60% would get an annual bill increase of at least $120. About 4.5% of non-CARE customers get monthly bill increases of more than $20 under the End State TOU, as compared to only 0.05% under the Introductory TOU.

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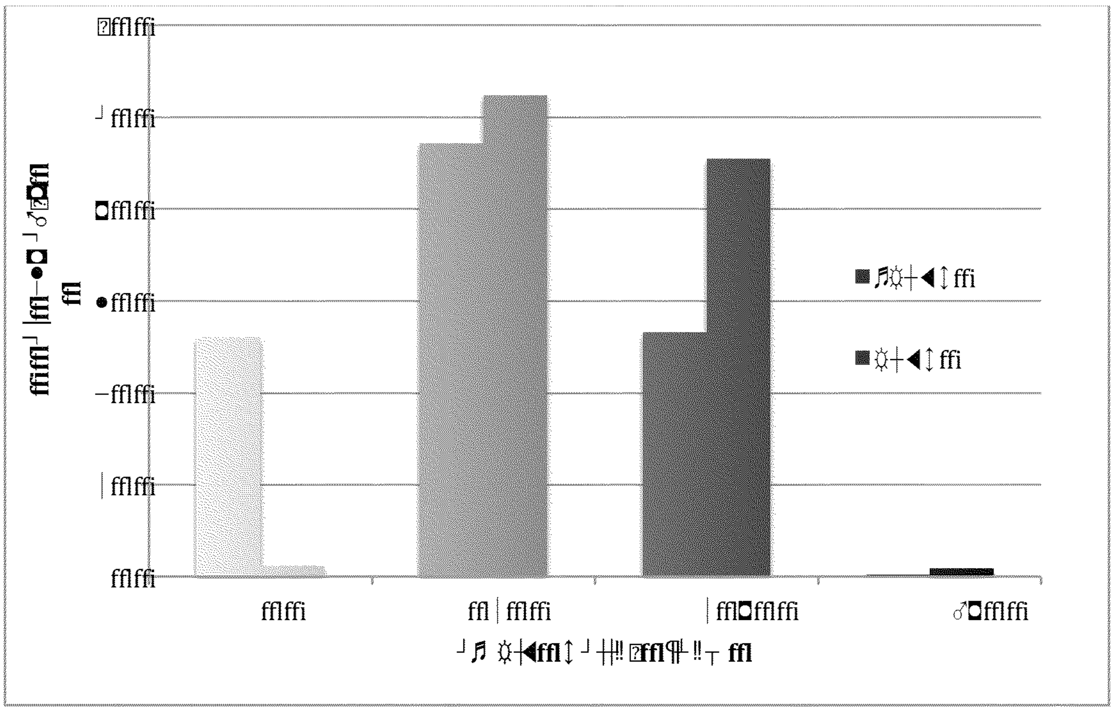
[9] DRA Appendix B, p. B-4.
[10] DRA Appendix B, p. B-19.
[11] DRA Appendix B, p. B-19.
[12] Averaged across the entire service territory for an entire year.
[13] DRA Appendix B, p. B-7.
[14] DRA Appendix B, p. B-11.
[15] DRA Appendix B, p. B-15.
[16] Comparing Figures B1.4 and B1.24.

Over 46% of CARE customers would see average monthly increases above $10 under the End State TOU, as compared to less than 8% under the Introductory TOU.[17] DRA acknowledges that "the cost-based TOU rate option has the most severe bill impact to a substantial number of customers."[18]

Figure 2 – Monthly Bill Impacts of DRA's Cost Based TOU for PG&E[19]



In a data response, DRA provided the annual bill impacts for PG&E customers in climate zone W. These results are discussed in the Section concerning seasonal bill volatility below.

DRA likewise modeled the bill impacts of its TOU rates for SCE. The Introductory TOU rate resulted in a modest average monthly bill increase of $0 to $10 for about 60% of non-CARE customers[20] and about 90% of CARE

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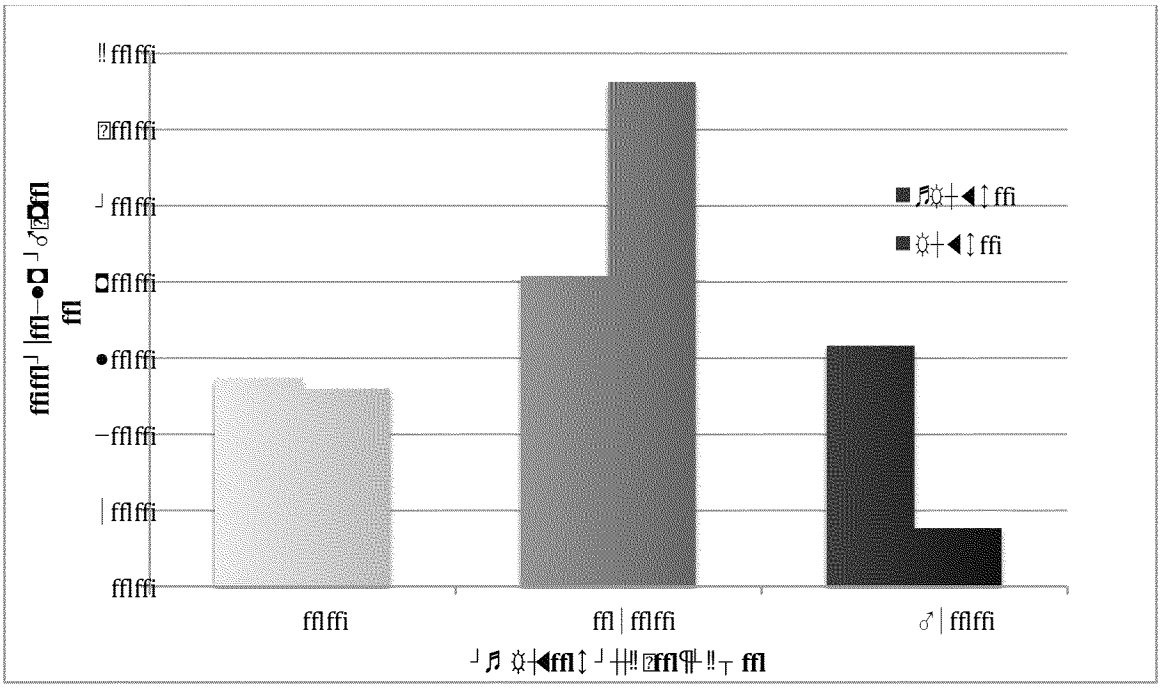
[17] Comparing Figures B1.8 and B1.28.
[18] DRA Appendix B, p. B-1.
[19] From DRA Figures B1.24 and B1.28.
[20] DRA Appendix B, p. B-29, Figure B2.2.

customers.[21] Almost no customers experienced bill increases above $10. However, in Climate Zone 15, which includes Inyo and Riverside, the summer bill impacts of the Introductory TOU are significantly higher, with almost 50% of customers experiencing a summer monthly bill increase of more than $10.[22]

Once again, the impacts of the End-State TOU rate (with an on / off peak differential of 2.4) are significantly higher. About 40% of non-CARE customers see average monthly bill increases of $0 to $10 on an annual basis, and fully 31.6% of non-CARE customers get monthly bill increases above $10.[23] About 66% of CARE customers would see monthly bill increases of $0 to $10.[24] DRA did not model the impacts of its End-State TOU on customers in CZ 15, though such output could be produced by SCE's model.

[21] DRA Appendix B, p. B-31, Figure B2.6.
[22] DRA Appendix B, p. B-34, Figure B2.10.
[23] DRA Proposal, Appendix B, p. B-42, Figure B2.20. In other words, almost a third of SCE's non-CARE customers will pay at least $120 more per year with the Cost-Based TOU.
[24] DRA Proposal, Appendix B, p. B-44, Figure B2.24.

Figure 3 - Monthly Bill Impacts of DRA's Cost Based TOU for SCE



These results indicate that TOU rates with an on / off peak differential above about 2.0 will result in significant annual bill increases for a large number of residential customers. DRA's bill calculator results show that its End-State TOU will increase annual bills by over $120 for 26.6% of PG&E's non-CARE customers, and for 31.6% of SCE's non-CARE customers. Moreover, the impacts will be much more severe for customers in hot climate zones.

2.2.4. EDF Analysis

The Environmental Defense Fund (EDF) proposed a TOU rate with a three-hour peak period (4-7 p.m.) and prices based on utility marginal costs. The EDF used existing utility optional TOU rates to develop utility specific TOU rates with peak price ratios of 2.3 (PG&E), 5.5 (SCE) and 1.2 (SDG&E).

The EDF did not use the utility bill calculators to calculate the impacts of its proposed rate design. EDF criticized its inability to see the individual load

profiles embedded in the utility calculators, so instead EDF developed a single "average" load profile for each utility.[25] TURN appreciates that the bill calculators had severe limitations and were extremely time-intensive.[26] However, EDF's explanations of the limitations of the bill calculators are difficult to understand. The bill calculators provide more granularity and specific data than are available from EDF's "generic bill calculator." EDF's outputs represent a system average customer, and thus do not allow any evaluation of impacts on customers located in different climate zones. It is difficult to understand how EDF's calculations in any way better "elucidate the questions of interest" concerning the impacts of alternative rate structures on demand and environmental impacts.[27]

Using an average load profile for customers from both SCE and PG&E, EDF calculated average percentage bill impacts for different peak price ratios and peak period time windows.[28] EDF's graph shows that, for a four-hour TOU peak period window, the average customer would see a bill decrease of between 0 and -15% for any peak price ratio less than about 2.0, and a bill increase of between 0 and 10% for peak price ratios between 1.3 and 2.7.[29] In other words, the "average" customer (average load profile) would get a 10% bill increase with a TOU at a peak price ratio of 2.7. Since the relationship is linear, EDF's analysis shows that an average customer would see a bill increase of about 17% with a peak price ratio of 3.0 and a four-hour peak time window.

[25] EDF Proposal, p. A-7.
[26] Using the bill calculators required multiple runs to ensure revenue neutrality, especially when considering the changes in CARE discounts.
[27] EDF Proposal, p. A-7 to A-9.
[28] EDF Proposal, p. A-10, Figure 1 (labeled as Figure 3 in text).
[29] EDF's Figure 1 assumes an off-peak price of $0.15/kWh, and the graph continues to a peak price of $0.40/kWh (a peak price ratio of 2.7).

