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)

RATE DESIGN PROPOSAL OF THE NATURAL RESOURCES DEFENSE COUNCIL (NRDC) IN RESPONSE TO THE ADMINISTRATIVE LAW JUDGES' RULING REQUESTING RESIDENTIAL RATE DESIGN PROPOSALS

May 29, 2013

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I. INTRODUCTION

Pursuant to Rules 1.9 and 1.10 of the California Public Utilities Commission's (Commission) Rules of Practice and Procedure, the Natural Resources Defense Council (NRDC) respectfully submits this proposal pursuant to the March 19th "Administrative Law Judges' Ruling Requesting Residential Rate Design Proposals" (RFP). NRDC is a non-profit membership organization, representing nearly 100,000 California members with an interest in receiving affordable energy services and reducing the environmental impact of California's energy consumption.

NRDC presents a rate design in this proposal that we believe balances the principles for rate design laid out in the RFP and the Commission's Order Instituting Rulemaking (OIR), and is compatible with and together with California's energy policy and programs would encourage the cleanest, most energy efficient and affordable electric system possible.

II. EXECUTIVE SUMMARY

California has long been a leader in environmentally and economically sustainable energy policy. In the electricity sector, these policies include California's Energy Action Plan's "Loading Order", the Global Warming Solutions Act (AB32), its leadership in energy efficiency (policies to pursue all cost-effective energy efficiency as the priority resource through both customer-funded programs and building codes and appliance standards) and renewables (33% renewable portfolio standard and net energy metering) policies, to name just a few. As we discuss below, the goals of these policies and programs are reinforced by the price signals that customers face in their purchase of electricity services; however, since customers' response to price signals is weak, even optimal pricing cannot replace important policies and programs.
NRDC agrees with many parties that there are some real issues with the current rate design and tier differentials that likely make them unsustainable. It is important to note that the problem is not inherent in the tiered rate design itself. In fact, we show that tiered rates are cost-based, efficient, and proven to incent conservation.

The financial health of the utilities in California is not linked to retail sales volumes because of a simple decoupling mechanism, which holds the utilities neutral to reduced sales from energy efficiency, conservation, and increased penetration of distributed generation. Despite this fact, some of the rate design proposals are likely to include a fixed customer charge component. In this environment, not only is a fixed customer charge unnecessary, the discussion below argues that fixed charges are not cost-based, distort unit prices, and increase consumption. Our rate design proposal shows that there are better ways to address our current issues.

NRDC's rate design proposal includes two very simple rate designs: a three-tiered volumetric rate for small customers (defined as customers with demand of <7kW); and a time of use rate with simplified tiers for larger residential customers (defined as customers with demand of ≥7kW). We proposed a simpler design for smaller customers because they impose less peak demand on the system than larger ones and generally have less potential for demand response than larger demand customers.

Our proposal addresses the problem created by the highest tier differentials and the need for more time differentiated response, while embodying a more simplified and understandable bill with transparent conservation incentives for customers. We preserve choice by ensuring that customers are given information about how their standard rate would compare to the alternative rate with their usage pattern, and allowing each customer to opt out onto the alternative rate design. We believe these changes will mitigate most if not all of the issues with the current rate structure for the residential customer class, and perhaps also with onsite generator customers.

We briefly address one onsite generation issue - only because we think it could unavoidably drive some of the rate designs proposed in this proceeding in an unnecessary direction, but we do so only as a concept to stimulate thought. We believe our conceptual approach, which addresses the on-site generator's contribution to maintaining the distribution system, is a far superior approach compared with imposing a high fixed charge on *all* residential consumers. But we emphasize that any net energy metering (NEM) issues should be addressed in detail and resolved in the NEM docket only after the cost-benefit study is completed and released and after analysis of the new rate design eventually adopted by the Commission.

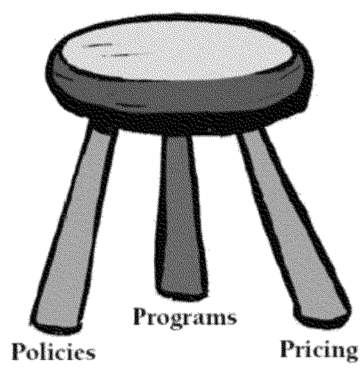
NRDC's objective in presenting our proposal is to put forward one potential rate design that meets the principles laid out by the Commission, in addition to those articulated in this document; one that presents a fair, affordable, understandable design for customers, and also helps keep the utility financially healthy so that California can continue to advance its environmental and economic goals in parallel.

III. OVERARCHING PRINCIPLES AND CONSIDERATIONS

Optimizing rate design, or the prices that customers see, is not an easy thing to do, nor can it be done in isolation from California's other energy and environmental policy objectives. The OIR, and the process established to address the changes in residential rate design that might be needed, recognizes this fact. Even a well-designed rate cannot by itself overcome the significant barriers to cost-effective energy efficiency, demand response or other clean energy resources; however, it can help if done right or hurt if not. We cannot expect rate design to meet all of our goals, nor is it necessarily the most effective tool to accomplish each one of the goals. Some of our goals may more effectively be reached through targeted programs rather than through a rate design applying to all residential customers.

NRDC proposes certain overarching principles and considerations that should guide rate design at the CPUC. These inform our specific proposal, in addition to the principles laid out in the RFP, and are discussed below.

a. **Customers Respond To Prices, But Not To The Extent Economic Theory Suggests**. Evidence shows that customers respond to prices – both to the overall level of prices (average price) and to the design of rates. But that response is quite weak. Decades of experience show that consumers (residential, commercial, industrial, agricultural, and institutional) do not take actions that economic theory suggests are economic and cost-minimizing. A three-legged stool of **Policies** (codes, standards, net metering, hookup policies), **Programs** (energy efficiency, renewables, and demand response), and **Prices** (inclining block, time of use (TOU), critical peak pricing (CPP)) can work together to produce a positive outcome. Over-reliance on any one leg of the stool is unlikely to produce acceptable results; in



this case, "optimal" pricing (whatever that might mean) does not mean that policies and programs can be ignored or weakened.

b. **Recovering Any Significant Share Of Revenue Through A Fixed Charge Will Adversely Affect Energy Efficiency Progress**: A high fixed charge applied to small-use residential customers will significantly lower the price per kWh, and this in turn will significantly reduce price-related savings. Some analyses have shown that high fixed charges can result in increased usage on the order of 10% -- an amount equal to about ten years of programmatic conservation efforts.

c. **Inclining Block Rates Are Demonstrated To Save Energy:** Inclining block rates with zero or minimal customer charges are utilized around the world by electric utilities. California's current rate design is consistent with international practice. The majority of electricity consumers in the world are served under inclining block rate designs, from China and India to Samoa and South Africa. They have been tested and demonstrated to provide significant energy savings. All residential consumers should be exposed to an inclining block framework of some kind to convey the message that conservation and efficiency are beneficial.

d. **Subjecting Small Customers To Complex Rates That They Cannot Understand And Have Limited Ability to Respond To Is Not Productive:** Small use customers will have relatively small electric bills under any reasonable rate design. That low use is highly correlated with end-uses for which alternatives and substitutes are largely unavailable or that result in negligible shifts in usage. There is little evidence that large shifts or savings will result from complex rate design. We recommend that the standard rate design for small residential users be kept simple. *Optional* rate designs for these customers that include time-of-use, critical-peak, or interruptible elements *may* be acceptable if they are voluntary.

e. **Larger Residential Consumers Have More Options And Can Better Respond To Advanced Pricing Design:** Conversely, large-use residential consumers have much more usage to work with, and more of that usage is associated with end-uses for which alternatives exist, including water heating, space heating, space cooling, swimming pools, and electric vehicles. All of these are amenable to significant load reduction or load shaping as might be augmented by time-variant rate design.

f. **Any transition should be gradual and include a clear and deliberate customer education and assistance effort:** One consistent ratemaking principle is that change should be gradual, so that consumers can adapt to a new framework in an orderly fashion. In addition, special attention should be paid to ensuring customers have information about and access to the tools they need to respond to any new price signals, including energy efficiency and demand response.

We are impressed by the basic principles espoused by the Regulatory Assistance Project, an internationally renowned group of regulatory experts. In a recent publication, Pricing Do's and Don'ts[1], RAP advised:

Pricing Do's and Don'ts

Efficient Price Signals: Base Prices on Long-Run Marginal Costs

DO set prices for usage to reflect all relevant long-run costs, including production, transmission, distribution, administrative, customer service, and environmental costs.

DO set the basic charge at a level that includes only the utility's costs that vary by the number of customers.

DO consider inclining block rates for residential consumers to recognize higher resource costs in the future and typically greater use of power during peak periods by high-use consumers.

DO let customers choose a pricing option that varies according to time of day or market and system conditions.

DO make it easy for consumers who choose time-varying rates to shift energy use from peak load hours.

[1] Lazar, Jim; Schwartz, Lisa; and Allen, Riley. "Pricing Do's and Don'ts" Designing Retail Rates As If Efficiency Counts." Regulatory Assistance Project. April 2011. http://www.raponline.org/document/download/id/939

DO display the rate structure on the consumer's bill in a way that conveys the cost (savings) from increased (decreased) usage.

DO complement economically efficient pricing with energy efficiency programs that focus on reducing peak demand.

Align Society's Interests: Consumers, Utilities, and Third Parties

DO consider revenue decoupling to eliminate the incentive for utilities to increase sales in order to increase profits.[2]

Some Pricing Options That Don't Always Solve Problems

DON'T raise the fixed customer charge to address the utility throughput incentive.

DON'T price kilowatt-hours cheaper by the dozen.

DON'T force consumers onto complex rate designs that they cannot understand or respond to.

DON'T shift risks with automatic adjustment mechanisms without considering the impact on consumers and adjusting the utility's allowed rate of return.

DON'T set the rate of return higher than the utility's incremental cost of capital.

We also believe that the original rate design principles espoused by James Bonbright should still be considered relevant today[3]:

- The related "practical" attributes of simplicity, understandability, public acceptability, and feasibility of application;
- Freedom from controversies as to proper interpretation;
- Effectiveness in yielding total revenue requirements under the fair return standard;
- Revenue stability for the utility from year to year;
- Stability of the rates themselves, with a minimum of unexpected changes seriously adverse to existing consumers (compare this with the adage that "the best tax is an old tax");
- Fairness of the specific rates in the apportionment of total costs of service among the different consumers;
- Avoidance of "undue discrimination" in rate relationships; and,

[2] One caveat is that revenue decoupling breaks the link between kWh sales and the utilities' financial health by ensuring recovery of authorized non-energy costs – not profits.
[3] Bonbright, James C. "Principles of Public Utility Rates." Public Utilities Reports, Inc. 1961, p. 291.

- Efficiency of the rate classes and rate blocks in discouraging the wasteful use of service while
- Promoting all justified types and amounts of use.

Note that these principles as well as the principles laid out in the OIR, call for qualitative policy judgments and not sole reliance on any particular cost of service analysis. There are competing objectives for rate design and often tradeoffs between efficiency, equity, and simplicity have to be made.

IV. NRDC's RATE DESIGN PROPOSAL

(Q. #1 *Please describe in detail an optimal rate design structure based on the principles listed above and the additional principles, if any, that you recommend. For purposes of this exercise, you may also assume that there are no legislative restrictions. Support your proposal with evidence citing research conducted in California or other jurisdictions.*)

A. ILLUSTRATION OF NRDC RATE DESIGN PROPOSAL

NRDC's proposed rate design balances the principles laid out in the RFP, our additional principles laid out above, and encourages the cleanest, most energy efficient and affordable grid possible. The rates we use in the proposed designs are illustrative and have not been tested for revenue generation compared with existing rates for any utility. We believe this proceeding is best used to develop rate design concepts, not actual rates, as actual rates can only be set after legislative authority is granted, and costs and peak periods will surely change by that time.

Our proposal would phase out the current rate design for all customers (see section on transition) and replace it with two standard residential rate designs for two different types of residential customers. The first, labeled Small Users, would be the standard rate applicable to "small" residential customers (which we define as having a peak demand not exceeding 7 kW in any hour), and the second (labeled Large Users) would be the standard rate applicable to "large" residential customers, meaning those larger than 7 kW demand).

Small Users		
Customer Charge	Per Month	$ -
Baseline usage	Per kWh	$ 0.12
100% - 200% of Baseline	Per kWh	$ 0.18
Over 200% of Baseline	Per kWh	$ 0.24

Large Users		
Customer Charge	Per Month	$ -
On-Peak		$ 0.18
Mid-Peak		$ 0.12
Off-Peak		$ 0.06
Surcharge 101% - 200% of Baseline		$0.06
Surcharge above 200% of Baseline		$0.12

In our proposal, any customers assigned to either standard rate design would have the option to opt out and choose the alternative rate design. In addition, both designs will be phased in over a specified period of time with accompanying customer education and related resources.

This rate design has simple and explainable components. We discuss each of these elements below.

Definitions:

Block Ratio: The ratio of the price in the second and subsequent blocks of usage to the price in the first block. For TOU rates, it is the ratio of the mid-peak and on-peak prices to the off-peak price.

NEM: A net-energy-metered customer having on-site generation but utilizing grid power for some of their usage, and delivering surplus power to the grid in other hours.

TOU: A time of use rate with at least two different time periods, with higher prices applying during on-peak hours.

Customer Charge: A monthly (or daily) charge that is independent of any measure of usage. Internationally, known as "standing charge" or "service charge."

CPP: A critical peak price, which applies a much higher price to usage during a limited number of hours per year, designated by the utility no more than one day before these prices are effective.

B. DETAILED DESCRIPTION OF PROPOSED RATE DESIGNS

1. Small and Larg Customer Split

Our proposal begins with a definition of "small" and "large" customers. Regulatory law prohibits "unjust discrimination" but experience shows that rational delineation of rate classes does not run afoul of this.[4]

In our proposal, "small" means peak demand for any hour less than7kW, and "large" means greater than or equal to 7kW. Delineating by level of demand has the effect of capturing customers with central air conditioning, electric vehicles, swimming pools, and other large and potentially schedulable loads. Some of these customers may have PV systems, and have low monthly an annual net usage, but we believe they still have loads that can be shaped in response to a TOU rate.