The EDF's results are not surprising, but also not terribly illuminating with respect to the distribution of load impacts. EDF's results show the impact on a customer with an "average load profile." One can compare this result to the output of DRA's End-State TOU for SCE, which shows percentage of customers by monthly demand and on-peak use.[30] Extrapolating from the SCE bill calculator outputs, one can see that DRA's Cost-Based TOU rate (with a peak price ratio of 2.5 and a time window of approximately 6 hours) results in approximately 18% of customers having bill impacts of 0 to 10%, and 21.7% of customers having bill impacts of 10% to 20%.[31] The "average customer" falls in these two categories, with usage around 600 kWh per month and a load factor of around 12% to 14%. DRA's Figure B2.19 shows that on a percentage basis, the change in monthly bills is directly related to usage. High usage customers get bill reductions, and the lowest monthly usage customers get the highest percentage bill increases.

EDF's presentation for the "average customer" does not illustrate the bill impacts on customers with different load profiles. Admittedly, EDF hopes that TOU incentives will motivate all customers to shift load and eventually make all load profiles slightly more similar. However, there is absolutely no way that the load profile of a customer with air conditioning will ever be the same as the customer without air conditioning during the summer. Customers with air conditioning will simply pay more, and EDF's analysis does nothing to reveal the extent of this impact.

[30] DRA Proposal, p. B-42, Figure B2.19 and 2.20.
[31] DRA, Figure B2.19.

EDF points out that bill impacts are significantly lower with a two-hour peak window, and that load shifting has less of an impact with a short peak window. EDF appropriately explains the trade offs between the size of the peak price time period, the price ratios and shifting behavior.[32] However, a two-hour peak period during weekdays over six summer months results in a total of about 240 hours, only about twice that of most Critical Peak Pricing proposals. It is absolutely true that such a TOU rate would result in lower bill impacts, but it would also result in significantly fewer less load shifting and emissions reductions.[33]

2.3. TOU Rates Dramatically Increase Summer Bills for Central Valley Residents, Even Though No Party Fully Analyzed This Bill Volatility Impact

2.3.1. Seasonal Bill Volatility Is a Major Concern for Utility Customers, Yet No Party Fully Analyzed The Impacts of Proposed TOU Rates

The utilities provide a lengthy history of residential rate design. They conclude that the limitation on rate increases for usage below 130% of baseline has created the large differentials between tier 2 rates and tier 3 and 4 rates. The utilities explain that one problem of steep tier differentials is the potential volatility of summer bills when customer consumption spikes into upper tiers.[34]

Indeed, SCE explains that a major cause of customer dissatisfaction was the high bills experienced by customers due to the summer 2006 heat wave.[35] Similarly, PG&E notes that customer dissatisfaction originated with the heat

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[32] EDF, p. A-12 to A-13.
[33] EDF used utility TOU periods to model the economic benefits of TOU. The utilities define the on-peak period as six or seven hours during every summer weekday afternoon, resulting in approximately 750 total hours.
[34] PG&E Proposal, pp. 3-4, 77-78. SCE Proposal, p. 24-26.
[35] SCE Proposal, p. 24.

wave of July 2009, when customer bills spiked dramatically.[36] Even then, the average bill of the average customer did not increase precipitously, as shown in TURN's pleading.[37] However, a subset of customers with higher than average use undoubtedly experienced significant bill increases during that single month.

Given this history, TURN was extremely surprised by the lack of data or analysis concerning seasonal or geographic bill impacts provided by parties advocating for TOU rates. Not a single party aside from DRA provided any analysis or information concerning the potential impacts of a time-varying rate on customer bill volatility, especially for customers dependent on air conditioning during the summer. Of course, meaningful quantitative analysis was difficult due to the fact that the bill calculators lack the functionality to provide seasonal bill impacts, and only SCE's bill calculator allows easy calculation of bill impacts segregated by climate zone.[38]

However, both PG&E and SCE conducted separate analyses to show the reduced monthly bill volatility due to flat rates and tiered rates with fixed charges.[39] But neither PG&E nor SCE presented these results for their proposed optional TOU rates.

Through data requests TURN was able to obtain limited information concerning the monthly and seasonal bill impacts of proposed TOU rates.

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[36] PG&E Proposal, p. 2, Figure 1. PG&E calls this event the "Rate Revolt in Kern County." See, also, SCE Proposal, p. 24.
[37] TURN Proposal, p. 33, Figure 11.
[38] Indeed, TURN does not fault intervenors for the lack of analysis. The primary fault is the lack of consistent functionality for the three bill calculators. Indeed, even using the calculators to do any significant sensitivity analyses is prohibitively time-consuming for other parties. In retrospect, a more effective approach would have been to ask parties to submit proposed desired rate designs and have the utilities model revenue-neutral rates with sensitivies for critical parameters.
[39] SCE Proposal, p. 26-27, Figures II-2 and II-3. PG&E Proposal, p. 78, Fig. 4-3.

The data show that seasonal bill impacts will cause customer bills to fluctuate dramatically. For example, under DRA's End State TOU, over 33% of PG&E non-CARE customers in Bakersfield will see their monthly bills increase by at least $40 in each and every summer month, and over 40% of PG&E CARE customers in Bakersfield will see their monthly bill increase by at least $40 in each and every summer month.[40]

PG&E and SCE provided data responses that likewise show the increased annual volatility due to their proposed TOU rates.[41] However, neither PG&E nor SCE was able or willing to provide complete data on seasonal and geographic bill impacts. Given that consumer concerns about the impacts of tiered rates were largely caused by the bill volatility experienced by large users due to heat storms in the summers of 2006 and 2009, the Commission should be extremely wary about moving towards a TOU rate design which will make such bill increases significantly worse, even when compared to today's tiered rates. TURN's proposed tiered rates, on the other hand, would moderate summer bill volatility as compared to present rates.

2.3.2. PG&E Analyses

In its proposal, PG&E discussed a 1) standard two-tiered rate, and 2) an optional TOU rate without tiers. PG&E presented no details concerning these rate options in its proposal. In data responses, PG&E clarified that its default end-state rate was modeled as a two-tiered rate, with non-CARE rates at

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[40] PG&E's summer season contains six months. Thus, total summer bills will increase by over $240 for at least 33% of Bakersfield non-CARE customers.
[41] SCE's bill calculator could be used to determine bill impacts on an annual basis for CZ 13. PG&E provided bill volatility analyses, but could not provide bill impact analyses segregated by climate zone or season. SCE provided some analyses of bill volatility on July 10, 2013.

approximately 16.8 and 20.1 cents / kWh and a $10 / month customer charge. PG&E's optional TOU rate also included a $10 / month customer charge and summer non-CARE rates of 16.9, 21.9 and 28.5 cents / kWh for off-peak, part-peak and on-peak use, resulting in a peak price ratio of approximately 1.7.

In its proposal and Appendices, PG&E provided no analyses of the bill volatility impacts of TOU rates. However, such an analysis was clearly within PG&E's ability to perform, since PG&E did explain that its proposed standard tiered rate "significantly reduces today's high summer bill volatility," and PG&E quantified that impact using a typical (i.e. average) customer load profile.[42] PG&E's Figure 4-3 shows that in each and every month June-September, the proposed two-tiered rate reduces monthly bills by $50-$100 as compared to present rates.

In a data response, PG&E calculated the monthly bills of a typical non-CARE Bakersfield customer under existing rates, PG&E's proposed two-tier standard rate, and PG&E's proposed optional TOU.[43] The analysis shows that the summer bill impact of PG&E's proposed TOU rate is actually slightly greater than the volatility impacts of existing tiered rates. Both the existing four-tiered rate and PG&E's proposed TOU rate increase monthly bills in June-September by about $20-$50 as compared to PG&E's proposed two-tiered rate.[44]

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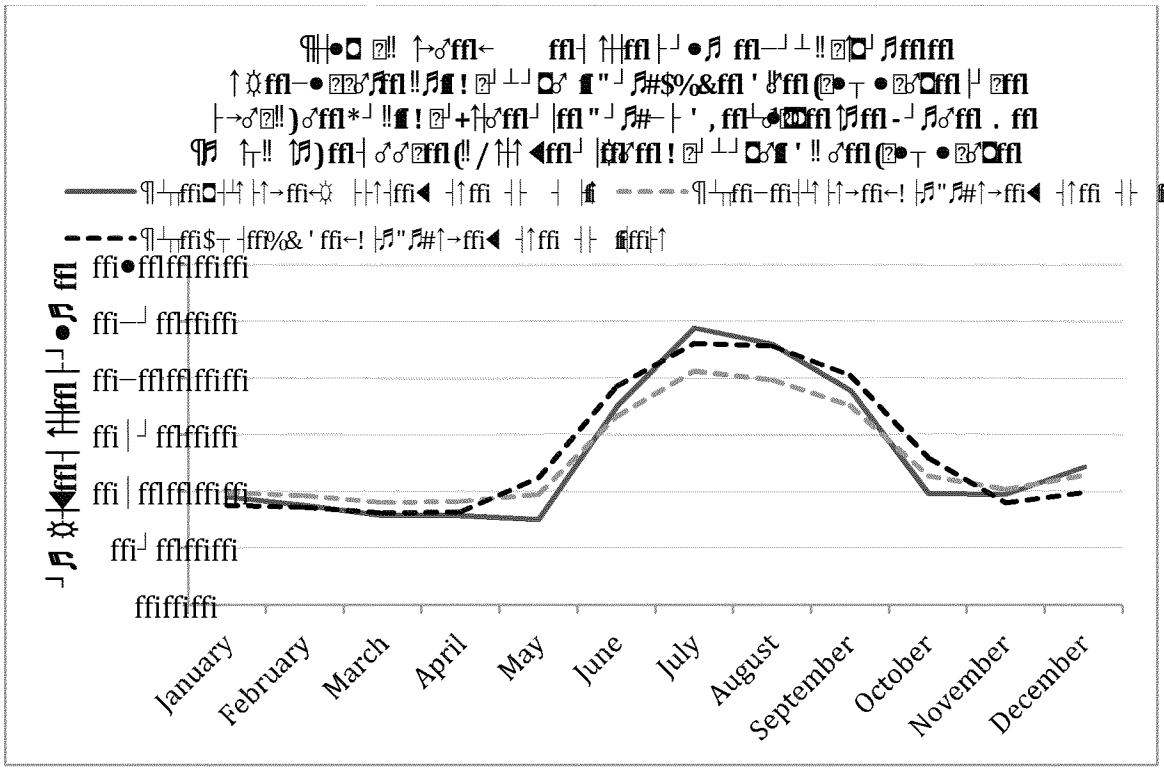
[42] PG&E Proposal, p. 77-78 and Figure 4-3.
[43] PG&E Response to TURN 05-03.
[44] PG&E's proposed two-tier rate, with a tier differential of 1.15 and a $10 fixed charge, is functionally very similar to a flat rate.

Figure 4: PG&E Bill Volatility Analysis[45]



PG&E's results for an average climate zone W customer are based on a TOU rate that includes a $10 fixed customer charge, and that has an on / off peak ratio of 1.70.[46] Such a customer would pay about $30 more on their August bill as compared to PG&E's two-tiered rate. Any TOU rate that has higher on / off peak ratios would result in greater monthly volatility for summer bills. Likewise, PG&E's result only provides the volatility data for an "average" customer who uses 661 kWh per month. Any customer using more than the average would experience even greater volatility and greater summer bills.

[45] This Figure corresponds to PG&E's Figure 4-3, on page 78 of its Proposal.
[46] PG&E's proposed TOU has non-CARE rates of 28.51, 21.93 and 16.87 for summer on-peak, part-peak and off-peak.

What is needed is a seasonal or monthly bill impact analysis by usage percentile for customers in different climate zones. However, PG&E declined to provide any such analysis, explaining that:

> PG&E cannot provide this data within the given timeframe as there is no tool readily available to produce the results differentiated by season and climate zone.[47]

Of course, the fact that PG&E could not provide any such analysis "within the given timeframe" because there was "no tool readily available" does not mean it could not have performed this analysis. The bill calculator provides detailed monthly results for each of the over 7000 benchmark customers, who reside in all climate zones. DRA conducted additional analysis on these outputs to aggregate results by season and climate zone. Given the concerns expressed early on concerning bill volatility impacts, and given early assurances that the bill calculators would provide more than just a service territory-wide annual output, PG&E should have included such basic functionality in the bill calculator.[48]

2.3.3. SCE Analysis

SCE identified monthly bill volatility as one of the key problems due to existing high tier differentials, and SCE analyzed monthly bills to show how its proposed two-tiered rate design with a customer charge of $5 results in lower

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[47] PG&E Response to TURN DR 05-04, sent June 25, 2013.

[48] The "Joint IOU Rate Design and Bill Impact Model Summary," dated Nov. 28, 2012, stated that at least for SDG&E the model output would provide "Monthly bill comparison of Low, Medium, and High users by CARE / non-CARE, Climate Zone, and Type of Service for Current rates, Cost-Based rates, and the Selected Structure rates." However, it appears that not even SDG&E's model provided such outputs.

monthly bill volatility than existing rates.[49] SCE finds that a flat rate produces similar results as a two-tier or three-tier rate.

SCE acknowledges that bill volatility is most problematic for customers "who live in warmer climates whose usage increases into Tiers 3 and 4 during extreme summer heat."[50] SCE thus additionally modeled monthly bill volatility for customers in CZ 13. The analysis found that the standard of deviation for a July bill for CZ 13 is over $80 with current rates, versus a standard of deviation of about $50 for customers in all climate zones (average for service territory).[51]

But SCE did not model the volatility impacts of a TOU rate, even though it did provide limited outputs for an illustrative TOU rate with an on/off peak differential of about 5.8 and a fixed charge of $20 (for customers with demands <5kW) or $30 (for customers with demands >5 kW).

In data responses, SCE explained that its model could provide bill impacts by climate zone, but not by summer and winter season. SCE explained that:

> SCE worked with parties and Commission staff over several months to scope and develop its bill impact model. The functionality to view bills by season was not adopted through that process.[52]

SCE provided limited data on bill volatility resulting from its proposed TOU rates, showing exactly the same result as for PG&E – the proposed TOU rate has bill volatility impacts that are almost identical to the impacts of existing tiered rates:

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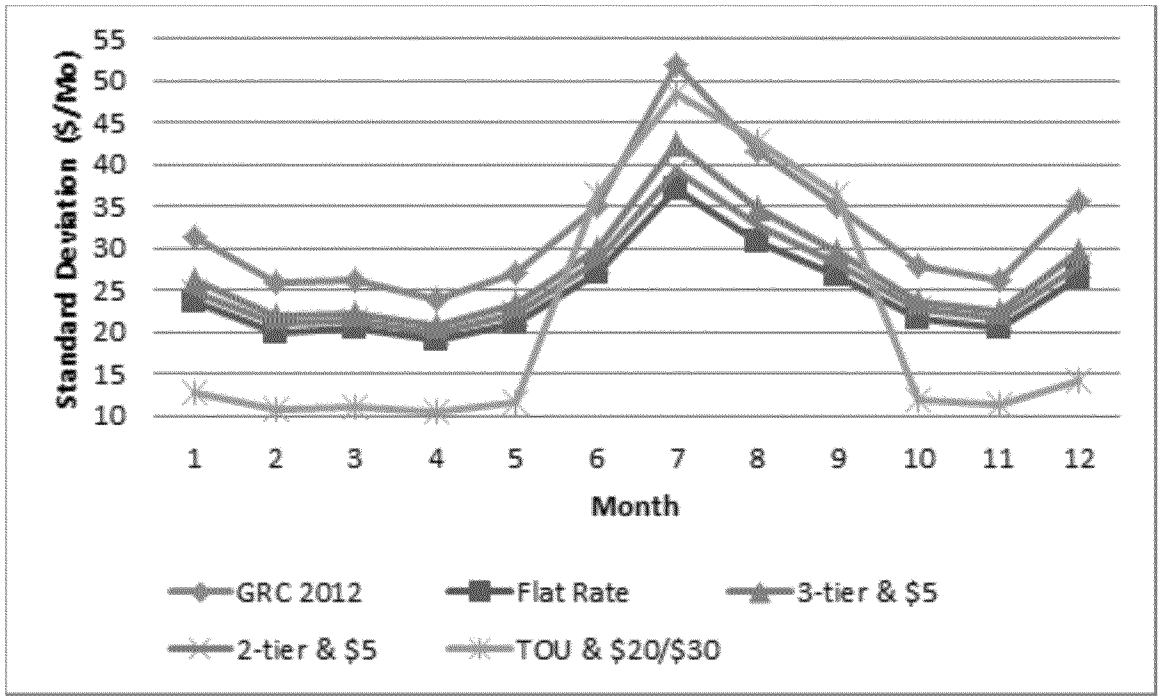
[49] SCE Proposal, p. 25-26, Figure II-2.
[50] SCE Proposal, p. 25.
[51] SCE Proposal, p. 27, Figure II-3.
[52] SCE Response to DR TURN 04-09.

Figure 5: SCE Bill Volatility Analysis[53]



2.3.4. DRA Results

In its proposal DRA analyzes the impact of its Introductory TOU rate on summer bills of a PG&E customer in Climate Zone W. Climate Zone W includes King and Kern Counties, with Bakersfield as the principal city. There are approximately 250,000 PG&E electric customers in CZ W, split almost equally between CARE and non-CARE customers.

DRA calculated that with the Introductory TOU, about 20% of Bakersfield customers would experience average monthly increases, in each of the six

[53] This Figure corresponds to SCE's Figure II-2, on page 26 of its Proposal. While SCE has a high on / off peak price differential, it also includes high ($20 and $30) fixed charges which somewhat dampen the volumetric price signal.

summer months, of more than $10 dollars (or an annual increase of at least $60).[54] The impact on CARE customers in Bakersfield in the summer is more severe, with 40% of CARE customers seeing monthly summer bill increases of more than $10 on the Introductory TOU.[55]

But these impacts are trivial compared to the impact of DRA's End-State TOU, with an on / off peak price ratio of about 2.4. In a data response DRA calculated that the monthly bill impacts of its End-State TOU for a customer in Climate Zone W.[56] That analysis showed that almost 60% of Baskersfield customers would see an annual bill increase of more than $120, and about 20% of Bakersfield customer would see an annual bill increase of at least $240, as illustrated below.

Table 1: Annual Average Monthly Impact of DRA Cost Based TOU on non-CARE Customer in CZ W

Cost-Based TOU	Annual Bill Impact per Month	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
←		

[54] DRA Appendix B. Figure B1.12 on p. B-13. On an annual basis across the entire service territory only 2% of customers would see monthly bill increases of more than $10. Figure B1.8.
[55] DRA Appendix B, Figure B1.12, p. B-13.
[56] Some of the tables provided in DRA's Data Response for the Cost-Based TOU bill impacts are included in Attachment A.

Cost-Based TOU	Annual Bill Impact per Month	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
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DRA likewise calculated the summer month bill impacts of the End-State TOU for Climate Zone W. That analysis shows that literally 93% of Bakersfield non-CARE customers will see summer monthly bill increases of more than $10, and fully 33% of Bakersfield's non-CARE customers will see bills more than $40 higher in each and every month of the six-month summer.[57] During the single month of August, fully one-half of Bakersfield's non-CARE customers will see a bill increase of more than $40.

Table 2: Summer Average Monthly Impact of DRA Cost Based TOU on non-CARE Customer in CZ W

Cost-Based TOU	Summer Bill Impact per Month	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
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[57] This results in a summer bill increase of $240. However, some of this increase is offset in winter months. Thus, while 33% of Bakersfield customers will get summer bill increases of at least $240, only 20% would get annual increases of at least $240. See Table 1 above.

Cost-Based TOU	Summer Bill Impact per Month	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
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Bakersfield's CARE customers, who make up more than 50% of PG&E's customers in Climate Zone W, will be even harder hit, with more than 40% getting an average summer bill that is $40 higher than under current rates. Over three quarters (75.5%) of CARE customers will get an August bill increase of over $40.