We believe that most PV customers will be classified as "large" consumers, in part because so many of them are high-use consumers that have installed PV systems in response to the current 4-block rate design. These customers should generally benefit from a TOU rate, because their generation delivered to the grid is mostly during on-peak and mid-peak periods, while their usage is tilted towards the off-peak period.

[4] California Public Utilities Code 453(c) states that "No public utility shall establish or maintain any unreasonable difference as to rates, charges, service, facilities, or in any other respect, either as between localities or as between classes of service." While the rate *designs* proposed are different based on customer demand, this should not result in any unreasonable differences in the rates or charges since they should be set to collect the same average revenue as previously. In addition, all customers will have the option to opt-out of their standard rate design and choose the alternative design. The current rate design, which apportions different baseline amounts for the first two tiers or usage blocks, already includes differences in rates based on energy usage and this has not been found to run afoul of this statute.

Small customers impose less peak demand and use less peak energy than larger ones due to their lower saturation of air conditioners, smaller dwellings and fewer electric appliances. Therefore, smaller customers generally have less potential for demand response than larger customers.[5]

2. Customer Charge

We do not include a customer charge in our proposal for many reasons. First and foremost such a charge results in lower per-kWh prices which undermines achievements of many of the state's priorities, including energy efficiency and distributed generation. It also adds unnecessary complexity to the rate design. Finally, fixed charges are not cost-based. See Section V for more detailed discussion of these points.

3. Tiered Rates for *Small Customers*

The rate blocks proposed for small customers are compressed into three rate blocks instead of four or five rate blocks. The block ratios in the illustrative rate are 1: 1.5: 2.0, meaning the second block rate is 1.5 times that of the first block, and the third block is 2.0 times the first block. These are designed to be large enough steps that customers take note of them, and respond appropriately by controlling their usage, and similar enough to current rate design that they are recognizable while significantly reducing the current price differentials.

Experience applying TOU rates to small customers has demonstrated that this is not a cost-effective strategy. In 2000-2002, Puget Sound Energy imposed a TOU rate on 300,000 residential customers located in the portion of their service territory where advanced metering capability was in place. The evaluation report of that experiment showed that fewer than 10% of the participant customers actually were able to save more than $1.00 per month under this program; since the incremental cost of data management

[5] W. Marcus, G. Ruszovan and J. Hahigian, "Economic and Demographic Factors Affecting California Residential Energy Use," September 2002.

for the program was about $1.00 per month, the program was not cost-effective for these customers.[6]
We are skeptical that circumstances in California would be significantly different for the small-use customers today.

As discussed below in Section VI, there are multiple reasons for inclining block rates, including allocation of limited low-cost resources, recognition of load shape differences, and conservation. All of these factors contribute to the rate design we propose.

4. Time of Use Rates With Simplified Inclining Blocks for *Large Customers*

NRDC proposed a fundamentally different rate design for larger residential consumers, one that addresses the need for more time differentiated response for the customers best equipped to respond. We propose TOU for these customers and not real-time pricing because it is much more predictable and allows relatively unsophisticated customers to participate assuming adequate education and transition. A recent Department of Ratepayer Advocates (DRA) analysis on time-variant rates concluded that predictable TOU rates are likely to be superior to real-time pricing rates under the relatively stable conditions prevalent in California's wholesale energy markets in recent years and is likely to place fewer burdens on customers.[7]

The proposed rate design for large customers includes a simplified inclining block element in the form of a surcharge because there is no evidence of conservation effects with TOU rates alone, and that is one of the primary goals of this redesign. Enabling technologies and information can be critical to the effectiveness of TOU rates. Transition to this rate design should include a plan to encourage/support adoption of automated equipment to help with control of discrete loads. This is consistent with guidance from most advocates of complex pricing.

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[6] Washington Utilities and Transportation Commission, Dockets UE-011570 and UG-011571, Final Evaluation Report, July 1, 2003. Jim Lazar, consultant to NRDC in this docket, was a principal author of this final evaluation report.

[7] Levin, Robert. "Time-Variant Pricing for California's Small Electric Customers." May 2011. pp. 5, 45.

The large customer rate design we propose has the following elements:

a. TOU Blocks: We have proposed an on-peak, mid-peak, off-peak rate structure, because this is familiar in California and approximates distinct cost periods that can be served by baseload, intermediate, and peaking resources. The rates should be stable through the year, but an "on-peak" rate period should be introduced in the high-load summer months. This is consistent with the guiding principle that rates should be easily understood, and that consumers should not be subjected to a rate design that they cannot understand. This does not mean that the cost is not seasonal, because the higher on-peak period occurs only during the summer months in the current TOU rate designs. Specific time periods for each rate element are not proposed here because we expect they may differ by utility and change over time. To illustrate this design, we have divided the rate design presented above into summer and winter periods; virtually all consumers would pay higher average prices in the summer season with this rate design.

Large Users		Summer	Winter
Customer Charge	Per Month	$ -	
On-Peak		$ 0.18	
Mid-Peak		$ 0.12	$ 0.12
Off-Peak		$ 0.06	$ 0.06
Surcharge 101% - 200% of Baseline		$0.06	$0.06
Surcharge above 200% of Baseline		$0.12	$0.12

b. Inclining Block Element: We include an explicit surcharge in the TOU design for usage above baseline quantities. This has the effect of retaining a "the more you use, the more you pay" effect within a time variant rate design without being too complex for consumers to understand. We considered whether to present this as a surcharge above lower rates, or a discount from higher rates, and we concluded that avoiding a surcharge by avoiding high usage was a better psychological message. The surcharge should have the same effect as the inclining block rate has for the smaller-use consumers: encouraging consumers to be vigilant with their discretionary usage.

The rate design we have identified is consistent with best practices worldwide. As with the small-customer rates, we used TOU block ratios of 1: 1.5: 2.0 based on 101% - 200% of baseline usage levels. We considered using percentage adjustments to each TOU period, rather than uniform cents/kWh adjustments, and, we remain open to which approach is easiest for consumers to understand. Experiments in other states with smaller TOU rate differentials showed relatively low customer response and relatively poor cost-effectiveness.[8]

NRDC does not propose that critical peak pricing (CPP) be included in a new standard rate design; and if it is included at all, it should be offered to residential customers only on a voluntary opt-in basis. The DRA analysis referenced above identified in detail why CPP should not be a default rate design. The analysis found that TOU rates offer comparable, if not superior, benefits to those obtainable from CPP – maintaining reliability and controlling utility costs about as well as CPP, and outperforming CPP in reducing greenhouse gases.[9] CPP, which would operate only during approximately one percent of the hours of the year may be a case where a more targeted demand-response program could be more effective than including it in a tariff. DRA found that CPP would add little incremental value compared to the burden it would place on customers and the greater implementation costs it would impose on the utility.[10] As the DRA analysis notes, the greatly diminished price volatility in California in recent years because of increased energy efficiency, more comprehensive procurement and added generation – which was the original motivation for dynamic or real-time pricing – make both RTP and CPP less effective and unnecessary.[11]

C. CUSTOMER EDUCATION AND TRANSITION

It is critically important to the effectiveness of any new rate design that there is a clear and ordered transition and that the utility educates their customers not only about the

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[8] Final Evaluation Report, Puget Sound Energy, WUTC Docket UE-011570, November, 2001.
[9] *Ibid.* pp 4, 33.
[10] *Ibid.* pp 11-12.
[11] *Ibid.* p 18.

changes to their rates and options, but how to respond to and minimize their bills under the new design. We address both issues below. Any transition will also be much more effective and accepted if at the same time, the utilities provide information and links to an integrated set of energy efficiency and demand response solutions.

Block pricing is not complicated to understand; nearly all of us encounter it in the commercial world in the form of "large economy size" products. Time-of-use pricing is less common in the commercial world – in fact, the busiest shopping day of the year (day after Thanksgiving) often has some of the LOWEST retail prices.

Just as those (declining block) rate designs tell us to buy larger sizes, inclining block rates tell us to use energy carefully.

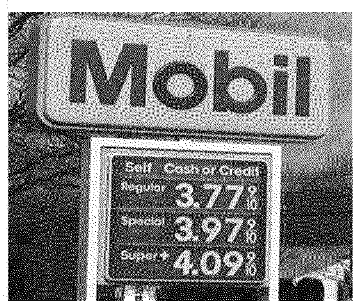
1. Bill Simplification

Electricity bills have become exceedingly complex, with many tariff riders, taxes, and other elements separately stated. Customers need to understand the effect of their actions that may increase or decrease usage, and this requires that all bill elements be consolidated for presentation on the bill.

Consider, for example, how preposterous we might find detailed itemization of gasoline costs. In the image below, which helps the customer best decide whether to use more or less gasoline, or to buy from a different vendor?

Which Pricing Approach is More Useful to You as a Consumer?

Crude Oil	$2.237
Tanker to Refinery	$0.114
Refinery Capital	$0.213
Refinery Operating	$0.235
Product Pipeline	$0.113
Terminal Rack	$0.023
Truck to MiniMart	$0.114
Mini-Mart Profit	$0.217
State Taxes	$0.349
Federal Taxes	$0.184



The same is true for electricity service. For example, take a typical electricity bill with three blocks, five adjustment mechanisms, and a city and state tax:

Complex Electric Utility Bill

Your Usage:	1,266 kWh		
Base Rate	Rate	Usage	Amount
First 500 kWh	$ 0.04000	500	$ 20.00
Next 500 kWh	$ 0.06000	500	$ 30.00
Over 1,000 kwh	$ 0.08000	266	$ 21.28
Fuel Adjustment Charge	$ 0.03456	1,266	$ 43.75
Infrastructure Tracker	$ 0.00789	1,266	$ 9.99
Decoupling Adjustment	$ (0.00057)	1,266	$ (0.72)
Conservation Program Charge	$ 0.00123	1,266	$ 1.56
Nuclear Decommissioning	$ 0.00037	1,266	$ 0.47
Subtotal:			$ 126.33
State Tax	5%		$ 6.32
City Tax	6%		$ 7.96
Total Due			$ 140.60

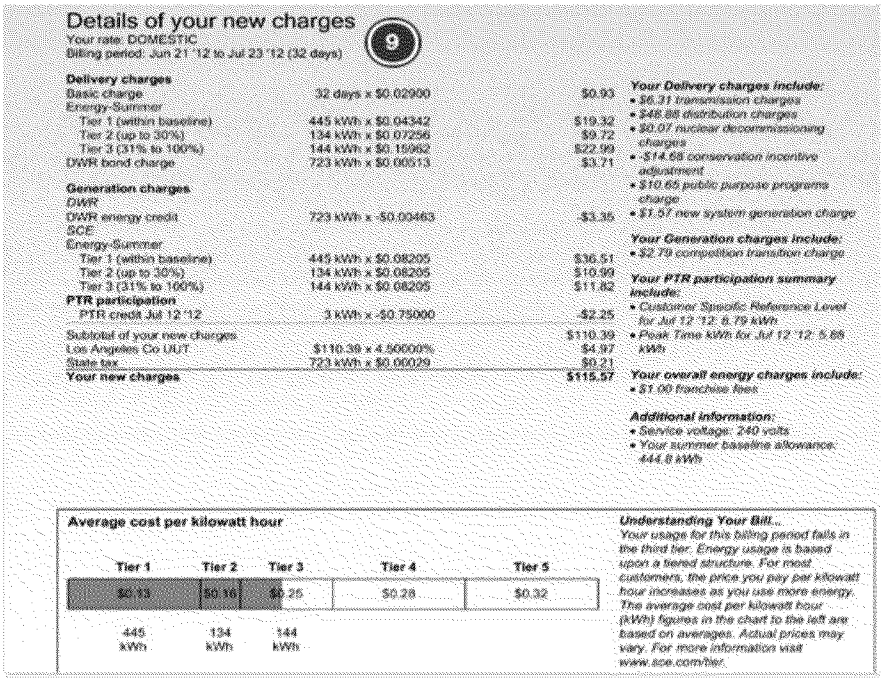
Nowhere on this bill does it show the consolidated or all "rolled-in" amount to be paid (or saved) if usage were to increase (or decrease). It is possible to derive from the information on the bill, but it is not a trivial task. The consolidated end result that provides a clearer price signal is shown below.

Simplified Electric Utility Bill

EFFECTIVE RATE INCLUDING ALL ADJUSTMENTS			
First 500 kWh	$ 0.09291	500	$ 46.46
Next 500 kWh	$ 0.11517	500	$ 57.59
Over 1,000 kwh	$ 0.13743	266	$ 36.56
			$ 140.60

The actual tariff rates and bills for SCE, SDG&E and PG&E are, in many ways, even more complex that the example shown above for illustrative purposes. SCE, for example, has separate rates for unbundled functions in its tariff, a customer charge, four tiers (not three), several adjustment clauses including two for DWR, and two taxes. However, SCE presents a great graphic at the bottom of the bill that indicates a total cost of incremental or decremental usage (even though it mistakenly labels it "average cost"), which is consistent with our recommendation above (provided that all taxes and other adjustments are included). This is a good practice and provides a more understandable signal to the customer.