DRA was unable to complete a similar seasonal analysis using its End-State TOU rates for SCE customers.

DRA's analysis illustrates graphically that any TOU rate with an on / off peak differential of greater than about 2.0 will produce severe bill impacts, with much higher summer month bill increases than calculated using PG&E's proposed voluntary TOU rate or DRA's Introductory TOU rate.

2.4. TURN Is Not Opposed to an Optional non-Tiered TOU Rate

TURN appreciates that parties proposing TOU rates seek to improve customer load factors, thus reducing the need for unnecessary capacity and reducing some emissions. However, the data indicates that the "harm" due to negative bill impacts outweighs the benefits.

TURN believes that time-varying pricing will reap the most benefits in the future when customers purchase smart appliances and devices that allow more significant automation of load shifting. TURN suggests that the best path towards this future state is to provide optional TOU rates, and build into utility customer interactions the ability to promote such rates to customers who have requisite home automation.

TURN does not have sufficient information or analyses from the proposals to recommend any particular TOU rate design. However, after examining DRA's proposal, which provides for some tiering with a TOU rate, we suggest that a non-tiered TOU rate option may better provide customers (and vendors) with the ability to model the economics of energy efficiency or demand response investments. We appreciate DRA's point that even a tiered TOU rate could be made understandable to a customer;[58] however, we remain concerned that even if the rate is understandable, it may still be too complicated to allow for easy evaluation of the payback period for any particular investment in more efficient appliances or lighting.

[58] DRA Proposal, p. 27-28.

3. Rate Design and Conservation – California at a Crossroads

One of the primary goals of rate design is to align customer rates with California's goals of promoting energy efficiency, demand response and renewable energy. A key issue in dispute is whether the addition of large fixed customer charges, as recommended by the IOUs, will impair the incentive for customers to conserve energy, invest in energy efficient appliances, and / or install on-site solar generation. TURN addresses these issues in the first section below.

The IOUs also allege that inverted tier rates do not promote conservation, as is commonly assumed. TURN responds to some of the arguments presented by PG&E. We strongly commend, moreover, the discussions about tiered rates and conservation provided by the NRDC[59] and the Sierra Club.

3.1. Fixed Charges

Both PG&E and SCE extensively lament the lack of fixed charges in their existing rates. The utilities argue that fixed charges appropriately reflect cost causation. They argue that fixed charges will not reduce conservation incentives. And lastly, they portray the Commission's policy of minimizing fixed charges as an extreme position at odds with rate designs for POUs in California and large utilities everywhere else in the country.

The utilities' cost causation arguments are based on overinflated assumptions about the nature of fixed costs, as already addressed in TURN's proposal. But more importantly, the utilities are absolutely correct that this Commission has bucked the norm by minimizing fixed prices as part of utility tariffs, and instead incorporating revenue decoupling to stabilize utility revenues.

[59] NRDC, p. 37-44.

This policy is one of the components contributing to California's success in minimizing per capital load growth. This Commission is at a crossroads. It can follow the suggestions of the IOUs and align rate design policy with national norms, thus abandoning California's environmental leadership role; or it can continue to promote a rate design that aligns pricing with other programs and policies that encourage energy conservation in order to achieve a cleaner and healthier environment for California.

3.1.1. Fixed Charges and Conservation

This Commission has historically favored volumetric rates based on the fact that consumers can save money by reducing energy use; whereas fixed charges reduce the economic incentive to conserve or invest in energy efficiency. [60] PG&E argues that fixed charges do not promote conservation because customers respond to average rates, so that whether the rate is volumetric or fixed makes no difference.[61]

PG&E's argument boils down to an assertion that customers do not, and cannot, understand the components of electricity rates. While a rational customer would understand that reductions in usage only provide economic savings equal to the avoided volumetric rate, PG&E asserts that customers will not understand this fact. Furthermore, PG&E's entire argument relies on the assumption that customers will never understand that fixed charges are unavoidable or that the value of conservation is tied to the price of the volumetric rate. To accept this premise, the Commission must conclude that customers can never be educated to

[60] D.11-05-047, page 24 ("the customer charge also would conflict with price signals that encourage conservation and utilization of alternative resources such as solar.")
[61] PG&E Proposal, p. 52-53. PG&E relies entirely on the analysis by Ito (2012). TURN addressed this analysis already in our Proposal at p. 37-41 (Sec. 2.3.2).

act rationally in response to the rates they are charged. Indeed, PG&E's approach argues against any customer education efforts in the event that large fixed charges are adopted.

Thus, while customers are supposed to understand how to ration their consumption based on marginal cost pricing of everything ranging from food products to airplane tickets to insurance policies, consumers do not apparently understand how much electricity to use based on the notion of a marginal price of electricity. Are customers just inherently more stupid with regards to electricity consumption? TURN does not believe this to be the case. However, TURN agrees that the level of customer understanding of electric rates and pricing is low and that customer response to existing prices is not optimal. But this consumer behavior does not reflect some intrinsic inability to understand tiered pricing. Rather, massive consumer confusion regarding electricity pricing reflects market dynamics and the role of regulated utilities in consumer education.

As the IOU customer survey showed, fully half of electric ratepayers do not realize California has tiered pricing.[62] There are numerous other products and services that are sold on either inclining block (water rates, formerly phone service), declining block (Costco, printing, postal rates, 'two for one' deals) or time-variant (some phone service, airline prices) rate structures. However, since utilities are natural monopolies, consumers do not have much need to educate themselves concerning electricity pricing so as to shop around for better deals. Absent a clear understanding of the financial consequences, it is clear that many consumers remain confused about electricity pricing.

[62] PG&E, Appendix A, p. 7.

In California, it has been the role of the IOUs to educate consumers about tiered rates. It should come as little surprise that the IOUs have not exactly been leaders in informing the public that the best way to reduce electric bills is to limit monthly usage. Why should the utility promote behavior that will result in lower commodity sales, even with decoupling protections for revenue fluctuations? Such education has been especially difficult in the past decade, since the utilities do not want to promote greater understanding of actual tiered rate levels that potentially antagonize their largest (and wealthiest) users.

As graphically illustrated by the NRDC, utility bills have been utterly useless in providing customers with clear and actionable information concerning the impacts of tiered rates.[63] Only recently have the utilities begun to revise their bill presentation to make clearer the impact of tiered rates.[64]

3.1.2. The IOU Comparison to Other Jurisdictions Ignores Other Ratemaking Differences and Ignores California's Energy Policy Goals

The IOUs emphasize that their rate designs are an anomaly due to their very low, or nonexistent, fixed monthly charges.

PG&E and SCE both provide extensive data concerning fixed charges used by regulated utilities in other jurisdictions and by municipal utilities in California. PG&E presents data for 22 "representative utilities,"[65] showing that the majority have fixed charges between $5 and $10 per month. SCE presents data for the largest 50 IOUs in the country,[66] similarly showing a distribution

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[63] NRDC Proposal, p. 15-18.
[64] TURN is awaiting to see PG&E's long-planned bill redesign. SCE does presently provide some graphical information regarding tiered rates and usage on its residential bill.
[65] PG&E Proposal, p. 86-87. PG&E does not define "representative."
[66] SCE Proposal, Figure II-4, p. 31.

dominated by fixed charges of between $6 and $10 per month. Both PG&E and SCE provide data for various California publically owned utilities, likewise showing fixed charges of $3 to $12 per month.[67] PG&E and SCE approvingly describe SMUD's intent ultimately to increase its monthly fixed charge to $20 per month.[68]

It is also noteworthy that SCE's and PG&E's illustrative rates include fixed charges of $10, $20 and $30 per month. While most other jurisdictions have customer charges of $5 to $10, PG&E and SCE would actually like ot become "leaders" in high fixed charges. And the utilities apparently seek this role despite the fact that the number one conclusion from the recent customer survey is that utility customers hate fixed monthly charges.[69]

Reading PG&E's and SCE's proposals, one might get the impression that California is a pariah, eschewing fixed charges and violating sensible precepts of cost causation and rate design.

Missing from this presentation is any mention of California's leadership role in promoting energy efficiency. Missing is any acknowledgment that California, unlike the rest of the nation, has maintained a fairly constant per capital energy use since about 1975, coincidentally the year of passage of the Warren-Miller Lifeline Act.[70]

Indeed, the comparisons to other utilities are incomplete. Fixed charges are simply one ratemaking method of providing utilities with revenue stability.

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[67] SCE Proposal, p. 34, Figure II-5. PG&E Proposal, p. 46.
[68] PG&E Proposal, p. 84-85.
[69] PG&E, Appendix A, p. 18-19, 44.
[70] This fact has been repeatedly documented in the so-called "Rosenfeld curve," named in honor of former CEC Commissioner Arthur Rosenfeld.

In this sense, fixed charges are quite analogous to decoupling in providing utilities with revenue certainty and stability:

> A steeply inverted block rate design, such as those used by PG&E, correctly associates the cost of seldom-used capacity with the (infrequent) usage for which that capacity exists. Decoupling is one way to provide revenue stability for the utility, without introducing rate design elements such as high fixed monthly charges, in the form of a Straight Fixed / Variable rate design, that remove the appropriate price signals to consumers.[71]

The utilities make no mention of whether any of the other utilities or jurisdictions have adopted decoupling, or other ratemaking mechanisms that enhance revenue stability. While cost causation is one element supporting certain fixed charges, cost causation can also be used to support decoupling as an alternative to fixed charges.

California's preeminence in per capita electric use is due to many factors, including the codes and standards initiated by the Lifeline Act and the tiered rates mandated by this act. As NRDC points out, price is not everything when addressing electricity consumption and conservation. It is but one of several important factors, including codes and standards and efficiency programs.[72] However, price and rate design are certainly important variables.

This Commission has led the nation in adopting the 'loading order' for electricity procurement guidance. The Legislature has provided a vision of California leading the nation with respect to policies designed to reduce pollution and limit GHG emissions.

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[71] See, Regulatory Assistance Project, "Revenue Regulation and Decoupling," June 2011, p. 26. See, also, Edison Electric Institute, "Innovative Regulation: A Survey of Remedies for Regulatory Lag," April 2011, p. 17-24.
[72] NRDC Proposal, p. 4-6.

The utilities would have the Commission believe that adopting fixed charges "like everyone else" is a positive step for rate design. TURN urges the Commission to resist this facile suggestion. We urge the Commission to remember that over the past forty years California has adopted policies to promote conservation and energy efficiency.

Over the past decade California has adopted policies to accelerate renewable energy and halt global catastrophe. Now is not the time to forget that rate design is an important factor influencing these goals. Now is not the time to become "just like everyone else" and move to fixed charges. Rather, the Commission should find that fixed charges are an impediment to conservation and should be avoided at all costs.

3.2. Conservation and Inclining Block Rates

Inclining block rates charge more for higher use, thus providing an incentive to conserve at all times. But numerous critics contend that this rate structure is inconsistent with marginal costs and thus economically inefficient. Some contend that tiered rates encourage too much conservation, resulting in inefficient lack of electricity use, while others contends that very low bottom tiers discourage conservation by low energy users.

Several parties point out that one of the hallmarks of a natural monopoly is a declining marginal cost curve.[73] EDF concludes that an "efficient rate would thus be *decreasing* block tariffs rather than increasing."[74] And PG&E provides a useful graph showing that the residential rates of many large domestic IOUs do

[73] For example, PG&E Proposal, p. 83; EDF Proposal, p. 15.
[74] EDF Proposal, p. 15.

indeed exhibit "a declining average rate with increasing usage,"[75] most likely due to the use of fixed charges together with a single volumetric usage rate.[76]

On the other hand, NRDC points to the LADWP, regulated utilities in the Western United States, as well as utilities in various countries around the world, that use increasing block pricing.[77]

Decreasing block pricing sends a very clear signal to the consumer – the more you use, the less you will pay. Decreasing block pricing is extremely common for many products and commodities, since such pricing reflects certain cost structures. This discussion leaves this Commission with a very clear choice. Should we abandon inclining block rates to conform exclusively to cost causation and economic efficiency, or should we use rates to promote conservation and energy efficiency, the two pillars of California's energy policy?

For the utilities the answer is clearly that economic efficiency trumps everything, since "conservation for the sake of conservation does not improve efficient use of energy."[78] Thus, the utilities prefer a declining rate structure or a TOU rate structure, even though on a net basis such changes could result in an increase in overall energy use.

The Commission should not be driven strictly by theoretical "efficiency" arguments. The Legislature decided almost forty years ago that conservation should be one of the goals of residential rate design. The Commission has reiterated the importance of energy efficiency in adopting two Energy Action Plans and embracing the loading order. The Commission should not abandon

[75] PG&E Proposal, Figure 5-1, p. 83-84.
[76] Both fixed charges and "declining block rates" result in a price curve that decreases with usage.
[77] NRDC Proposal, p. 44-50.
[78] SCE Proposal, p. 54.

this principle just to adhere to economic efficiency based on disputed marginal cost data.

An apt analogy exists in the public health arena. Decreasing block pricing is in effect for soft drink purchases, where the incremental unit price per ounce of buying a medium soft drink is much less than the price per ounce for the small soft drink. Soft drinks are not a regulated commodity, and public health advocates seem almost powerless to stem the debilitating rise of obesity, which is at least in part fueled by larger and larger sizes of fast food and soft drinks.

PG&E challenges the "conventional wisdom" that increasing tier rates promote conservation, and emphasizes that the relationship between inclining block rates and consumption is an empirical issue.[79] PG&E then notes that there is an overall reduction of about 2-3% in energy use when changing from present rates to PG&E's end state two-tiered rate or TOU rate.[80]

But this is a non-sequitur. PG&E is simply using a constant -0.20 price elasticity estimate changes due to pricing, looking at the amount of energy billed under any proposed rate. This analysis *explicitly acknowledges* that higher tiered rates will promote conservation. The "net reduction" in PG&E's calculation is simply due to the fact that there is a very large increase in the bottom tier rates from existing tier 1 and tier 2 rates, thus reducing some consumption for lower tier users. TURN does not disagree with this mathematical result.

A valid apples-to-apples comparison would take a flat rate and compare it to a revenue neutral tiered rate. The NRDC presents exactly this type of analysis

[79] PG&E, p. 51-52.
[80] PG&E, p. 77.

and shows that a tiered rate inherently reduces consumption due to the mathematical fact that mean usage is higher than median usage.[81]

Both the NRDC and the Sierra Club summarize the literature concerning conservation and tiered rates and cite to the conclusions of Dr. Faruqui, one of the primary national proponents of dynamic pricing, who likewise agrees that tiered rates promote overall conservation.[82]

Yet another recent empirical data point comes from Xcel Energy, which implemented a two-tiered rate (4.6 and 9 cents/kWh) for the first time in 2010. The Colorado PUC approved this rate specifically "to encourage a more efficient use of energy during the summer, since summer peak loads drive the Company's generation and transmission capacity costs."[83] This transition allowed for a direct comparison for the same customers of consumption under the old flat rate versus the new tiered rate. Xcel found that in each of the three summers 2010, 2011 and 2012 customers reduced usage (after adjusting for weather and economic conditions) by approximately 2-4% due to the tiered rates.

Proving the impacts of tiered rates is not an easy task, and modeling the results is never as easy as modeling the results of a time-varying rate where load and price can be directly matched. However, a large and long body of academic theory, supported by a few studies conducted when a utility has implemented

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[81] This is due to the fact that a few customers who use relatively large amounts of electricity skew the mean. This is true for California's electricity. PG&E data show that 5% of residential customers use 16% of all kilowatt hours consumed by the class and 24% of customers represent 48% of the class usage.
[82] Ahmad Faruqui, "Inclining Towards Efficiency," *Public Utilities Fortnightly*, August 2008. See, also, NRDC Proposal, p. 40.
[83] Xcel Energy, "Impact Analysis of Residential Two Tier, Inverted Block Rates," January 22, 2013.

tiered rates, do demonstrate that utility customers respond to inclining block rates by reducing energy consumption.

4. The Economic Benefits of TOU Are Overstated, and the Environmental Benefits of Load Shifting Are Likely Extremely Small

Both the DRA and the EDF quantified the potential benefits of the load shifting caused by a TOU rate. The load shifting decreases the need for generation capacity, and also reduces somewhat GHG emissions. Both parties used marginal cost data and an assumed price per ton of GHG to model the resulting benefits.

TURN does not disagree that load shifting will produce some benefits. However, the magnitude of the benefits estimated by DRA and EDF are overstated due to erroneous assumptions about elasticities, peak price ratios and marginal costs. Even more importantly, the fundamental assumption (which has driven much of the Commission's stated interest in TOU rates) that load shifting will reduce carbon emissions, may not actually be correct even for California's electric generation dispatch system.

4.1. Response to EDF

EDF calculated TOU benefits of $472 million statewide based on utility data concerning marginal costs, utility specific TOU rates, and elasticity data from the Statewide Pricing Pilot. This estimate is likely overstated by a factor of two, with potential benefits closer to $223 million.[84]

[84] Of course the economic benefits would come at the cost of a reduction in consumer surplus, which includes comfort level and effort needed to comply with the tariffs.

First, EDF relied on price elasticities for TOU rates from the Statewide Pricing Pilot (SPP). However, the final SPP Report cautioned against using the TOU results:

> The reduction in peak-period energy use resulting from TOU rates in the inner summer of 2003 equaled –5.9 percent. This 2003 value is comparable to the estimate for the CPP-F tariff on normal weekdays when prices were similar to those for the TOU treatment. However, in 2004, the TOU rate impact almost completely disappeared (-0.6 percent). TOU winter impacts are comparable to the normal weekday winter impacts for the CPP-F rate.
>
> Drawing firm conclusions about the impact of TOU rates from the SPP is somewhat complicated by the fact that the TOU sample sizes were small relative to the CPP-F sample sizes. Small sample sizes are more subject to influence by outliers and changes in the sample composition over time. Further complicating the estimation of the daily energy equation is that variation in daily prices over time is quite small, which makes it difficult to obtain precise estimates of daily price responsiveness. In short, there are reasons to take the analysis of the TOU rate treatment with a "grain of salt." Indeed, an argument could be made that the normal weekday elasticities from the CPP-F treatment may be better predictors of the influence of TOU rates on energy demand than are the TOU price elasticity estimates. [85]

Using the preferred elasticities (from CPP-F normal weekdays) reduces the economic results by about 18% to $388 million.

Second, and more important, is the use of the SPP results to model SCE's TOU rate design, with a peak price ratio of over 5. Over three-quarters of the calculated economic benefits are due to the SCE rate, and reflect the very high peak price ratio.[86]

However, the maximum price ratio tested in the SPP was 3 to 1 for normal weekdays.[87] It is not statistically valid to apply the SPP equations to a peak price