SCE Sample Bill from SCE Website 5/20/2012



Details of your new charges

9

Your rate: DOMESTIC
Billing period: Jun 21 '12 to Jul 23 '12 (32 days)

Delivery charges		
Basic charge	32 days x $0.02900	$0.93
Energy-Summer		
Tier 1 (within baseline)	445 kWh x $0.04342	$19.32
Tier 2 (up to 30%)	134 kWh x $0.07256	$9.72
Tier 3 (31% to 100%)	144 kWh x $0.15962	$22.99
DWR bond charge	723 kWh x $0.00513	$3.71
Generation charges		
DWR		
DWR energy credit	723 kWh x -$0.00463	-$3.35
SCE		
Energy-Summer		
Tier 1 (within baseline)	445 kWh x $0.08205	$36.51
Tier 2 (up to 30%)	134 kWh x $0.08205	$10.99
Tier 3 (31% to 100%)	144 kWh x $0.08205	$11.82
PTR participation		
PTR credit Jul 12 '12	3 kWh x -$0.75000	-$2.25
Subtotal of your new charges		$110.39
Los Angeles Co UUT	$110.39 x 4.50000%	$4.97
State tax	723 kWh x $0.00029	$0.21
Your new charges		**$115.57**

Your Delivery charges include:
- *$6.31 transmission charges*
- *$48.88 distribution charges*
- *$0.07 nuclear decommissioning charges*
- *-$14.68 conservation incentive adjustment*
- *$10.65 public purpose programs charge*
- *$1.57 new system generation charge*

Your Generation charges include:
- *$2.79 competition transition charge*

Your PTR participation summary include:
- *Customer Specific Reference Level for Jul 12 '12: 8.79 kWh*
- *Peak Time kWh for Jul 12 '12: 5.88 kWh*

Your overall energy charges include:
- *$1.00 franchise fees*

Additional information:
- *Service voltage: 240 volts*
- *Your summer baseline allowance: 444.8 kWh*

Average cost per kilowatt hour

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
$0.13	$0.16	$0.25	$0.28	$0.32
445 kWh	134 kWh	144 kWh		

Understanding Your Bill...
Your usage for this billing period falls in the third tier. Energy usage is based upon a tiered structure. For most customers, the price you pay per kilowatt hour increases as you use more energy. The average cost per kilowatt hour (kWh) figures in the chart to the left are based on averages. Actual prices may vary. For more information visit www.sce.com/tier.

NRDC recommends that the CPUC require each utility to provide a "rolled-in rate summary" on each customer bill, which shows the consolidated rate that would have applied to incremental or decremental usage by the customer in the billing period. For TOU rates, this would show the price by rate period. This rolled-in rate must include ALL surcharges, surcredits, fees, and taxes that would change if the customer's usage were to change. SCE's chart can be easily adapted for our three tier inclining block rate design for small customers. An example of how our TOU design with simplified inclining blocks for large customers would look is below.

Consolidated Bill: TOU with Simplified Inclining Blocks

The More You Use, The More You Pay			
	Baseline 0 - 300 kWh	301 - 600 kWh +$.06/kWh	Over 600 kWh +$.12/kWh
On-Peak	$ 0.18	$ 0.24	$ 0.30
Mid-Peak	$ 0.12	$ 0.18	$ 0.24
Off-Peak	$ 0.06	$ 0.12	$ 0.18
Your Usage This Month:	442 kWh		

2. A Transition Plan

a. <u>Transition to Tiered Rates for Small Customers</u>

This proceeding was triggered in part, by the high level of the end block in California's 4-block (and previously 5-block) rate design. NRDC believes that a 3-block rate design is easier for consumers to understand, and will help alleviate the very high price in the fourth block by consolidating that with the third block. We also propose a second block with a ratio of 1.5: 1 over the first block, which is higher than the current block ratio; this will also help moderate the price in the third block to a level well below the fourth block in current rates.

The issue is how the CPUC should gradually transition rates from the current rate design to the desired rate design. We believe this can be done gradually without severe disruption by:

i. Holding the line on the first block during the transition period; customers using baseline quantities of electricity will not see increases faster than now permitted;

ii. Gradually raising the rate on the second block (101 - 130 percent of baseline) until it reaches a block ratio of 1.5: 1; at the same time, gradually LOWER the third block to achieve this block ratio.

iii. Once the first and second blocks are at the desired ratio, gradually adjust the third block (currently the 4th block) to achieve the block ratio of 2.0: 1.

The table below illustrates a hypothetical gradual implementation over a seven year period, beginning with the current PG&E rate design, and ending in year 7 with a three-block rate design with the proposed block ratios. In an attempt to simulate a realistic transition, we assumed a hypothetical average rate increase over this time period of 2.5 percent annually overall. Each year, the baseline (first tier) is increased by 2.5 percent with the other blocks gradually brought into the proposed block ratios. Each year, the second block size is increased by 10 percent, gradually rising from 130 percent of baseline to 200 percent of baseline usage.[12]

Current Block	New Block	PG&E Current	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Block 2 % of Baseline		130%	140%	150%	160%	170%	180%	190%	200%
Baseline	Baseline	$ 0.132	$ 0.136	$ 0.139	$ 0.142	$ 0.146	$ 0.150	$ 0.153	$ 0.157
101% - 130%	101% - 200%	$ 0.150	$ 0.163	$ 0.175	$ 0.187	$ 0.199	$ 0.211	$ 0.224	$ 0.236
131% - 200%	>200%	$ 0.311	$ 0.312	$ 0.312	$ 0.313	$ 0.313	$ 0.314	$ 0.314	$ 0.315
>200%		$ 0.351	$ 0.346	$ 0.341	$ 0.335	$ 0.330	$ 0.325	$ 0.320	$ 0.315

One common principal of ratemaking is that no customer should receive a decrease at a time when others are generally experiencing an increase. The absolute decrease in the fourth block rate is offset by increases in the first two blocks, so that essentially no customer will experience a decrease in bills, assuming an underlying 2.5 percent annual overall increase.

The point is that by the end of year 7, the second block covers 100 - 200 percent of baseline, the fourth block has been eliminated, and the blocks are in the ratios of 1.0 : 1.5 : 2.0 that we have proposed. [This illustrative example was tested against the example bill frequency analysis shown in Section VI. B. 2. below, with assumed blocks of 250 kWh and 500 kWh, and found to produce about a 13 percent overall increase in total revenue over this period. It was not possible within the framework of this proceeding to test it against actual bills for PG&E, SCE, or SDG&E, but we feel it is appropriate as an illustrative example. The actual revenue requirements for the actual affected utilities will undoubtedly not follow such a uniform trajectory over this period.]

[12] As discussed later in this document, this may require legislative change, to allow the price for the usage now billed in the second block – 101 - 130 percent of baseline – to be gradually raised to the level proposed, a block ratio of 1.5 : 1.0.

This approach demonstrates that the vast majority of the effect of this transition occurs in the second block – where very significant sales exist. The third block barely moves – up only 1 percent over this period, while the fourth block actually declines. It gradually eliminates the problem commonly cited, that the burden of rate increases has fallen on a very small group of consumers, while still keeping the first tier relatively low.

b. Transition to TOU With Simplified Inclining Block Rates for Larger Customers

As with our gradual transition from a four-block to three-block rate design for small residential consumers, we propose a gradual implementation of the TOU rate design.

This transition is much simpler. It consists of a bill limiter, so that a customer placed on a TOU rate cannot receive a significantly larger bill than if they were on the new standard inclining block rate which is the standard rate for small residential consumers. These types of bill limiters are quite common when introducing more complex rate design. Our proposed transition bill limiter is depicted below.

Bill Limiter For TOU Rate Consumers

Year	Maximum Increase in Total Bill Compared With Inclining Block Rate Design
1	0%
2	2%
3	4%
4	6%
5	No Limit; Bill limiter ends

Any revenue shortfall (or surplus) to the utility as a result of the bill limiter operation compared with underlying base assumptions would be recovered or refunded through a true-up mechanism.

D. REVISITING THE BASELINE ALLOCATIONS

Both parts of NRDC's proposed two-part rate design maintain the baseline quantity concept that California has relied on for the better part of four decades. While we continue to support the baseline concept, we do not maintain that the current baseline allocations are all "optimal" in any sense. California law requires that the Commission must "take into account climatic and seasonal variations in consumption" in determining the amount of energy necessary to meet basic needs.[13] We are aware that many households in the Central Valley have suffered very high electric bills under the current rate design. We believe our proposal, dramatically moderating the burden of this rate design, probably addresses most of this concern. Under this approach, all of the increase over the next seven years would be borne in the first and second blocks, with actual annual decreases to customers using power in the fourth block until it converges with the third block rate.

But we believe it is important to get to the root of the high bill problem. If these houses have inefficient cooling systems, or inadequate insulation, the first step should be in install all cost-effective energy efficiency measures. We urge the CPUC to direct the utilities to proceed without delay to achieve these retrofits over an accelerated period. We note that the country of New Zealand accomplished weatherization of 100% of low-income dwelling units in the country over four years[14]. New Zealand found that the health benefits alone of their weatherization program provided economic benefits dwarfing the cost, before even examining the energy benefits, with a 43 percent reduction in hospital admissions due to respiratory ailments.[15]

If analysis shows that accelerated energy efficiency is not sufficient, then perhaps the baseline allocations for this climate zone should be revisited. It is possible that occupants

[13] California Public Utilities Code 739 (a).

[14] Grimes, Arthus; Young, Chris; Arnold, Richard; Denne, Tim; Howden-Chapman, Philippa; Preval, Nicholas; and Lucy Telfar-Barnard. "Warming Up New Zealand: Impacts of the New Zealand Insulation Fund on Metered Household Energy Use." Ministry of Economic Development (Wellington), October, 2011.

[15] Barnard, et. al., "The Impact Of Retrofitted Insulation And New Heaters On Health Services Utilisation And Costs, Pharmaceutical Costs And Mortality." October, 2011.

per household in this Central Valley region is significantly different than in other regions with similar climate, and that this could explain higher use and justify a higher baseline. The underlying principle of the baseline should not be changed – it should provide an amount of electricity necessary to meet essential needs, and no more, consistent with the appliance types and climate conditions attendant to the customer structures; as we discuss later, an incremental baseline for electric vehicle owners is consistent with these principles.

E. TREATMENT OF CALIFORNIA ALTERNATIVE RATES FOR ENERGY (CARE) AND OTHER VULNERABLE CUSTOMERS

We do not consider this rulemaking to be an appropriate venue for making changes to the legislatively-mandated CARE program. That is an issue of social welfare, not of energy pricing theory. Our intent in this proposal is to avoid economic harm to vulnerable subgroups of residential billpayers, including, but not limited to low income households and special medical need customers. Within the context of this proposal, CARE customers would receive discounts as needed from the usage blocks (smaller consumers) or TOU rates[16] (larger customers) so that as a group they are not paying a different contribution to the cost of service than at present. However, we would support Commission evaluation of whether changes to the structure of CARE could increase affordability at the same or lower cost to billpayers.

F. ADDRESSING DISTRIBUTED GENERATION (PV CUSTOMERS)

Our proposal addresses the high tail block rates in current rate design - which in large part triggered this proceeding - by reducing the number of tiers and significantly moderating the tier differentials for smaller demand customers, and by introducing TOU with a simplified tier structure for larger customers. We believe these changes will

[16] Although here we recommend that the utilities identify these customers and make special efforts help them determine whether it would be more beneficial for them to shift to the smaller customer rate design.

mitigate most if not all of the issues with the current rate structure for the residential customer class, and perhaps also for onsite generator customers.

In keeping with the direction in this proceeding, our proposal is not intended to address the proper pricing of service for customers with on-site generation, other than providing them with time-variant price signals as many may fall into the larger customer category. The Commission has a separate docket underway for net energy metering (NEM), and we believe that details relating to any NEM changes should be addressed there, but only after the Commission's cost-benefit study is released and after the impacts of the new rate structure adopted by the Commission have been analyzed. But these topics are inevitably related, and we think it important to discuss here how the framework in our proposal would likely fit with an eventual resolution of issues in the NEM docket.

One issue that will be dealt with in the NEM proceeding (in addition to the total costs and benefits from on-site generation), and that might unavoidably drive some of the rate designs proposed in this proceeding, is the issue of the on-site generator's contribution (or lack thereof) to maintaining the distribution system. As we see it, there are four potential solutions to this issue: 1) a fixed customer charge on all residential customers; 2) a demand charge on all residential customers; 3) some kind of bi-directional charge for the distribution circuit; or 4) no charge. We discuss at length and provide evidence in Section V of this proposal as to why a fixed customer charge for residential customers is not justified and runs counter to California's energy goals. The same disincentives for investments in energy efficiency, conservation and distributed generation that it provides to non-onsite generator customers would also apply to onsite generator customers with the added problem of muting their time-variant price signal. A demand charge is perhaps only a slightly better option since it adds a complexity that many customers will not understand. "No charge" might be the correct answer depending on the outcome of the cost-benefit study and impact analysis of the new rate design adopted by the Commission. We discuss here the third option, or the bi-directional distribution rate concept because, given the caveats above, we believe that it may address the issue better than the solutions we have evaluated thus far.

One refinement that could be easily adapted to our proposed rate design to specifically address NEM customers is to make the "*local* distribution circuit" part of the cost of service a bidirectional rate.[17] The portion of the tariff associated with the *local* distribution loop or circuit (not the total distribution charge) would be applied regardless of whether power was flowing from the grid to the customer, or from the customer to the grid. The NEM customer would have to pay for the use of the grid when it is employed to find customers for excess generation – but the NEM customer would only pay for that part of the overall grid.

Without a connection to the grid, NEM customers would have no market for their surplus power. While they may have sized their system to meet their own needs, those needs change over time or may have been based on average use. They may go off to work during the day when their house is using low levels of electricity and the solar system is generating at its maximum, and then come home and use the electricity largely in the evening/early morning hours when the solar is generating much less if any power; their high school students become college students and move away; appliances are replaced with more efficient models; shading benefits of solar in reducing air conditioning loads are not always considered. Any number of factors can cause a NEM customer to have excess generation, particularly during the daytime, and to have grid-dependency, particularly in the higher use evening and early morning hours. Power will flow back and forth. Some payment for the use of the grid is appropriate for making this possible, assuming that the NEM customers are being fairly compensated for the benefits they provide, but it should be related to that part of the grid actually used.