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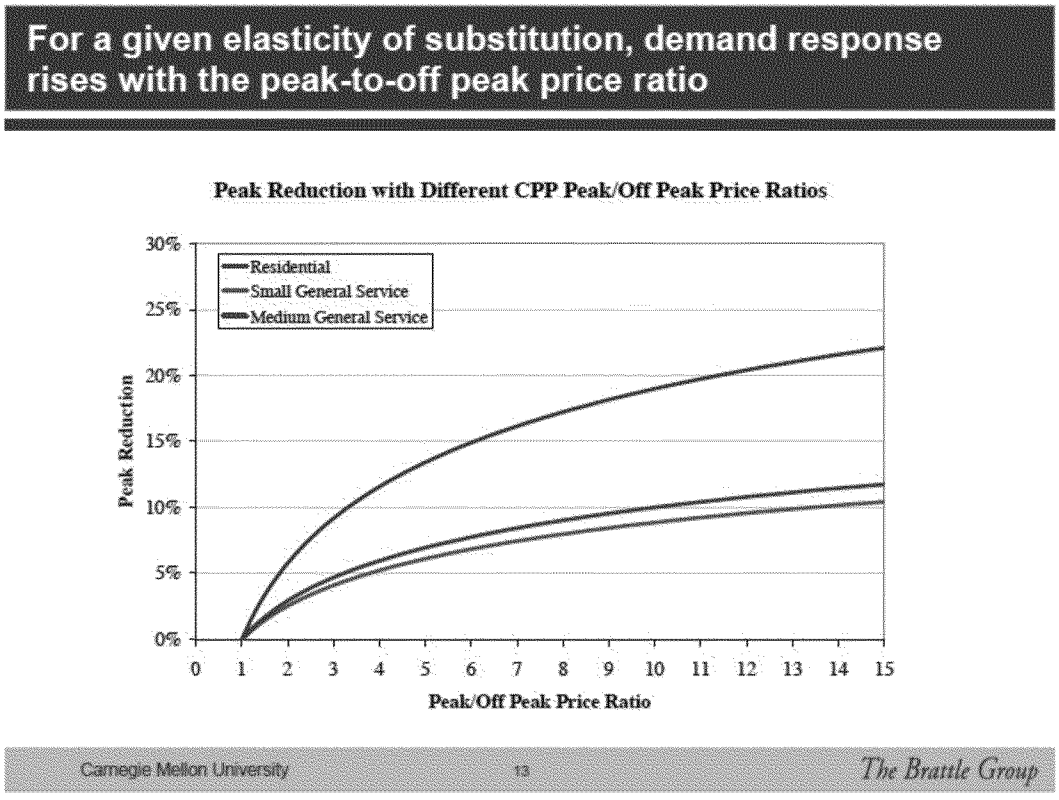
[85] Charles River Associates (CRA), *Impact Evaluation of the California Statewide Pricing Pilot*, March 16, 2005, p. 8.
[86] EDF, p. A-6, Table 5.
[87] CRA SPP Report, p. 44.

ratio so far outside of the valid range of TOU tariff structures tested in the SPP. To do so erroneously assumes that the elasticity curve is linear with peak price increases at all price levels. This assumption is not true in theory or practice. In theory, the demand response to price will cease when a customer sheds discretionary load. Most customers will not go to heroic lengths (for example, unplugging the refrigerator and ceasing all television viewing) at almost any price. This impact is reflected in the empirical data on peak reduction versus CPP price, as illustrated below:[88]

[88] Note that this figure shows the price ratio of the CPP peak price versus off-peak price. Such CPP price ratios are generally much larger than ratios of TOU on-peak to off-peak prices, because the TOU on-peak price is applicable to more hours and thus must be lower to preserve revenue neutrality. The graph is shows only to illustrate the empirical non-linearity of peak price ratio and peak load reduction, in contrast to EDF's theoretical model.

Figure 6: Nonlinear relationship between demand response and CPP peak price ratio[89]



Thus it is not valid to apply the SPP equations and elasticities to the "SCE Structure," and EDF's results from that scenario as well as the "current structure" (which includes the "SCE structure" for SCE) should be discarded. Only the PG&E and SDG&E structures are valid choices for this analysis (or an alternative with a tariff "structure" of 3 or less). It is incorrect for EDF to suggest that total system savings would be $686 million if other utilities adopted SCE's TOU rate

[89] Source: Ahmad Faruqui, "Dynamic Pricing and Customer Behavior," March 9, 2010, p. 13.

structure,[90] because the SCE structure used in that calculation is outside the valid range of predictability for SPP equations.

Using the "PG&E Structure"[91] and all other EDF initial assumptions gives total savings of $273 million, a further reduction of 42% compared to EDF's initial calculations.

Adjusting for these two primary errors results in total benefits of about $223 million, or about 48% of the benefits estimated by EDF. There are other aspects of EDF's analysis (marginal cost inputs, information effect) that TURN believes are either incorrect or unsupported, but we have not had time to closely analyze these factors.

4.2. Response to DRA

4.2.1. Economic Benefits

The DRA calculates a more reasonable figure of $169 million in economic benefits due to a 9.6% reduction in peak load with a peak price ratio of 2.5.[92] DRA used an avoided generation capacity cost of $85 per kW-year and a GHG price of $20 per ton. DRA explained that its calculations "need to be taken with significant caveats" and likely represent "an upper bound for the benefits obtainable by TOU."

TURN agrees that DRA's results represent an upper bound. TURN suggests that DRA's assumption of a 10% peak load reduction with a price ratio of 2.5 may be overly optimistic.

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[90] EDF, Residential Rate Design Proposal, page 6, footnote 2.
[91] Between the choice of the SDGE and the PG&E structure, the PG&E structure incorporates a larger on- versus off-peak rate differential.
[92] DRA, p. D-4.

4.2.2. Benefits Due to Reduction in Carbon Intensity Are Small, and Are Likely Overstated

The DRA calculates that a small portion of the economic benefits is due to reducing carbon emissions at a carbon price of $20 per ton.[93] This Commission has at times accepted, without any data or analysis, the assumption that time-varying rates will lead to reductions in carbon emissions.[94] DRA assumes GHG benefits based on the relative marginal heat rates of two California units. Unfortunately, this assumption may not be correct for all times, and may change over time.

As aptly described by the Sierra Club, the calculation of marginal carbon intensities for on versus off-peak generation is extremely complicated.[95] While there is data suggesting a positive impact *in California,* this impact depends greatly on the nature of off-peak generation, and the relative impacts likely change daily and seasonally, and may well change dramatically over time. In other parts of the Western Electric Coordinating Council, off-peak generation from baseload coal is actually more polluting.

The biggest unknown factor is how much load is shifted to part-peak versus off-peak, and the amount of system power imports from the Southwest that might replace on-peak generation. At least one study conducted for the CEC suggests that any pure "peak" load reduction mechanism could actually increase net CO2 emissions in the Western grid by increasing imports of dirtier system

[93] DRA, pp. 24-25 and D-4. Carbon emissions reductions result in a economic benefit of about $4.6 million out of $169 million.
[94] See, for example, D.08-07-045.
[95] Sierra Club, p. 15-18.

power from the southwest.[96] This study also found that larger GHG reductions were achieved through flat (24 x 7) reductions in usage associated with baseload energy efficiency measures. The biggest GHG reductions were attributable to adding clean, off-peak renewable generation in California – an impact comparable to reducing customer demand during off-peak hours. These results suggest that it may be a mistake to focus on peak period demand reductions as a strategy for maximizing overall GHG emissions reductions in the West.

Critics are correct that increasing block rates with monthly bills do not advance truly "efficient" behavior – using more during lower prices times and using less during higher price times. But there is a very good policy reason for diverging from pure efficiency. Harmful emissions of pollutants and GHGs occur *at all times of electricity consumption*, irrespective of price. Irrespective of whether it is true that carbon emissions are higher during peak load conditions due to dispatch of less efficient units, the difference in emissions is not nearly as large as the difference between consuming and not consuming a kilowatt-hour of electricity, even from a very efficient plant.[97] In other words, any potential benefits due to more efficient dispatch are outweighed by increased emissions if total usage increases under purely "efficient" pricing.

5. Relationship Between Income and Usage for Residential Customers

TURN provided detailed analysis in its proposal concerning the empirical relationship between energy use and income in California, based on both utility

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[96] Synapse Energy Economics, "Emissions Reductions from Renewable Energy and Energy Efficiency in California Air Quality Management Districts," Final PIER Project Report, November 2011, p. 46-47.

[97] The difference between zero emissions and emissions from an efficient CCGT is much higher than the difference between emissions from an efficient CCGT and an older steam turbine or peaker plant.

data and demographic analyses as well as the RAS 2010 data. PG&E focused strictly on the RAS data set to argue that the relationship is "weak."[98]

TURN does not disagree with PG&E's observations that there are geographic differences, so that high-income residents of San Francisco may have low usage, while moderate and low-income families in the Central Valley may have higher usage. It is precisely for this reason an analysis of income versus usage should focus on different climate zones, and PG&E's overall usage correlations coefficient of 0.33 masks the relationship between income and usage when climate zone differences are adjusted.[99]

However, the data explicitly show a very strong correlation between average rates and median incomes in cities both in PG&E's and SCE's service territories.[100] In addition to the tables and charts provided in the original rate proposal, TURN has conducted additional analysis using the median income data for every city and town in PG&E's service territory and sales for non-CARE and CARE customers. TURN segregated the communities by climate zone - cool coastal, (largely T and V, with an adder included for zone V in further analysis), mid (largely X, with some Y and Z), and hot (R, S, W, and most of Y).[101]

The analysis shows that at a community level, income sensitivity is highest in the mid-zone (X), intermediate in the coastal Bay Area, and lower in the Central Valley. While the data show scatter (due to items such as age of

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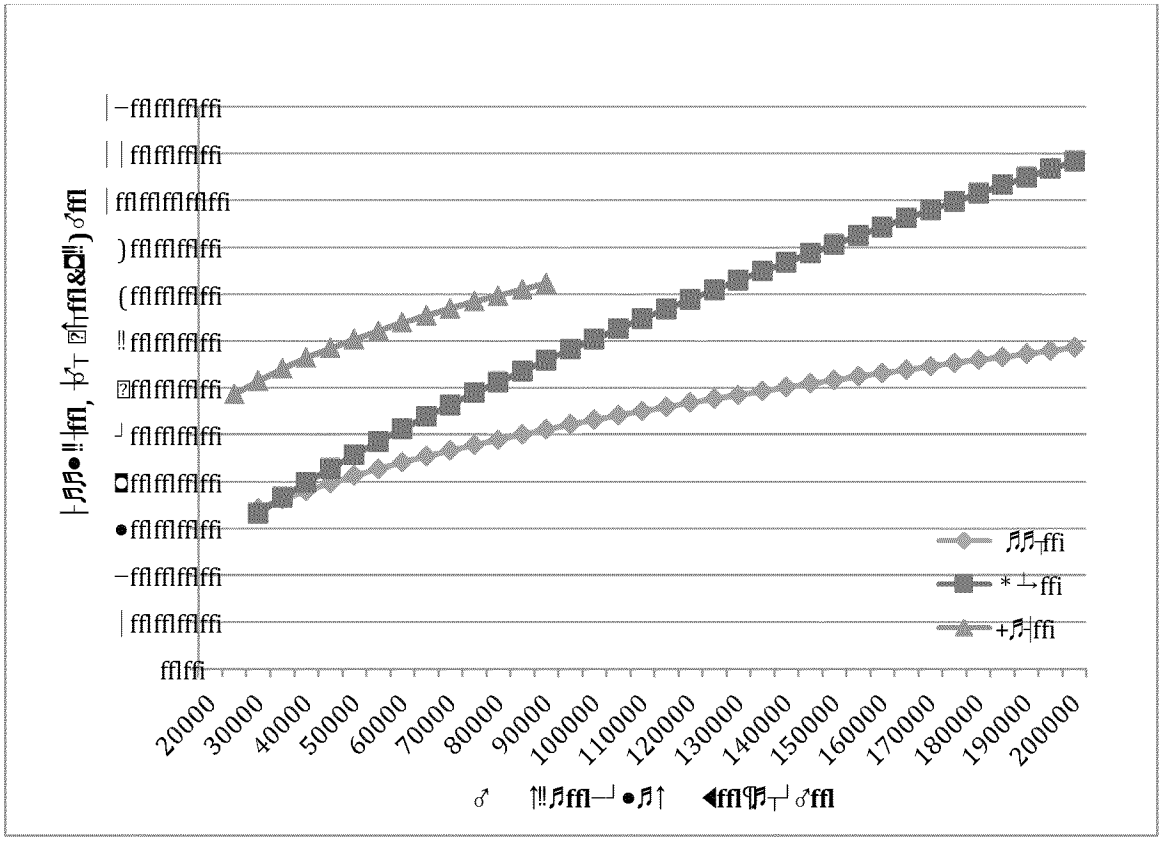
[98] PG&E, p. 36-41.
[99] PG&E, p. 40, Figure 2-4.
[100] TURN Proposal, p. 20 (Table 3) and p. 23 (Table 4).
[101] The data were adjusted by 1) removing removed all unincorporated county areas (due to lack of income data), and communities with less than 500 non-CARE customers or 800 total customers and 2) removing one community which was divided between two climate zones. There were 200 remaining cities and towns.

housing stock, percentage of multi-family dwellings, etc.), the projected usage by community increased as community median income rose, as demonstrated in the best fit equations relating the logarithm of usage to the logarithm of median income. The findings were statistically significant in all cases.

Figure 7: Income Versus Usage by City for Separate Climate Zones in PG&E Service Territory



This analysis highlights the demonstrable and statistically significant correlations between usage and income that cannot be assumed away. These correlations are not limited to extreme ends of the usage / income spectrum.

6. EDF Analysis of CARE Load Usage Inappropriately Includes the Impact of Extremely Large Users Who Can Be Removed from CARE

EDF asserts that CARE customers tend to be higher usage than non-CARE customers and states that "on a per capita basis, CARE customers use more

energy than non-CARE customers in six of PG&E's ten climate zones." [102] EDF also shows graphs indicating that PG&E CARE customers have 12% of total usage in Tiers 4/5 as compared to 16% for non-CARE customers. Based on this information, EDF concludes that "CARE customers use more electricity, at top tiers, than non-CARE customers."[103]

EDF's analysis is deficient in several respects. First, EDF does not correct for the skewing of average CARE customer usage due to the presence of a small number of "super-users" who consume more than 600% of baseline.[104] In response to a data request, PG&E provided TURN with adjusted CARE average usage by climate zone that removes these "super-users" to provide a better comparison with non-CARE customers. The following table compares non-CARE and CARE usage by climate zone in 2012, shows CARE usage after the adjustment to remove super-users, and quantifies the amount of total usage in Tiers 4 and 5:[105]

Table 3: Corrected CARE and non-CARE Usage (PG&E)

	Non-CARE		CARE		
	Avg. usage	**% of usage in Tier 4/5**	**Avg. usage**	**Avg. usage (adjusted)**	**% of usage in Tier 4/5**
P	674	10.2%	795	744	7.3%
Q	809	30.0%	1292	766	20.2%
R	702	14.7%	702	679	10.0%
S	659	13.6%	638	618	9.1%
T	370	16.1%	385	352	8.8%

[102] EDF, Exhibit C, page C-2.
[103] EDF, Exhibit C, page C-1.
[104] These users are believed to be inappropriately relying on discounted CARE rates to support activities that are commercial in nature.
[105] Data provided by PG&E in response to TURN data request #1, questions 14, 16 in A.13-04-012. CARE (adjusted) data excludes customers using over 600% of baseline. "Total" reflects weather adjusted averages for all customers.

	Non-CARE		CARE		
	Avg. usage	% of usage in Tier 4/5	Avg. usage	Avg. usage (adjusted)	% of usage in Tier 4/5
V	573	25.2%	702	448	8.0%
W	723	15.8%	679	668	10.0%
X	518	15.4%	479	447	7.0%
Y	493	14.8%	772	685	8.4%
Z	275	9.8%	585	537	9.7%
Total	**540**	**15.0%**	**534**	**501**	**8.7%**

This analysis shows average CARE customer usage (excluding super-users) is lower than non-CARE usage in the 7 of 10 baseline zones which include 95% of CARE customers. Customers in the remaining 3 zones represent only 5% of total CARE customers in PG&E's service territory and reflect only 7% of total CARE customer usage. The data also shows that there is far less CARE customer usage in the upper tiers than for non-CARE customers.

TURN does not dispute EDF's desire to target CARE customers with aggressive energy efficiency measures including refrigerator replacements. However, the Commission should not be under the misimpression that CARE customer usage is generally higher than non-CARE usage or more concentrated in the upper tiers. Typical CARE customer usage remains below the average for non-CARE customers in practically every significant measure. The skewed results based on including usage by CARE super-users should not drive policy, especially given that the Legislature has authorized the electrical utilities to remove from CARE customers whose usage exceeds 600% of baseline usage

(after affording such customers an opportunity to participate the low-income efficiency program and lower their usage).[106]

7. The Commission Should Be Careful of Unverified Claims About Cost Causation, and Must Balance Competing Goals of Economic Efficiency and Environmental Sustainability

7.1. Marginal Costs, Cost Causation and Economic Efficiency

The utilities and several other parties argue that existing rates are not close to "cost-based" rates as modeled in the bill calculators. These parties allege that fixed charges and time-varying rates more appropriately reflect marginal distribution and generation costs.

While rate design should reflect cost causation, it is also entirely appropriate for rate design elements to include incentives for conservation. And while the utilities pretend that there is an easily determined "cost based" rate, the exact calculation of utility marginal costs via various analytical methods is a matter of significant dispute among parties.[107]

The utilities claim that fixed charges appropriately reflect cost-causation principles and allow recovery of fixed costs imposed by all consumers. For example, PG&E claims that "one of the fundamental principles of cost accounting and rate design, generally, is to recover fixed costs through a fixed charge."[108] But NRDC explains that there is nothing magical about the notion of "fixed" costs that requires recovery through fixed charges, especially for residential customers.[109] As a matter of principle, fixed costs are not as significant a component of utility costs for residential customers as they might be for other customers. Unlike

[106] PU Code Section 739.1(h)(2). See also D.12-08-044, pp. 219-221.
[107] See, for example, TURN Proposal, p. 71-78; NRDC Proposal, p. 29-35; Sierra Club, p. 8-12.
[108] PG&E Proposal, p. 46.
[109] NRDC, p. 29-31; See, also, Sierra Club, p. 10-11.

commercial and industrial customers, the size of customer-specific facilities (meter, service drop) is a small portion of utility distribution costs. Indeed, the NRDC argues that only certain billing and collection costs could be truly 'fixed' costs given the alleged use of residential smart meters for distribution system operations.[110]

The argument concerning the calculation of "fixed costs" for residential customers has been fiercely debated in numerous general rate cases. TURN has strongly opposed various utility definitions of fixed costs that classify significant proportions of distribution system costs as fixed.

TURN reiterates that the factual marginal cost data underlying the utility "cost-based rates" have not been reviewed and are subject to dispute. If the Commission is to base its decision in reliance on the "cost based" rates unilaterally developed by the IOUs, it must hold evidentiary hearings. However, TURN recommends against going down this rabbit hole. The Commission should not make any specific decisions or recommendations in this proceeding based on allegations that particular proposed rates are more "cost based" than other rates. Given the extensive amount of work involved in parsing through various cost elements and applying them to different customer usage patterns and load shapes, only the IOUs have sufficient resources in this case to develop estimates of "cost-based rates". If the Commission wishes to rely more heavily on such an approach, there should be a dedicated phase of this proceeding focused on litigating the "cost-based rate" assumptions for each utility.

The argument that TOU rates more correctly reflect marginal costs than tiered rates is not entirely self-evident. While it is true that marginal prices on the

[110] NRDC Proposal, p. 32-33.

wholesale markets are higher during a limited number of hours of peak demand, the relationship is nowhere near as dramatic as during the 2000-2001 time period, when 100% of energy was purchased on the Power Exchange spot market.

Presently, the on / off peak price differentials are significantly muted due to resource adequacy requirements. This is precisely the point made by DRA in its Motion to Reopen the Record in A.09-02-022, filed on October 31, 2011. DRA submitted extensive ISO hourly price data for 2009 to 2011 to demonstrate that:

> [H]ourly CAISO wholesale prices have been remarkably stable since MRTU began in 2009. In the last 3 years, CAISO day-ahead hourly locational marginal price has not exceeded 11.4 cents per kWh. This means that RTP is no longer the best rate to promote economic efficiency; TOU rates, which can have on-peak rates as high as 44.7 cents per kWh, may be superior with regard to promoting economic efficiency than RTP, under current market conditions.
>
> In contrast, California wholesale hourly energy prices have not exceeded 11.4 cents per kWh since MRTU became operational in the spring of 2009. Because the CAISO price data does not include nongeneration price components, for an "apples-to-apples" comparison one could add PG&E's on-peak nongeneration rate components which total 11.254 cents per kWh. Even in the highest-wholesale priced hour of the last 3 summers, PG&E's retail A1-PDP rate exceeded its wholesale cost (plus nongeneration costs) by 363%. Such a large difference between wholesale CAISO prices and CPP rates is hardly indicative of close alignment.[111]

A TOU design can charge dramatically higher prices for usage at the boundary between time periods (e.g. 11:59 am vs. 12:01 pm). There is no inherent rationale supporting such a difference. Obviously, any TOU rate simulates wholesale prices only at a very general and aggregate level.