Current rates are unbundled at the tariff level, but (for good reason) aggregated when displaying rates to consumers. For PG&E, the "distribution" component of the E6 TOU rate design is set in $/kWh as follows:

[17] More precisely, the distribution circuits connecting from the lower voltage side of a distribution substation served from a transmission or sub-transmission network of 25 kv or above to line transformers that deliver power to customer premises at 480 volts or less.

	PEAK	PART-PEAK	OFF-PEAK
Distribution*:**			
Summer	$0.17150	$0.06860	$0.03430
Winter	–	$0.06591	$0.04394

This covers the *entire* distribution cost, including everything below the transmission level. When an NEM customer has excess supply, that power is essentially always used by another customer on the same distribution circuit, so the costs of sub-transmission (everything below FERC-regulated ISO transmission and the distribution substations) and distribution substations are not associated with delivery of that excess supply. While a detailed cost of service analysis could further unbundle these tariff rates, for simplicity and purposes of this discussion, we believe it is reasonable to assume that about one-third of these costs are associated with local distribution as contrasted with network distribution. Therefore, the NEM customer would pay a *local* distribution rate, equal to one-third of the otherwise applicable distribution rate for redelivery of any power that is surplus to their own usage.

In this approach, the NEM customer would pay for power from the grid at the applicable TOU rate when they are consuming power. They would be compensated for power they deliver to the utility at those TOU rate blocks for energy, transmission, and *network* distribution. But the NEM customer would have to pay the *local* distribution charge to the utility to cover the portion of the utility's costs in receiving, managing, and re-delivering that power. Thus, the payment to the NEM customer would be slightly lower, first reflecting the absence of *local* distribution costs in the price paid, and then reflecting an assessment of *local* distribution costs as an obligation of the NEM customer.

We provide an illustration below of our concept rate design strictly to stimulate thought as to how it would affect both onsite generators and non customer-generators. The eventual details of any new rate would need to be resolved in the NEM docket and subsequent general rate proceedings. In the table below, the "unbundled" column shows the unit rates for each element of service. The "Price for Power Taken From The Grid" includes all of these elements. The "Revenue to NEM For Power Delivered To The Grid" column includes compensation to the NEM for the avoided costs of production, transmission, and network distribution, but applies a charge of $.02/kwh for the use of the distribution system to dispose of surplus electricity.

Bi-Directional Local Distribution Rate Design

	Unbundled	Price for Power Received From The Grid	Revenue to NEM for Power Delivered to the Grid
Power Supply			
On-Peak	$ 0.18	$ 0.18	$ 0.18
Mid-Peak	$ 0.12	$ 0.12	$ 0.12
Off-Peak	$ 0.06	$ 0.06	$ 0.06
Transmission	$ 0.02	$ 0.02	$ 0.02
Distribution			
Network Distribution	$ 0.03	$ 0.03	$ 0.03
Local Distribution DOWN	$ 0.02	$ 0.02	
Local Distribution UP	$ 0.02		$ (0.02)
Total Price			
On-Peak		$ 0.25	$ 0.21
Mid-Peak		$ 0.19	$ 0.15
Off-Peak		$ 0.13	$ 0.09

These customers would support grid costs in direct proportion to their use of grid services, both when taking power from the grid and when delivering power to the grid. The effect of this would be to increase the billing determinants for local distribution above those used to compute rates today, since it would not only include the usage of the customers USING the power from NEM customers that is delivered to the grid, but would ALSO include the amount delivered by the NEM customers. This would reduce the rate for local distribution to all customers, and the NEM customers would also get this benefit when they take power from the grid. In this manner, both NEM customers and customers with no on-site generation would benefit from the presence of NEM customers, and NEM customers would unambiguously be "paying for grid services" on an as-used basis.

We believe this is a far superior approach compared with imposing a high fixed charge on *all* residential consumers, including NEM customers, in order to assure a contribution to grid costs. First and foremost, it is volumetric, so the incentive for all users to conserve is not impaired. Second, it charges NEM customers for the portion of the grid actually used to redeliver their surplus, not for grid costs unrelated to their surplus.

Finally, it leaves these customers with an incentive to control their surplus to economical levels, by giving them only the net value to the grid for the power they deliver.

We reiterate that this is only a concept submitted to stimulate thought. We believe these issues should be addressed in detail and resolved in the NEM docket and subsequent company-specific general rate proceedings after the cost-benefit study is completed and released and after analysis of the new rate design eventually adopted by the Commission. We are aware that multiple analyses show that local generation helps avoid ancillary services, and while we believe our proposal addresses this (by applying the full power supply rate to power delivered to the grid), we expect other ideas to be presented and look forward to reviewing these. We raise the issue here only to show that the rate design we propose in this docket is easily adapted to a NEM framework, and that high fixed charges are neither necessary nor desirable to address NEM issues. NEM customers can be charged for their use of the grid on a volumetric basis, just as drivers using highways pay for these through fuel taxes on a volumetric basis.

G. ELECTRIC VEHICLES

Rates for electric vehicles (EV) are the subject of another proceeding, but we believe it important to show how the proposed large customer rate design is likely a good model for electric vehicle service with a baseline allowance adjustment for these customers.

First, our proposal to divide the residential class, with customers using more than 7 kW over any one hour being classified as "large" customers would put most EV owners into the large category; their chargers alone can draw 3.3 kW or more, and when coupled with typical household appliances operated in evening hours, we believe that most would pass this threshold.[18] However, even if they do not, we believe that most would opt onto the large-customer rate schedule to take advantage of TOU pricing, assuming the utilities are

[18] However, The vast majority of plug-in hybrids (PHEVs) drivers are relying on "Level 1" 120V charging at ~1.2 kW.

required to provide customers with information about the relative advantages of each rate option for their situation.

Electric vehicles use approximately 0.35 kilowatt-hour per mile; at annual usage of 12,000 miles, they require about 350 kWh per month.[19]

Households with electric vehicles should receive an incremental baseline because they make a significant contribution to the state's goals to reduce local air pollution, improve public health, and curb greenhouse gas emissions to meet AB 32. Electric vehicles can be charged during off-peak periods, and ultimately may be controllable to charge under the minute-to-minute control of the utility or grid operator thereby helping integrate renewables. By moving transportation energy use from petroleum to renewable electricity, electric vehicles both reduce emissions and contribute to a stronger local economy. Major analyses of California's energy future found that the state must electrify much of the transportation sector in order to achieve the state's goal to reduce GHG emissions by 80% by 2050.[20] Therefore, the CPUC's rate design should encourage vehicle electrification.

We believe that the baseline allowances should reflect the addition of EVs to the existing baselines that are devised based on housing type and climate zone. In order to entice EV customers to choose the TOU with simplified inclining block rate schedule, we urge the Commission to make an incremental addition to the baseline of approximately 200 kWh/month (subject to further analysis) available to customers on the large-customer rate tariff. We do not propose an EV rate on the small customer inclining block rate, because our goal is to have EVs charge during off-peak periods. The Commission may also choose to keep the current EV rate as an option, but we think it is important for *all* customers to have a conservation signal in the rate design.

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[19] This is true for today's efficiency rates – which we very much hope will improve.

[20] California Council on Science and Technology. "California's Energy Future – The View to 2050, Summary Report." May 2011, www.ccst.us/publications/2011/2011energy.pdf. Williams, J. et al, "The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity." *Sciencexpress*, Nov 24, 2011.

This should be limited to vehicles registered at the service address, and a maximum of two vehicles per account (auto collectors may have more than two, but likely do not drive them very much). The details of this should be addressed in the EV docket, once the principles are established in this docket.

V. HIGH FIXED CHARGES ARE INAPPROPRIATE

High fixed monthly customer charges are inappropriate for residential customers of any kind. They are not cost-based, they reduce the benefit to customers of investments in energy efficiency, distort unit prices, and they cause increased consumption. For all of these reasons, they should be avoided.

A. FIXED CHARGES ARE NOT COST-BASED

There is no economic principle that says fixed costs should be collected in fixed charges. The usual argument in favor of fixed charges is to recover non-varying distribution system investment, maintenance, and administrative costs from all customers, based on the argument that these costs are independent of sales volumes, and should not be recovered in the volumetric rate. This argument is fundamentally flawed for many reasons.

First and foremost, the only costs that are truly "fixed" are interest and depreciation. All other costs of the utility – labor, return, taxes – are technically variable costs in the long run.

Second, even these truly "fixed" costs vary in the long run. Utility grids are only expanded where there is customer demand, and utility line extension policies ensure that very small-use customers will contribute a significant amount towards line extensions. Where usage is de-minimus, customers today find it cheaper to install solar PV systems to serve small loads. These are proliferating for highway signage, where low-wattage

LED lighting can be more economically served without extending the grid. So even the interest and depreciation on distribution plant investment is variable in the long-run.

Third, within those utility costs, the only things that actually vary with the number of customers served are the costs of billing and collection, plus a very small number of customer service calls into the utility call center.

If a customer were to convert their single-family house into a duplex, with the identical loads now being those of "two customers" instead of "one customer" there would be no need to augment the distribution system, upgrade the transformer, or conduct more maintenance. The only incremental cost would be an additional meter to read, bill to render, and payment to process. Similarly, if that customer's house were to burn down, the utility would not avoid any distribution costs; it would avoid one meter read, one bill to render, and one payment to process. And, unless high usage justified frequent billing, an annual bill (as with magazine subscriptions) would be adequate. If any fixed charge is warranted, a $3.00 customer charge (think of this as $6 to generate each bill for bimonthly billing, which is quite common for water, solid waste, and sewer utilities) is adequate to recover these costs from small-use customers who do not really require monthly billing. This is the level now imposed by SCE.

Many non-utility vendors bill small-use customers on a bimonthly, quarterly, or even annual basis, because it does not make economic sense to read meters and render bills every month for very low usage. California IOUs bill monthly, which involves significant billing and collection costs, which they may argue justify a fixed customer charge. Frequent billing and collection is justified but only because usage levels are higher, and that is a usage-related cost, not a customer-related cost. Therefore the cost of more frequent billing should be recovered in the usage charge.

Globally, customer charges are mostly either zero or very small. We provide examples below of rates in Mexico, India, Indonesia, China, and Brazil that have a rate form similar to that of PG&E – no customer charge, and steeply inclining rate blocks.

Many utilities apply lower customer charges to multi-family customers, recognizing that these customers have much lower costs (per customer) for service. In general, those utilities include some distribution costs in the customer charge, giving rise to a logically lower rate for customers in denser locations. Because we do not include a customer charge, we do not distinguish between single-family and multi-family dwellings; were the Commission to include a customer charge, such a division would be logical and appropriate.

B. FIXED CHARGES DISTORT UNIT PRICES, REDUCE THE BENEFITS TO CUSTOMERS OF ENERGY EFFICIENCY INVESTMENTS, AND CAUSE INCREASED CONSUMPTION

One obvious problem is that high fixed charges reduce the benefits to customers of investing in energy efficiency. As we show above, for a utility with average sales of 500 kwh/month/customer, a fixed charge of $25/month would mean a price-per-kWh that is $.05/kWh lower. Introducing a $25 customer charge would reduce the per-kWh price from $.15 to $.10, and would increase the payback period on every energy efficiency investment by 50 percent. The measure that pays off in two years without a customer charge would be extended to three years; the measure that pays off in four years would be extended to six years. Many studies show that once consumer payback exceeds two years, customer willingness to invest declines sharply.

Fixed charges also distort prices. In the example above, if a flat rate were $.15/kwh, then a $25 customer charge would lower the per-kWh rate to $.10, a 33 percent reduction. At a long-run arc elasticity of -0.50, that would cause a 16.5 percent increase in usage. ***Indeed, an analysis presented to the Minnesota PUC in 2008 by the Regulatory Assistance Project concluded that high fixed-charge pricing for natural gas would***

result in as much increased usage as ten years of programmatic conservation had saved.[21]

Both Of These Rates Generate The Same Average Revenue / kWh

High Fixed Charge			
Customer Charge		Per Month	$ 30.00
Energy Charge		All kWh	$ 0.100

Marginal Cost Based Endblock			
Customer Charge		Per Month	$ 5.00
Energy Charge		First 500 kWh	$ 0.100
		Next 500 kWh	$ 0.150
		Over 1,000 kWh	$ 0.180

Which rate makes it more likely a customer will invest in an Energy Star A/C Unit?

Taken from Regulatory Assistance Project presentation to Pedernales Electric Cooperative, March, 2011.

High fixed charges that include recovery of distribution costs are particularly harmful for multi-family residents and people living in urban areas with high customer density, where the distribution costs per customer are typically much lower than in suburban and rural areas. . The net effect is that urban and apartment residents subsidize suburban sprawl. Many utilities address this by having lower customer charges for multifamily residents, but we think it is better to address this by recovering distribution costs volumetrically. It is important for customers to continue to see a price signal that conveys "the more you use, the more you pay"; and it is equally important that utilities themselves continue to be held neutral (through decoupling) to changes in sales volumes.

A cost-based customer charge is potentially reasonable, but only to recover billing and collection costs, and then based only on infrequent billing of the type that would be typical for very small-use customers as discussed above. The cost of smart meters should not be included in the monthly customer charge, because the reason for installing smart

[21] Shirley, Wayne; Lazar, Jim; and Weston, Frederick. "Revenue Decoupling Standards and Criteria: A Report to the Minnesota Public Utilities Commission." The Regulatory Assistance Project. June 30, 2008. http://www.raponline.org/document/download/id/850

meters is usage related, not customer-related.[22] The previous electromechanical meters were perfectly adequate for very small-use customers' needs. We do not dispute here the purported benefits of a smart grid, including standardization of meters – indeed, they have already delivered operational benefits to the system in many places and we believe that there is great *potential* for benefits to customers if linked to programs and designed into the system - but these costs are not *customer* costs, they are *usage-related* costs. On it's website, PG&E explains the benefits of smart meters to include[23]:

- More reliable service
- See your daily energy use
- Get alerts about your usage
- More choices in pricing plans
- Better usage of renewable energy
- Smart devices and smart homes

None of these are "improvements" in the periodic billing function that is often presented as a basis for customer charges.

Smart meters are an integral part of the distribution system, enabling dispatchers to do phase balancing, voltage control, and other important distribution functions; distribution functions should not be included in a fixed charge. In his seminal work on ratemaking, Professor Bonbright addressed this in detail, being extremely critical of allocation of distribution costs on a per-customer basis.[24] Now, as then, the Commission should reject any attempt to collect distribution costs on other than a usage basis.

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[22] Investment in smart meters was justified based on an array of benefits, including improvements to generation, transmission, distribution, reliability, and fuel savings, plus integration of renewable energy resources. The function of facilitating periodic billing is only a tiny portion of the justification for smart meters.
[23] http://www.pge.com/en/myhome/customerservice/smartmeter/benefits/index.page
[24] See Principles of Public Utility Rates, 1961, pp. 347-349.

Smart Grid benefits enabled by smart meters include:

- Reduced O&M Expense for meter reading
- Remote shut-off and turn-on
- Reliability Improvement:
- Distribution Automation
- Peak load reduction through Time of Use and Critical Peak Pricing
- Loss reduction: Voltage Control and Power Factor Correction
- Loss Reduction: Phase balancing on the fly

The vast majority of these benefits are peak demand and energy-related, not customer-related benefits. Recovering these smart grid costs on other than a peak and energy basis would have the effect of allocating benefits to large users (in the form of lower prices for usage), while assigning costs disproportionately to small users (in the form of a customer charge to recover smart meter costs).

VI. TIERED RATES ARE COST-BASED, EFFICIENT AND PROVEN

Tiered rates are used around the world to fairly allocate the cost of service to residential customers. There are critics of tiered rates, but the criticisms generally result from the ways in which it has been implemented and not on the underlying characteristics themselves. Significant research has been done on tiered rates, and they are a proven tool to lower customer usage.

A. UNDERLYING PRINCIPLES OF TIERED RATES ARE COST-BASED AND EFFICIENT

Tiered rates are based on three different principles.

Recognition of Load Factor and Load Shape: Tiered rates recognize that residential lights and appliances have very predictable and relatively even load shapes. Analysis by Pacific Power, the Northwest Power and Conservation

Council, and others shows that this element of usage has an annual peak demand load factor of about 70%, much higher than the residential average. By contrast, residential air conditioning typically has an annual peak demand load factor of no more than about 20%, meaning that three and one half times as much capacity revenue is required per kilowatt-hour for air conditioning. A tiered rate captures this without the complexity of attempting to measure customer diversified contribution to system peak demand at the individual customer level (an attempt to do so would likely result in highly erratic customer bills, and lead to extreme customer dissatisfaction).

Conservation and Externalities: Tiered rates convey the important principle that excessive use requires additions of expensive new generation, transmission, and distribution capacity, and recognition that only a portion of the environmental costs of electricity supply are reflected in the utility revenue requirement. Customers can easily understand a pricing message that says: "*The more you use, the more you pay*." Tiered rates are generally found to be well-received by customers for this reason.

Equitable Allocation of Low-Cost Power: Tiered rates can be used to fairly allocate a very limited supply of low-cost power. PG&E, for example, gets a limited amount of power from its legacy hydroelectric resources at an extremely low rate. Tiered rates have been used to allocate hydro in the Pacific Northwest (where they are called "baseline" rates), in Canada, in Vermont, and in other countries as well. This is, admittedly, an "embedded cost" rate design concept, but it has the advantage of providing customers with infra-marginal energy usage at an infra-marginal prices, thereby allowing a limited revenue requirement to price incremental usage at long-run marginal cost, thereby achieving a principal goal of marginal cost pricing.

B. DETAILED ANALYSIS SHOWS TIERED RATES WORK

While it seems intuitive that pricing that sets the rate for discretionary usage higher than the rate for essential usage would produce lower levels of total usage, some utilities and analysts continue to question this.

A recent report from USEPA, as part of the National Action Plan for Energy Efficiency, ranked different types of rate design based on the expected effect. Inclining block rates were the only type of rate design ranked "high" (H) for "Customer Incentive for Overall Energy Savings." TOU rates were ranked high for peak load reduction, but only medium (M) for overall energy savings. Even fully dynamic "real-time" pricing was ranked lower than inclining block rates for overall energy savings.[25] (A=All customer types and L= Low and can include no effect or negative effect)

Table 1. Overview of Customer Incentives for Energy Efficiency From Various Rate and Pricing Options

Rate/Price Type	Description	Customer Types*	Customer Incentive for Overall Energy Savings**	Customer Incentive for Peak Demand Savings**	Financial Risk to Utility**	Financial Risk to Customer **
Fixed Rate Options						
Flat rates	• Customer charge for direct service costs. • Other fixed and variable costs allocated on an average basis, per kWh consumed.	A	M	L	M	L
Inclining block rates	• Basic customer charge. • Fixed volumetric rate for first usage block. • Higher fixed volumetric rate for subsequent "tail" block(s).	A	H	M	M	M
Seasonal rates	• Fixed volumetric rates, but with seasonal increase.	A	M	M	M	M
TOU rates	• Basic customer charge. • Volumetric charges that vary by time of day (typically with two or three periods, e.g. peak/off-peak or peak/mid/off-peak).	A	M	H	L	M
Declining block rates	• Basic customer charge. • Fixed volumetric rate for first usage block. • Lower fixed volumetric rate for subsequent "tail" block(s).	A	L	L	M	L
Bill adders/ surcharges	• Recover various costs such as franchise fees, universal service charges. • Some fee structures use fixed charges, some use volumetric. • Absolute amounts typically small.	A	L	L	L	M

[25] National Action Plan for Energy Efficiency (2009). "Customer Incentives for Energy Efficiency Through Electric and Natural Gas Rate Design." Prepared by William Prindle, ICF International.. www.epa.gov/eeactionplan

1. Studies Show Effectiveness Of Tiered Rates

While there are many studies showing the effectiveness of tiered rates[26], to our knowledge, there is only one disciplined and controlled study of this that has been undertaken, where a sample of customers on a single system was moved to tiered rates to study the changes in their usage compared with an otherwise identical sample. This was done in Wisconsin, in the early 1990s, and the results published in the Journal of Business and Economic Statistics[27].

The controlled experiment involved several hundred consumers, each assigned to one of five rate designs, ranging from a flat rate to an inclining block rate with a block ratio of 6.65, as shown below:

Table 1. Wisconsin Electric Residential-Rate Experiment in Rate Structure

Rate schedule	Tier 1 price (c/kWh)	Tier 2 price (c/kWh)	Rate boundary (kWh)	Number of customers
150	4.01	9.40	250	63
151	2.51	10.38	250	50
152	4.01	13.74	500	54
153	2.51	16.71	500	60
156	6.63	6.63	—	143

NOTE: Rate schedule 156 refers to the study's flat-rate schedule.

The results of the experiment were findings that short-run price elasticity was low, but negative (higher prices result in lower usage), and that there were significant income differences between the customers (smaller use was associated with lower income). The controlled experiment went on for only a two-year period, so these results should be considered short-run elasticities. Most elasticity estimates conclude that long-run elasticities (as consumers change appliances, not just behavior) are about twice as great as short-run elasticities. Both of these results are consistent with other less scientific studies.

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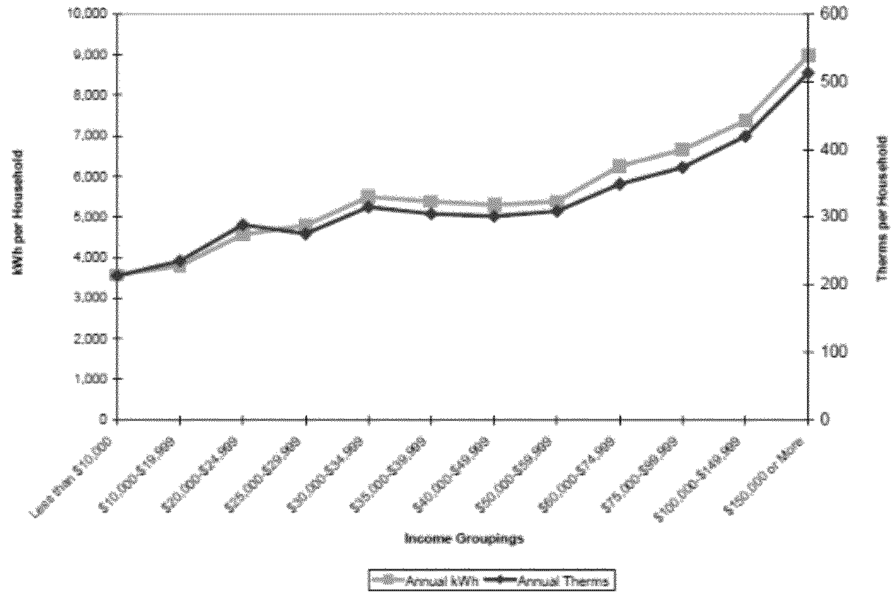
[26] For example, Acton, Mitchell, and Mowill 1976; Barnes, Gillingham, and Hageman 1981; Dubin 1985a, b; McFadden, Puig, and Kirshner 1977; Taylor 1975), water (e.g., Billings 1982; Billings and Agthe 1980, 1981; Foster and Beattie; 1981a, b), and natural gas (e.g., Barnes, Gillingham, and Hagemann 1982; Polzin 1984), all cited in Herriges (1994) below.

[27] Herriges, Joseph A. and Kuester King, Kathleen. "Residential Demand for Electricity under Inverted Block Rates: Evidence from a Controlled Experiment." *Journal of Business & Economic Statistics*, Vol. 12, No. 4 (Oct., 1994), pp. 419-430.

This is consistent with experience in California, where use is also income-related, as shown in the Commission's 2012 report on income and energy usage.[28]

Figure I. Average Electricity and Natural Gas Consumption by Income



Source: KEMA (2010), p. 32.

The following table shows the elasticities that were found indicate SIGNIFICANTLY higher elasticity 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.)

[28] Atamturk, Nilgun. "Electricity Use and Income: A Review." California Public Utilities Commission." June 21, 2012. http://www.cpuc.ca.gov/NR/rdonlyres/609BC107-EF3C-4864-AD56-E964884D51AC/0/PPDElectricityUseIncome.pdf

Wisconsin Electric Experiment: Upper Block vs Lower Block Elasticities

Variable	Annual income	Rate schedule 150	151	152	153
	$3,000	229**	231**	228**	230**
		(21)	(22)	(21)	(24)
Expected usage per month	$27,500	627**	627**	629**	631**
		(20)	(22)	(21)	(21)
	$90,000	1082**	1080**	1077**	1074**
		(66)	(65)	(67)	(73)
	$3,000	−.0190	−.0178	−.0184	−.0186
		(.0660)	(.0640)	(.0822)	(.0821)
Elasticity with respect to P_1	$27,500	−.0020**	−.0013**	−.0077	−.0065
		(.0003)	(.0003)	(.0197)	(.0185)
	$90,000	−.0006**	−.0004**	−.0014+	−.0065
		(.0001)	(.0000)	(.0008)	(.0185)
	$3,000	.0036	.0046	−.0026	−.0037
		(.0209)	(.0235)	(.0168)	(.0225)
Elasticity with respect to P_2	$27,500	−.0142	−.0137	−.0039	−.0019
		(.0793)	(.0793)	(.0572)	(.0572)
	$90,000	−.0175	−.0173	−.0146	−.0137
		(.0796)	(.0796)	(.0788)	(.0787)

This finding of higher elasticity for higher levels of usage is also consistent with findings in California, showing that the price elasticity is higher for customers with electric space conditioning than for those who do not cool and who use other fuels for heating.[29]

This same analysis, summarized in the table below, is intriguing because it does NOT show an income elasticity, but does show price elasticity; when combined with appliance saturation data, which shows higher saturation of high-elasticity appliances in higher-income households, the correlation between usage and income is logical, even without explicit income elasticity where appliance mix is held constant.

Table III. Price and income elasticities for California households

	Price elasticity	Income elasticity
All households	-0.39	-0.00
Households with	-1.02	-0.00
No electric space heating	-0.20	-0.00
Central or room air conditioning	-0.64	0.02
No air conditioning	-0.20	-0.01
No electric space heating Nor air conditioning	-0.08	-0.01

Source: Reiss and White (2005), p. 868.

[29] Nilgun. "Electricity Use and Income: A Review." Table III.

Other disciplined studies (but not involving control groups and test tariffs) have been published in other jurisdictions. For example, the Nova Scotia Utility and Review Board was considering a multi-block rate for Nova Scotia Power, Incorporated (NSPI) in 2004. An analysis presented in that docket concluded that: "In short, the inverted block rate model is superior to the flat rate model since it allows the use of price signals, can reduce cross-subsidies, and can reduce the impact of price rises on low- and fixed-income customers."[30]

In addition, Ahmed Faruqui found 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."[31] Long-run elasticity was found to be about three-times the level found for short-run elasticity.

Faruqui Elasticity Estimates In Response To Inclining Block Rates

TABLE 1 DISTRIBUTION OF RESIDENTIAL PRICE ELASTICITIES

		Low	Most Likely	High
Short Run	Block 1	-0.01	-0.13	-0.20
	Block 2	-0.02	-0.26	-0.39
Long Run	Block 1	-0.03	-0.39	-0.60
	Block 2	-0.06	-0.78	-1.17

Examination of block rates has been very extensive in water pricing, where marginal costs for new supply can dramatically exceed existing water supply costs. In California, all water utilities are required to have "conservation rates" and nearly all of those are in the form of multi-block inclining rates. We take note of the fact that in water, as in electricity, progressive pricing must be combined with good policies and good programs to be effective in optimizing resource usage. Pricing alone cannot do it all.

[30] Nova Scotia Utility and Review Board, Supporting Document, Dr. Larry Hughes, Energy Research Group, Department of Electrical and Computer Engineering, Dalhousie University, November, 2004.
[31] Faruqui, Ahmed, "Inclining Towards Efficiency," *Public Utilities Fortnightly*, August 2008, page 25.