TURN supports the long term goal of optional time-varying rates. However, TURN suggests that residential customer response to a TOU rate will

[111] DRA Motion, A.09-02-022, October 31, 2011, p. 4-5 (footnotes omitted).

be significant only in the future when sufficient market penetration of smart appliances and applications exist to fully support "machine to machine" automation of price response by appliances. Such a transition will best be achieved by offering optional TOU rates and encouraging certain customers to transition to such a rate.

7.2. Residential Rate Design and Distributed Generation

Some parties suggest that residential rate design should foster the installation of distributed solar generation. The Sierra Club provides the most comprehensive analyses of the impacts of rate design on solar DG economics, showing that flattening rates and introducing fixed charges has a much more significant (and negative) impact on solar economics than moving to a TOU rate structure.[112] This conflicts somewhat with the analysis of the EDF, which claims that TOU would support larger quantities of rooftop solar.[113]

The analyses of the Sierra Club and EDF both demonstrate that using net energy metering to subsidize rooftop solar is not equitable. The EDF points out that under tiered rates, there is not relationship between the financial compensation to the customer and the value of solar. TURN agrees. NEM effectively pays customer-generators a price for solar output based on the net *consumption* of the customer, rather than based on an appropriate price that reflects the value of the solar output.

The problem is that designing a residential rate based on Net Energy Metering in order to promote rooftop solar could harm 98% of residential customers, just to help 2%. TURN agrees that a rate design options should be

[112] Sierra Club, p. 18-25.
[113] EDF, p. 23-24.

developed that appropriately compensate solar owners while requiring payment for use of the grid, and that promote nightly charging of electric vehicles; however, such a rate design should not be the basis of the default rate that applies to all residential customers. TURN may provide additional discussion of NEM reform in our reply comments.

July 12, 2013

Respectfully submitted,

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ATTACHMENT A

Portion of Data Response from DRA re. Bill Impacts

Of DRA's Cost-Based TOU

Cost-Based TOU	Summer Bill Impact per Month		
% Impact: Zone W, nonCARE	% Cust	# Cust	Ave $ Impact
Below -20%	0.00%	[illegible]	[illegible]
-20% to -15%	0.20%	[illegible]	[illegible]
-15% to -10%	0.95%	[illegible]	[illegible]
-10% to -5%	1.15%	[illegible]	[illegible]
-5% to 0%	0.78%	[illegible]	[illegible]
0% to 5%	2.58%	[illegible]	[illegible]
5% to 10%	1.91%	[illegible]	[illegible]
10% to 15%	18.17%	[illegible]	[illegible]
15% to 20%	6.24%	[illegible]	[illegible]
20% to 25%	5.06%	[illegible]	[illegible]
25% to 30%	11.87%	[illegible]	[illegible]
30% to 35%	10.84%	[illegible]	[illegible]
35% to 40%	12.26%	[illegible]	[illegible]
40% to 45%	8.60%	[illegible]	[illegible]
45% to 50%	2.00%	[illegible]	[illegible]
50% to 55%	5.70%	[illegible]	[illegible]
55% to 60%	5.84%	[illegible]	[illegible]
60% to 65%	5.68%	[illegible]	[illegible]
65% to 70%	0.18%	[illegible]	[illegible]
70% to 75%	0.00%	[illegible]	[illegible]
75% to 80%	0.00%	[illegible]	[illegible]
80% to 85%	0.00%	[illegible]	[illegible]
85% to 90%	0.00%	[illegible]	[illegible]
90% to 95%	0.00%	[illegible]	[illegible]
Above 95%	0.00%	[illegible]	[illegible]
	100.00%	[illegible]	

Cost-Based TOU	Summer Bill Impact per Month		
% Impact: Zone W, CARE	% Cust	# Cust	Ave $ Impact
Below -20%	0.24%	[illegible]	[illegible]
-20% to -15%	0.00%	[illegible]	[illegible]
-15% to -10%	0.00%	[illegible]	[illegible]
-10% to -5%	0.00%	[illegible]	[illegible]
-5% to 0%	0.00%	[illegible]	[illegible]
0% to 5%	0.00%	[illegible]	[illegible]
5% to 10%	0.00%	[illegible]	[illegible]
10% to 15%	0.00%	[illegible]	[illegible]
15% to 20%	0.13%	[illegible]	[illegible]
20% to 25%	0.13%	[illegible]	[illegible]
25% to 30%	0.38%	[illegible]	[illegible]
30% to 35%	8.85%	[illegible]	[illegible]
35% to 40%	9.98%	[illegible]	[illegible]
40% to 45%	15.04%	[illegible]	[illegible]
45% to 50%	8.41%	[illegible]	[illegible]
50% to 55%	21.16%	[illegible]	[illegible]
55% to 60%	20.58%	[illegible]	[illegible]
60% to 65%	12.49%	[illegible]	[illegible]
65% to 70%	1.08%	[illegible]	[illegible]
70% to 75%	0.96%	[illegible]	[illegible]
75% to 80%	0.00%	[illegible]	[illegible]
80% to 85%	0.59%	[illegible]	[illegible]
85% to 90%	0.00%	[illegible]	[illegible]
90% to 95%	0.00%	[illegible]	[illegible]
Above 95%	0.00%	[illegible]	[illegible]
	100.00%	[illegible]	

Cost-Based TOU	Summer Bill Impact per Month	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
Below$40	1.15%	[illegible]
>$40 to $35	0.20%	[illegible]
>$35 to $30	0.15%	[illegible]
>$30 to $25	0.80%	[illegible]
>$25 to $20	0.00%	[illegible]
>$20 to $15	0.57%	[illegible]
>$15 to $10	0.20%	[illegible]
>$10 to $5	0.00%	[illegible]
>$5 to $0	0.00%	[illegible]
>$0 to $5	2.34%	[illegible]
>$5 to $10	1.77%	[illegible]
>$10 to $15	6.36%	[illegible]
>$15 to $20	11.12%	[illegible]
>$20 to $25	5.05%	[illegible]
>$25 to $30	11.43%	[illegible]
>$30 to $35	10.22%	[illegible]
>$35 to $40	14.77%	[illegible]
>$40 to $45	11.55%	[illegible]
>$45 to $50	11.16%	[illegible]
Above $50	11.18%	[illegible]
	100.000%	[illegible]

Cost-Based TOU	Summer Bill Impact per Month	
$$ Impact: Zone W, CARE	% Cust	# Cust
Below$40	0.00%	[illegible]
>$40 to $35	0.00%	[illegible]
>$35 to $30	0.00%	[illegible]
>$30 to $25	0.00%	[illegible]
>$25 to $20	0.00%	[illegible]
>$20 to $15	0.00%	[illegible]
>$15 to $10	0.00%	[illegible]
>$10 to $5	0.00%	[illegible]
>$5 to $0	0.24%	[illegible]
>$0 to $5	0.56%	[illegible]
>$5 to $10	0.92%	[illegible]
>$10 to $15	7.99%	[illegible]
>$15 to $20	5.84%	[illegible]
>$20 to $25	7.57%	[illegible]
>$25 to $30	2.10%	[illegible]
>$30 to $35	16.04%	[illegible]
>$35 to $40	18.01%	[illegible]
>$40 to $45	4.99%	[illegible]
>$45 to $50	9.78%	[illegible]
Above $50	25.97%	[illegible]
	100.000%	[illegible]

Cost-Based TOU	August Bill Impact		
% Impact: Zone W, nonCARE	% Cust	# Cust	Ave $ Impact
Below -20%	0.00%	[illegible]	[illegible]
> -20% to -15%	0.40%	[illegible]	[illegible]
> -15% to -10%	1.20%	[illegible]	[illegible]
> -10% to -5%	1.66%	[illegible]	[illegible]
> -5% to 0%	1.45%	[illegible]	[illegible]
>0% to 5%	1.98%	[illegible]	[illegible]
>5% to 10%	13.95%	[illegible]	[illegible]
>10% to 15%	7.12%	[illegible]	[illegible]
>15% to 20%	5.06%	[illegible]	[illegible]
>20% to 25%	11.40%	[illegible]	[illegible]
>25% to 30%	8.39%	[illegible]	[illegible]
>30% to 35%	5.02%	[illegible]	[illegible]
>35% to 40%	6.25%	[illegible]	[illegible]
>40% to 45%	5.50%	[illegible]	[illegible]
>45% to 50%	6.30%	[illegible]	[illegible]
>50% to 55%	6.32%	[illegible]	[illegible]
>55% to 60%	5.71%	[illegible]	[illegible]
>60% to 65%	0.70%	[illegible]	[illegible]
>65% to 70%	5.35%	[illegible]	[illegible]
>70% to 75%	5.85%	[illegible]	[illegible]
>75% to 80%	0.21%	[illegible]	[illegible]
>80% to 85%	0.18%	[illegible]	[illegible]
>85% to 90%	0.00%	[illegible]	[illegible]
>90% to 95%	0.00%	[illegible]	[illegible]
Above 95%	0.00%	[illegible]	[illegible]
	100.00%	[illegible]	

Cost-Based TOU	August Bill Impact	
$$ Impact: Zone W, nonCARE	% Cust	# Cust
Below -$40	2.30%	[illegible]
> -$40 to -$35	0.00%	[illegible]
> -$35 to -$30	0.53%	[illegible]
> -$30 to -$25	0.44%	[illegible]
> -$25 to -$20	0.20%	[illegible]
> -$20 to -$15	0.21%	[illegible]
> -$15 to -$10	0.40%	[illegible]
> -$10 to -$5	0.24%	[illegible]
> -$5 to $0	0.40%	[illegible]
>$0 to $5	2.55%	[illegible]
>$5 to $10	0.78%	[illegible]
>$10 to $15	0.98%	[illegible]
>$15 to $20	9.89%	[illegible]
>$20 to $25	5.10%	[illegible]
>$25 to $30	10.17%	[illegible]
>$30 to $35	5.44%	[illegible]
>$35 to $40	10.64%	[illegible]
>$40 to $45	5.22%	[illegible]
>$45 to $50	6.00%	[illegible]
Above $50	38.51%	[illegible]
	100.000%	[illegible]