2. Price Elasticity Of Upper Block Usage Need Not Be Higher For Inclining Block Rates To Be Effective

It is important to understand that price elasticity need not vary by block for inclining block rates to be effective at reducing energy consumption. This is because the majority of USAGE is associated with users who exceed the initial block, and thus see the rates for the upper blocks as their marginal cost. Because the initial block rate is not applicable to their marginal decision, and they have already consumed more than that amount, they cannot "consume more" power in the initial block. Only the relatively few customers whose usage does not exceed the first block rate can increase their usage.

A relatively simple illustration shows this effect. Below we show a bill frequency analysis, and cumulative analysis, for an actual small electric utility in Southern California. This utility had AVERAGE monthly usage of 526 kWh/month, but 69% of sales are to the 38% of customers using more than 500 kwh. This is simple arithmetic – because SOME customers use much more than the average, the mean usage is higher than the median usage.

Bill Frequency and Cumulative Analysis for a Small Electric Utility in California

	Bills	kWh Usage by Customers Ending in Block	% of Sales to Customer Using More than Block	Total Block Sales Including Sales to Customers Exceeding Block Limit	% of Sales In Block
0 - 250	154,281	22,705,353	92%	118,791,853	42%
250 - 500	176,985	64,370,066	69%	71,964,066	25%
500 - 750	94,209	57,617,207	49%	38,800,707	14%
750 - 1,000	49,741	42,864,074	34%	21,411,074	8%
>1,000	63,411	95,831,158	0%	32,420,158	11%
	538,627	283,387,858		283,387,858	

Now, we compare the effect of a flat rate, inclining block rate, and flat rate with customer charge for the above illustrative utility.

First, a flat (all energy) rate design, to generate a reference revenue requirement:

Flat Rate Design: Revenue Requirement

Flat Rate Design	
Total Sales	283,387,858
Flat Rate:	$ 0.15
Revenue	$ 42,508,179

With a two-block rate design, and a block ratio of 1: 1.5, the rate design below would generate this same revenue level.

Two Tier Rate Design: Revenue Requirement

Inclining Block Rate Design, 2 blocks, 1 : 1.5 Ratio			
Block	Sales	Rate	Revenue
0 - 250	118,791,853	$ 0.11624	$ 13,808,643
>250	164,596,005	$ 0.17436	$ 28,699,536
Total:			$ 42,508,179

With a two tier rate design, customers using less than 250 kWh would be expected to increase usage, in response to a lower price, while those using more than 250 kwh would be expected to decrease usage, in response to a higher price. BUT, only 8 percent of the energy is subject to the lower price, at the margin, while 92 percent is subject to the higher price. Using the elasticity factors identified by Faruqui, above, we find that the tiered rate results in an 11 percent *reduction* in total electricity usage.

Two Tier Rate Design: Energy Savings Elasticity Effect

Elasticity Effect of 2 Block Rate					
Block	Sales Subject to End Block	Rate Change From Flat Rate	% Rate Change	Assumed Block Elasticity	Change In Usage With Elasticity
0 - 250	22,705,353	$ (0.0338)	-22.5%	-0.39	1,992,847
>250	260,682,505	$ 0.0244	16.2%	-0.78	-33,025,924
Net Impact on Consumption:					-31,033,077
% Change in Consumption					-11.0%

With this simple change to a two-block rate, we find that the smallest users, consuming 8 percent of the system usage, have an economic incentive to use more power, and do so, in this case, about 2 million kWh/year. But the larger users, consuming 92 percent of the system energy, have an economic incentive to use less power, and do so, in this case, about 33 million kWh/year less. The *net savings* of 31 million kWh amount to about 11 percent of total sales.

Alternatively, we can compute the effect of imposing a fixed customer charge on the existing flat rate design. For illustrative purposes, we apply a $25 fixed charge, and reduce the per-kWh rate to keep the rate design revenue neutral. The customer charge generates nearly one-third of the required revenue. Implementing this leads to a 32 percent *reduction* in the price per kWh, down from $.15 to $.1025.

We then compute the elasticity effect of doing so.

Fixed Charge Rate Design: Increased Usage Elasticity Effect

Imposing a Customer Charge of $25/month		
Monthly Bills		538,627
Customer Charge Revenue @ $25/month	$	13,465,675
Energy Revenue Requirement	$	29,042,504
Energy Sales (kWh)		283,387,858
Price per kWh	$	0.1025
Rate change	$	(0.0475)
Percent Rate change		-31.7%
Elasticity effect at -.39		35,010,755
% Increase in Sales		12.4%

In the case of this illustrative utility, imposing a $25/month customer charge would be expected to result in *increased* usage of about 12.4 percent.

The difference between the inclining block rate with no customer charge (reduces sales by 11 percent) and the customer charge-influenced flat rate (increases sales by 12.4 percent) is a 23 percent increase in sales with the inferior rate design. This is about equal to twenty-five years of utility programmatic conservation efforts.[32]

[32] Sciortino, Michael; Neubauer, Max; Vaidyanathan, Shruti; Chittum, Anna; Hayes, Sara; Nowak, Seth; and Molina, Maggie. “The ACEEE 2011 State Energy Efficiency Scorecard.” Page 17 shows California electricity savings at 0.88% of total electricity sales per year.

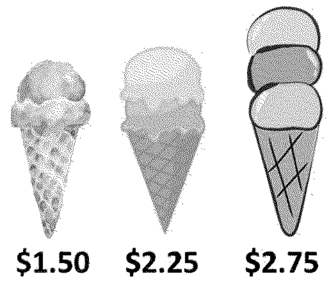
This arithmetic example uses the elasticities of -.39 (block 1) and -.78 (block 2) identified by Faruqui above as long-run elasticity factors. There are many different estimates of elasticity, and some are smaller than these. The purpose of this exercise is to show an illustrative effect of changing rate design, not to accurately predict the result of a specific change to the rate design of a specific utility.

The point of this exercise has been to demonstrate that the effect of an inclining block rate is to reduce energy consumption. The bill distribution of the illustrative utility, the level of the rates, and the assumed elasticity factors are all needed to perform precise calculations, but the same general effect will result from ANY utility-specific data. In every case, the amount of energy used by the smallest customers (and subject to elasticity increases in response to a decreased price) will be dwarfed by the elasticity impact on larger users who consume the vast majority of power and are expected to have higher elasticity responses to upper blocks of usage. That elasticity will be much more likely to be achieved if these customers have access to well-designed programs to provide

C. TIERED RATES ARE THE GLOBAL NORM

Tiered rates are in extensive use around the world. They have wide customer understanding and acceptance. Universally, people recognize tiered rates as an incentive to use less (inclining blocks) or more (declining blocks) of the product being priced. Some have suggested that marginal rate structures like tiered rates may be undermined by the fact that customers only understand the average price of electricity, not the marginal price. However, there is much evidence that customers are able to understand the marginal price concept – if given the appropriate information. Consider the simplest and most familiar tiered rate; one that even an eight-year-old has little trouble comprehending.

What Does This Rate Design Tell You?



A) The average price per scoop is $1.50 for one scoop, $1.125 for two scoops, and $.9167 for three scoops, or

B) The marginal cost of the second scoop is less than the first, and the third scoop lower still.

1. Los Angeles Department of Water and Power just completed a major rate review. That review ended with continuation of the utility's long-standing policy of an inclining block rate design with no customer charge, as shown below. When asked about this at a conference of rate analysts, the LADWP rates staff responded: "*A customer charge does not fit with our sense that rates should encourage conservation.*"[33]

LADWP Residential Rate May 21, 2013

		Summer		Winter
Customer Charge		None		None
First 350 kWh		$ 0.0718		$ 0.0718
Next 700 kWh		$ 0.0877		$ 0.0877
Over 1,050 kWh		$ 0.1245		$ 0.0877

2. Palo Alto is another example of a California municipal utility with a rate design nearly identical to that proposed by NRDC for small-use residential consumers, with block ratios of 1.0, 1.4, and 1.8, very close to the block ratios of 1.0. 1.5, and 2.0 we have proposed.

Palo Alto Residential Rate at May 21, 2013

Customer Charge		None
First 300 kWh		$ 0.0952
Next 300 kWh		$ 0.1302
Over 600 kWh		$ 0.1740

[33] George Chen, at the California Municipal Rates Group, Burbank, CA, May 17, 2013.

The examples below, taken from a recent Regulatory Assistance Project publication[34] and other sources, show examples from Canada, China, India, Indonesia, Hungary, Mexico, and South Africa. They are presented as demonstration that the tiered rate design is entirely consistent with industry norms around the world.

3. Canada: Several electric utilities in Canada have inclining block rates. In many cases, these were implemented in order to provide essential needs service at low prices, commensurate with the availability of limited amounts of low-cost hydropower from legacy resources. For illustrative purposes, we show prices for British Columbia.

BC Hydro Residential Rate 4/26/2013 -

1. Schedule 1101 - Residential Service

Basic Charge 15.27¢ per day

Energy Charge

A. For customers billed monthly

Step 1 – First 675 kW.h per month	@ 6.90 cents/kW.h
Step 2 – Additional kW.h per month	@ 10.34 cents/kW.h

B. For customers billed bi-monthly

Step 1 – First 1350 kW.h per two months	@ 6.90 cents/kW.h
Step 2 – Additional kW.h per two months	@ 10.34 cents/kW.h

Note: For billing purposes. Step 1 is pro-rated on a daily basis.

http://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/tariff-filings/electric-tariff/00-bchydro-electric-tariff.pdf

4. China: There are separate electric utilities serving separate regions in China. They have converted to a three-block inclining block rate design in 2012. The goal of the government was to assure adequate supplies to meet essential needs while increasing prices for discretionary service in an effort to contain load growth and thereby avoid increased coal dependency.

[34] Lazar, Jim. "Rate Design Where Advanced Metering Infrastructure Has Not Been Fully Deployed" Regulatory Assistance Project. April 2013. www.raponline.org/document/download/id/6516

The tariff below is for East China's Zhejiang province[35]:

Zhejiang Province Rates		China Daily, July 2, 2012	
Annual Usage	Equivalent Monthly Usage	RMB/kWh	$/kWh
<2,760	<230	0.538	$ 0.087
2,761 - 4,800	230 - 400	0.558	$ 0.090
>4,800	>400	0.838	$ 0.136

5. Hungary: There are four electricity distributors in Hungary, and a single national power supplier. Rates are unbundled, but are aggregated for the purpose of this illustration. The customer charge is very small, at less than $USD1.00 per month, the per-kWh rates quite high, and the level of inversion very minor.

Residential Electricity Prices in Hungary

Hungarian Forint	EDF	ELMU	EMASZ	EON
Customer Charge	195 Ft	195 Ft	195 Ft	195 Ft
First 110 kWh/month	46.40 Ft	46.85 Ft	47.57 Ft	45.51 Ft
Over 110 kWh/month	47.83 Ft	48.62 Ft	49.40 Ft	48.78 Ft
US Dollar Equivalent				
Customer Charge	$0.87	$0.87	$0.87	$0.87
First 110 kWh/month	$0.208	$0.210	$0.213	$0.204
Over 110 kWh/month	$0.215	$0.218	$0.222	$0.219

Information based on personal communication with Hungarian Energy Office, January 5, 2012

35 http://www.chinadaily.com.cn/business/2012-07/02/content_15542580.htm

6. India: Central Power of Andhra Pradesh is a state utility, serving about 7 million retail consumers. It has no customer charge, and a multi-block inclining block rate design.

Andhra Pradesh (India) Residential Tariff

	$/kWh	Rupees
Customer Charge	None	None
0-50 kWh	$0.030	1.45
51-100 kWh	$0.057	2.80
101-200 kWh	$0.062	3.05
201-300 kWh	$0.097	4.75
301-500 kWh	$0.123	6.00
Over 500 kWh	$0.128	6.25

Rate available at: http://www.apcentralpower.com/customer/Tariff.jsp Accessed November 6, 2011

7. Indonesia: Perusahaan Listrik Negara (PLN) is the single largest electric utility in the world, serving a population of nearly 250 million with electric service. The PLN tariff has increasing customer charges and increasing prices per kWh for several subclasses of residential service, with the lowest prices for the smallest users, reflecting an allocation of low-cost government-controlled hydropower in the initial blocks. A customer charge of $1.12/month applies to low-use customers; large-use customers pay only a minimum bill, similar to PG&E's current rate design.

PLN Indonesia Residential Tariff Prices[60]

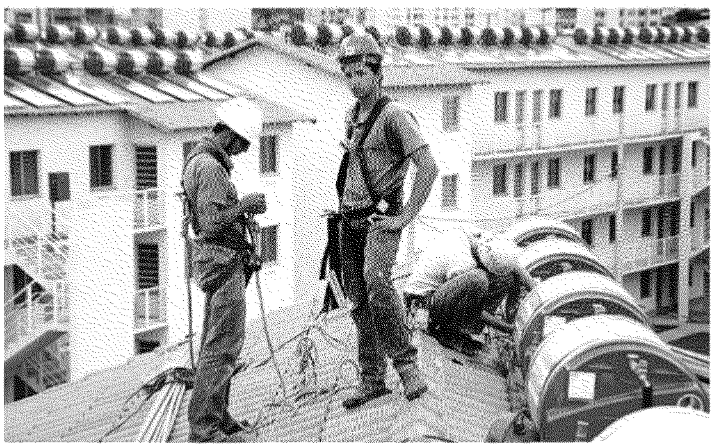
Maximum Demand VA (~watts)	Blocks	Price $/kWh	Price Rupiah
450	Monthly Charge	$1.12	10,000
	First 30 kWh	$0.014	123
	Next 30 kWh	$0.030	265
	Over 60 kWh	$0.040	360
900	Monthly Charge	$1.68	15,000
	First 20 kWh	$0.022	200
	Next 40 kWh	$0.033	295
	Over 60 kWh	$0.040	360
1,300	All Usage	$0.068	605
	Minimum Bill	$3.515	31,460
2,200	All Usage	$0.073	650
	Minimum Bill	$6.39	57,200

8. Mexico: Federal Electricity Commission (CFE) is the largest electric utility in the Americas, serving nearly 100 million people across Mexico. It is important to note that CFE bills customers bimonthly, and the bills show the block sizes as two times those in the tariff, below. Their tariff is divided between "small" residential users and "large" residential (alto Consumo) users who pay a much higher tariff. There are multiple geographic zones with slightly different prices. Customers using less than 450 kwh/month pay very low rates, and those exceeding the threshold pay much higher rates. As of April, 2013, the rates for Zone 1C (Mexico City) were:

Federal Electricity Commission		
Zone 1C Rates at 4/25/2013		
kWh	Pesos	USD
<150	$0.69	$0.056
150 - 300	$0.80	$0.065
300 - 450	$1.03	$0.084
Over 450 kwh	$2.74	$0.225

http://app.cfe.gob.mx/Aplicaciones/CCFE/Tarifas/Tarifas/Tarifas_casa.asp?Tarifa=DACTAR1C&anio=2013

It is interesting to note that solar water heat is nearly universal in new housing construction in Mexico City; the tariff design clearly encourages that.



http://chromagen.com/files/News/social_housing_032011.pdf

The purpose of showing these international examples is to demonstrate that tiered rate design is accepted around the world as appropriate for residential consumers. While each of these is different, all have as common characteristics an attempt to set a price for incremental usage at a higher price, and have low or zero customer charges.
The countries represented here account for more than half of the world's electrified population. Inclining block rate design is also nearly universal in the Western United States, including regulated utilities in New Mexico, Arizona, Oregon, Washington, Idaho, Utah, Montana, and Colorado. California is often singled out in the US as an outlier in residential rate design, but in fact California is consistent with global norms, and with much of the Western United States.

VII. COMMISSION QUESTIONS FOR RATE DESIGN PROPOSAL

#2. *Explain how your proposed rate design meets each principle and compare the performance of your rate design in meeting each principle to current rate design. Please discuss any cross-subsidies potentially resulting from the proposed rate design, including cross-subsidies due to geographic location (such as among climate zones), income, and load profile. Are any such cross-subsidies appropriate based on policy principles? Where trade-offs were made among the principles, explain how you prioritized the principles.*

Principles For Rate Design

<u>1. Low-income and medical baseline customers should have access to enough electricity to ensure basic needs (such as health and comfort) are met at an affordable cost;</u>

The purpose of the baseline determination is to provide every customer with affordable energy to meet essential needs. While all customers have essential needs, low-income and medical baseline customers have little ability to respond, other than by suffering without energy services, to high prices. For that reason, we do not propose any change in the CARE discount and medical baseline structure.

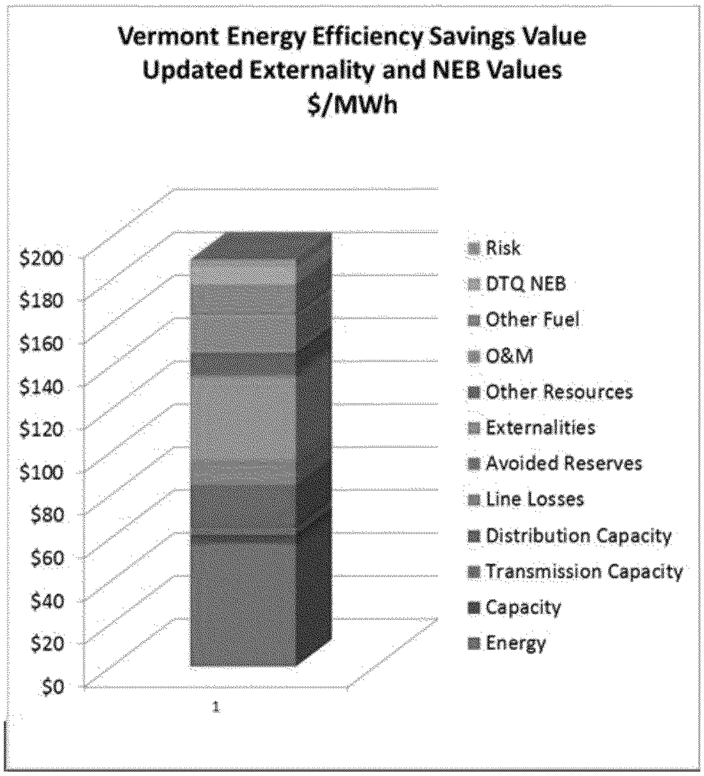
2. Rates should be based on marginal cost;

Rates should be aligned with *long-run* marginal costs, including all externalities to encourage good long-run choices by customers. To date, the CPUC has not included externalities such as health effects of generation, visual pollution of transmission and distribution, and safety impacts of electric service that are borne by the public, emergency service providers, and consumers. When all of these are included in the calculation of long-run marginal cost, we expect that marginal costs are significantly higher than average utility revenue requirements.

Each of the California utilities retains some resources that have costs that are far below long-run marginal cost. This includes generating resources such as PG&E's hydro system, transmission facilities built decades ago at low cost, and distribution facilities that were built decades ago at low cost. Each of these suppresses the utility revenue requirement below long-run marginal cost for building new resources, new transmission lines, and new distribution circuit upgrades. Quite simply, if marginal costs were not above average costs, then rates would be going DOWN over time, not UP.

Adding a customer charge would recover a portion of the revenue requirement in non-volumetric charges, and further suppress the volumetric price below marginal costs.

The graphic below was developed from a decision of the Vermont Public Service Board, in which they identified the avoided cost against which energy efficiency should be measured. Here they included such things as "difficult to quantify non-energy benefits" as well as risk and other factors. The point for showing it is that the true societal marginal cost of energy is significantly higher than just the costs that show up in the utility revenue requirements; we fully understand that the explicit costs identified in Vermont may be different from those applicable in California.



We believe that the rate designs we have proposed will closely approximate long-run marginal cost for discretionary usage. As shown by Vermont's analysis, the marginal value of energy efficiency far exceeds average rate levels under flat rates. In the NRDC proposal, the infra-marginal blocks reflect infra-marginal costs for such resources as legacy hydro and historic transmission and distribution facilities, which constrain the overall utility revenue requirement below replacement costs. The goal should be to align incremental prices for incremental usage with incremental costs, and we believe our proposal does this.

<u>3. Rates should be based on cost-causation principles;</u>

The rates we propose are based on a mix of cost-causation principles. The main focus is on having rates for incremental usage that reflect long-run incremental costs, including risk and externalities. The prices for infra-marginal usage reflect the lower cost of existing limited resources that constrain the utility revenue requirement.

4. Rates should encourage conservation and energy efficiency;

California's energy service procurement "loading order identifies energy efficiency and demand response as the state's preferred means of meeting growing energy needs. After cost-effective efficiency and demand response, we rely on renewable sources of power and distributed generation, such as combined heat and power applications. To the extent efficiency, demand response, renewable resources, and distributed generation are unable to satisfy increasing energy and capacity needs, we support clean and efficient fossil-fired generation. Concurrently, the bulk electricity transmission grid and distribution facility infrastructure must be improved to support growing demand centers and the interconnection of new generation, both on the utility and customer side of the meter."[36]

Volumetric rates, in the form of inclining block rates, produce the most overall reduction in energy usage because incremental usage is the most discretionary. Our proposed rate design has as its foundation a simple concept – the more you use, the more you pay.

Most research on demand response concludes that dynamic pricing structures lead to load shifts in electricity consumption to off-peak, but do not lead to overall reductions. For example, in the Connecticut Light and Power pricing pilot, which tested TOU rates, Peak-Time Rebates, and Critical Peak Pricing rates, only the PTR was found to produce any net total energy savings at all, and the CPP pilot was found to actually increase overall residential energy usage.[37]

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[36] "Energy Action Plan II: Implementation Roadmap for Energy Policies." September 21, 2005, p. 2; and codified by P.U. Code 454.5(b)(9)(A) and (C).

[37] Connecticut Light & Power. Results of CL&P Plan-It Wise Energy Pilot. Available at http://www.cl-p.com/downloads/Plan-it%20Wise%20Pilot%20Results.pdf?id=4294986558&dl=t

RESULTS OF CL&P PLAN-IT WISE ENERGY PILOT

Customers	Period	TOU High Diff.	TOU With Tech	PTR High Diff.	PTR With Tech	CPP High Diff.	CPP With Tech
Residential (Rate 1 & 5)	Peak Load Reduction	-3.1%		-10.9%	-17.8%	-16.1%	-23.3%
	Monthly consumption change	-0.1%		-0.2%		+0.2%	
C&I (Rate 30 & 35)	Peak Load Reduction	0%		0%	-4.1%	-2.8%	-7.2%
	Monthly consumption change	0%		0%		0%	

The inclusion of tiers within the large-user TOU rate has the benefit of exposing these customers to TOU prices, but also rewarding them for constraining total usage above the baseline and 200% of baseline levels.

We do not include a customer charge since the more costs in the volumetric rates, the larger the incentive to conserve or invest in energy efficiency. In addition, fixed charges would require higher incentives for energy efficiency because it would lengthen the payback period.

It is useful to see the difference that would be required in utility funding for conservation programs if a customer charge is included. For a utility with an average revenue requirement of $0.15/kWh, and average use per customer of 500 kWh/month, introduction of a $25 customer charge would result in a reduction of the retail per-kWh price from $.15 to $.15 ($25 customer charge divided by 500 kWh = $.05/kWh recovered in the customer charge. The table below shows how this would affect the utility's funding requirements in order to attract customer participation by providing a two-year customer payback for conservation investments. In this illustrative example, a 50 percent increase would be required in utility conservation funding if a large customer charge were imposed, simply to retain consumer participation rates.

Impact On Conservation Funding Requirement of a $25 Customer Charge

Assuming a 2-Year Payback Is Required To Achieve Customer Participation

		Without Customer Charge		With Customer Charge
Volumetric Rate / kWh		$0.15		$0.10
Program Cost:		$ 100,000,000		$ 100,000,000
Annual Savings (kWh)		200,000,000		200,000,000
Customer Savings @ $.15/kWh		$ 30,000,000		$ 20,000,000
2-Year Savings		$ 60,000,000		$ 40,000,000
Utility Funding Required To Achieve 2-Year Payback		$ 40,000,000		$ 60,000,000

<u>5. Rates should encourage reduction of both coincident and non-coincident peak demand;</u>

Our small customer rate encourages conservation of energy at all hours through a three-tier rate design. Reduction of customer non-coincident demands will occur as total consumption is constrained; this provides marginal cost savings throughout the distribution system. Because higher levels of usage are primarily associated with air conditioning and other peak-oriented loads, this rate design will encourage reduction of coincident peak demand in the most effective manner possible and without imposing an unnecessarily complicated design on smaller customers. For example, the cost-effectiveness of a high-efficiency air conditioner is greatly enhanced with inclining block rates, and our proposal would retain that incentive for consumers to choose an option that saves energy and reduces peak demand.

Our large user rate, with both tiers and TOU features, will go further in achieving reduction of coincident peak demand. The TOU features will cause large customers – those who most likely have air conditioning, swimming pools, hot tubs, and other large electric loads to attempt to schedule those loads to take advantage of the TOU rate design. BUT, our retention of the three-block inclining rate design will simultaneously encourage these customers to invest in energy efficiency and conservation, so that they do not choose inefficient storage technologies that waste large amounts of energy in order to take advantage of the TOU rate. For example, the round-trip efficiency of batteries is only about 70 -80 percent, meaning that if a customer responds to a TOU price by storing energy in a battery, up to 30 percent of the energy will be lost. A TOU price without tiers could inadvertently encourage such an inefficient option.[38]

Utilities like SCE and SMUD have operated air conditioner interruption programs for many years, without any need for TOU rates or smart grid systems. We believe that these types of programs can continue to provide excellent peak load reduction opportunities with the rate design we have proposed for small customers who have loads that can respond to peak demands.

Evidence shows that including technology to automate customer response to time-varying prices greatly increases participation and response. The graphic below[39] shows how much peak demand curtailment has been enhanced by technology automation of responses; this suggests that implementation of TOU rates should be combined with offering of technology enhancements to automate customer response to those rates.

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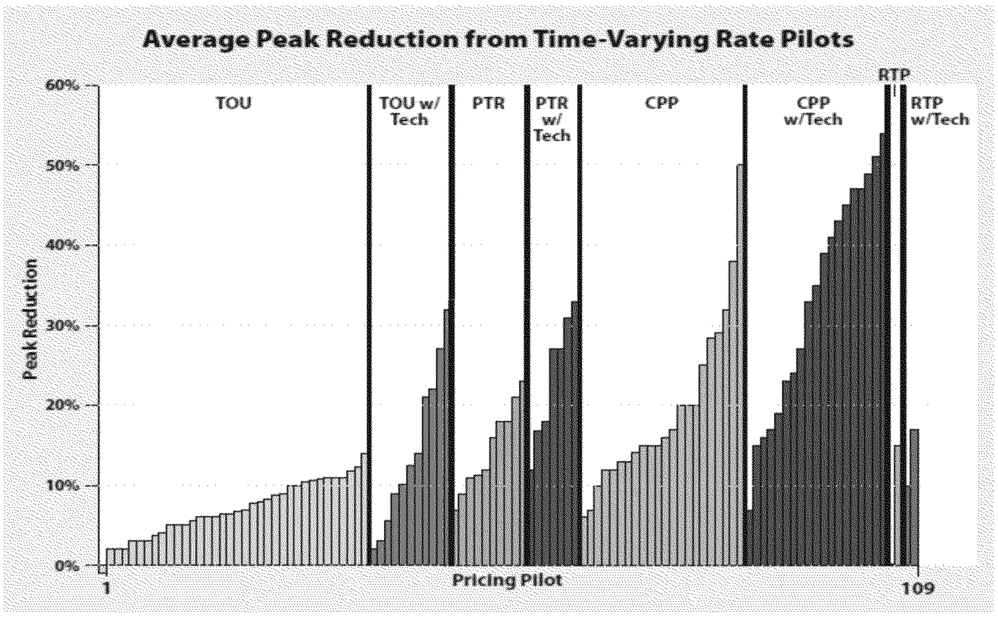
[38] "Grid Energy Storage Systems." Hawaii Renewable Energy Development Venture Technical Assessment. at p. 11-13. http://www.hawaiirenewable.com/wp-content/uploads/2009/12/16.-Energy-Storage.pdf

[39] Aruqui, Ahmad; Hledik, Ryan; and Palmer, Jennifer. "Time Varying and Dynamic Pricing,." The Regulatory Assistance Project. July 2012.



<u>6. Rates should be stable and understandable and provide customer choice;</u>

We specifically designed our rate designs to be stable, understandable and provide customer choice. First, our proposed gradual transition from a four-block to three-block rate design was done to ensure that abrupt changes to customer bills do not occur. In essence, the four-block rate would remain for seven years, but each year the differences in the rate blocks, both in size and price, would converge on the three-block design. The existing inclining block rate design has had good customer acceptance, and we believe that is in part because it is understandable. Similarly, our transition for large users for whom the TOU rate becomes the "standard" rate, protects these customers from significant bill increases during a phase-in period, and allows them to opt off of the TOU rate if they choose.

We provide for customer choice by allowing "large" customers to opt onto the "small customer" rate, and "small" customers to opt onto the large customer TOU rate design. This is not unlike the current situation, where consumers are placed onto the existing rate design, but may choose a TOU rate. Both PG&E and SCE have offered optional TOU rates to residential consumers for many years. Our proposal leaves these options in place for all customers, but tailors the standard design to the demand size of the customer.

We also leave open the option for a critical peak rate to be made available to customers who opt for such a rate, but do not believe it should be mandatory or default for any customer at this time. The evidence shows that while CPP rates do reduce peak demand, they do not reduce overall energy usage or encourage consumers to invest in energy efficiency as effectively as do inclining block rates. In addition, DRA analysis discussed earlier found that TOU rate design can achieve the same or better benefits as CPP. An USEPA publication[40], which rated different rate designs on their performance at achieving efficiency and achieving peak load reductions, found that inclining block rates have the highest performance at achieving efficiency, and time-varying rates the highest performance on peak loads. NRDC's proposal combines these two concepts.

7. Rates should generally avoid cross-subsidies, unless the cross-subsidies appropriately support explicit state policy goals;

There are several "cross-subsidies" built into the current rates, many of which are based on conscious policy choices that California has made, largely at the legislative level. These choices reflect the importance the state has placed on universal service, energy efficiency and conservation, greenhouse gas reduction and other issues.

It is a general premise in electric utility regulation that all customers in a given class pay the same rates. One effect of this is that old customers (served by depreciated assets) subsidize new customers. Another is that customers served by overhead facilities (with lower cost but lower reliability) subsidize customers served by underground facilities. A third is that urban customers (with high customer density per circuit-mile) subsidize suburban and rural customers. All of these subsidies are nearly universal[41] in the industry.

[40] National Action Plan for Energy Efficiency (2009). "Customer Incentives for Energy Efficiency Through Electric and Natural Gas Rate Design." Prepared by William Prindle, ICF International.. www.epa.gov/eeactionplan

[41] A few utilities do apply higher rates to customers with underground service, and a few apply higher rates to customers outside of incorporated city limits, but these are very much the exception. On the California IOU systems, even those customers are extremely isolated parts of the grid pay "system" rates. For example, SCE serves Catalina Island with diesel-generated electricity, with a fuel cost alone exceeding $.20/kWh, but those customers pay the same rates as customers in the urbanized service territory.

Our rate design proposal continues to support universal service, energy efficiency, conservation and greenhouse gas reductions in a simplified and more cost-based way than the current rate design, but we are not aware of any new categories of cross-subsidies that it would provide. Our TOU rate design for large customers would provide powerful new motivations for customers to install thermal storage and schedule their discretionary loads.

8. Incentives should be explicit and transparent;

Our proposal contains few "incentives" other than a sensible, cost-based rate design. We do propose bill simplification, so that consumers can better understand their bills. By consolidating the myriad of surcharges, taxes, and adjustments on bills, and showing customers exactly how much they can save by using less, and how much more they will pay if they use more, we are giving them essential information they need to make informed decisions.

The absence of a customer charge and presence of an inclining block rate design creates an incentive for each dwelling to be separately metered and served. Without inclining block rates and with a high customer charge, the result could be incentives for informal master metering, which is not in the public interest, as it disguises the consequences of individual actions from the consumers taking those actions.

The incentive to constrain usage is an obvious result of a rate design with inclining blocks. We have carried that into the TOU rate design, in order to ensure that even these large-demand consumers have an incentive to use electricity efficiently.

9. Rates should encourage economically efficient decision-making;

Tiered rates can be cost-based and high fixed charges are not (See discussion in Sections V. and VI.). Tiered, or inclining block, rates are efficient in that they convey the price signal of "the more you use, the more you pay" which reflects the generally higher cost with increasing incremental consumption. As we have noted throughout this proposal, however, rates will not address most of the barriers currently standing in the way of investment in energy efficiency, conservation and distributed generation – programs and policies are necessary to complement and reinforce these price signals.

In order to encourage economically efficient decision-making in customers, the rate design must be kept simple so consumers can understand it (See IV. A. – Section on proposal illustration). It is also important to print the consolidated rate design right on the bill, including all adjustments, taxes, surcharges, and surcredits rolled up into a simplified kWh charge so customers can respond rationally to the total rate, and not have to sift through complex and archane tariff elements (See IV. C. 1. – Section on bill simplification). Our rate design proposal keeps simplicity as a constant, adding complexity only where it serves an important purpose in guiding efficient decisions.

10. Transitions to new rate structures should emphasize customer education and outreach that enhances customer understanding and acceptance of new rates, and minimizes and appropriately considers the bill impacts associated with such transitions.

We have proposed a seven-year phase-in of our change in rate blocking, to allow time for customers to learn and understand the changes, and make plans to adapt their consumption to the new framework. The seven year phase-in is designed to make the bill impacts very gradual since our proposal simply moves one-seventh of the way each year towards raising the second block to a block ratio of 1.5, and one-seventh of the way each year towards consolidating the third and fourth blocks into a single block at a block ratio of 2.0. That approach could be used with a more rapid transition (e.g., one-fourth of the way in each of four years), but the customer impacts might be significantly greater on some consumers.

A key element of this design is avoiding imposition of a customer charge, particularly on small users and multi-family consumers for whom distribution costs are minimal, and whose usage is unlikely to change in a manner that would drive any change in distribution system design or construction. These are the customers who could be severely affected by a change in rate design that included a substantial fixed distribution charge – based on AVERAGE distribution costs driven up by large users.

#3. *How would your proposed rate design affect the value of net energy metered facilities for participants and non-participants compared to current rates?*

We expect that our proposal would cause the vast majority of net energy metered consumers to be served on the large user TOU rate. First, most of them are larger customers who would be assigned this design as their standard rate. Second, most will likely prefer this rate form as it will give them fair recognition for the value of energy they supply to the grid during daytime hours.

We do expect, over time, that the existing TOU periods will change as more and more solar generation is integrated to the system. The current peak period of noon to 6 PM may be shifted to something in the 4 – 8 PM time period, when solar production is low, but air conditioning demand is high The California Independent System Operator has presented analysis showing that they expect the "residual system peak" to be served with utility resources to shift quite dramatically over the next seven years, and therefore we believe it appropriate to leave open to each utility in general rate cases to propose appropriate changes in the specific hours to which different TOU rates apply, within the construct of a three-period TOU rate design with a summer on-peak period, plus year-round mid-peak and off-peak periods.

Not included in our proposed rate design is a concept for future consideration called a bi-directional local distribution rate (See Section VI F. for detailed discussion), which is specifically designed to ensure that both participants and non-participants derive benefits from the provision of local generation. The generation owner is paid based on the value of power delivered to the local distribution system, inclusive of values for production, bulk transmission, and network distribution, but must pay a small volumetric charge, contributing to the cost of their use of the local piece of the distribution system, which makes all customers better off.

Under the concept we have presented, because NEM customers are paying for *local* distribution service on a volumetric basis for the power they deliver to the grid which must be re-delivered to other customers, the total billing determinants used to compute the local distribution rate are increased. Given an unchanged or lower local distribution cost, this means that all customers (with or without NEM) will benefit by having a lower local distribution rate. In addition, they may also benefit if the addition of NEM generation results in a deferral of newer, higher-cost generation on the system. So, NEM customers will benefit from having access to a market for excess power at a price very close to the retail rate, and non-NEM customers will benefit.

#4. *How would your proposed rate design structure meet basic electricity needs of low-income customers and customers with medical needs?*

We do not consider this rulemaking to be an appropriate venue for making changes to the legislatively mandated CARE program. That is an issue of social welfare, not of energy pricing theory. Our intent in this proposal is to avoid economic harm to vulnerable subgroups of residential billpayers, including, but not limited to low income households and special medical need customers. Within the context of this proposal, CARE customers would receive discounts as needed from the usage blocks (smaller consumers) or TOU rates (larger customers) so that as a group they are not paying a different contribution to the cost of service than at present. In addition, any low income or medical needs customer put into the large customer category would receive assistance from the utility to determine of the alternative rate structure would better fit their needs. As stated earlier, we would support Commission evaluation of whether changes to the structure of CARE could increase affordability at the same or lower cost to billpayers.

#5. *What unintended consequences may arise as a result of your proposed rate structure and how could the risk of those unintended consequences be minimized?*

We would anticipate a small flurry of self-selection between optional rate forms initially. California customers can already choose between a default rate design and alternative TOU and CPP rate designs. By placing larger customers onto a TOU rate design that they have not already selected, it is likely that some number will opt back onto the non-TOU rate design. The revenue impact of this, positive or negative, will be picked up in a true-up adjustment.

#6. *For your proposed rate structure, what types of innovative technologies and services are available that can help customers reduce consumption or shift consumption to a lower cost time period? What are the costs and benefits of these technologies and services?*

We propose that the Commission require that the utilities, in their education efforts throughout any transition, be required to provide information about and connection to the energy efficiency and demand response tools available to help them respond to these new price signals in a one stop shop format.

One of the many technologies that they should be connected with is home energy management systems that enable consumers to take advantage of TOU pricing, including simple programmable thermostats to more sophisticated systems.

#7. *Describe how you would transition to this rate structure in a manner that promotes customer acceptance, including plans for outreach and education. Should customers be able to opt to another rate design other than the optimal rate design you propose? If so, briefly describe the other rate or rates that should be available. Discuss whether the other rate(s) would enable customers opting out to benefit from a cross-subsidy they would not enjoy under the optimal rate.*

It is critically important to the effectiveness of any new rate that there is a clear and ordered transition and that the utility educates their customers not only about the changes to their rates and options, but how to minimize their bills under the new rate structure.

We address both issues in detail in Section IV. C. Customer Education and Transition. Any transition will also be much more effective and accepted if at the same time, the utilities provide information and links to an integrated set of energy efficiency and demand response solutions. As data collection from smart meters continues, the utility should inform all customers as to whether an alternative rate design would save them money.

#8. *Are there any legal barriers that would hinder the implementation of your proposed rate design? If there are legal barriers, provide specific suggested edits to the pertinent sections of the Public Utilities Code. If there are legal barriers, describe how the transition to your proposed rate design would work in light of the need to obtain legislative or other regulatory changes and upcoming general rate cases.*

Our proposed rate design is completely consistent and supports California's energy policy as articulated in the State's Energy Action Plan[42], originally adopted in 2003 by the Commission, the California Energy Commission, and the California Power Authority, and its related statutes that support it. It also maintains the baseline quantity, differential considerations in use by climatic zone and season, and allowances for special needs customers in the design for both the larger and smaller customers, and is therefore consistent with Public Utilities Code 739. Because we propose to adapt CARE unchanged to our proposed rate design, Public Utilities Code 739.1 need not change to accommodate it. Public Utilities Code 739.7 requires retention of an "appropriate inverted rate structure." Both our small and large residential customer rate design proposals maintain an inverted rate structure.

P.U. Code 745 lays out the terms that the Commission and utilities must follow when employing time-variant pricing, which is defined as including time of use rates. It does not require that this pricing method is employed, but sets out specific terms for how it can be employed. Our rate design proposal for larger residential customers is a TOU rate with

[42] See i.e., "Energy Action Plan." May 8, 2003, p. 4; "Energy Action Plan II: Implementation Roadmap for Energy Policies." September 21, 2005, p. 2; and "Energy Action Plan: 2008 Update." February, 2008, p. 1; and codified by P.U. Code 454.5(b)(9)(A) and (C).

simplified tiers. While it is proposed as a standard rate, it is not mandatory and allows customers to opt out to the alternative rate. Our design also provides four years of bill protection, which is more generous than the one minimum in the statute. We propose no changes to the statutes discussed above.

The only statute that we are aware could potentially require any modification to implement our proposed rate design is P.U. Code 739.9. While we did not perform a precise calculation, we propose transitioning the small customers to three tiers from the current four over the course of seven years. No change in the statute should be required to accommodate changes to the first tier. It is possible that a modification would be needed to allow the price for the usage now billed in the second block, 101% - 130% of baseline, to be gradually raised to the level proposed, a block ratio of 1.5 :1.0, and change the second tier to a baseline range of 101% - 200%. However, since we do not know precisely the magnitude of any possible changes necessary to accommodate our proposed design, we have not proposed any specific line edits to the statute.

#9. *How would your proposed rate design adapt over time to changing load shapes, changing marginal electricity costs, and to changing customer response?*

The hours defined as "on-peak" and "mid-peak" would likely need to change over time, particularly as increased solar and wind penetration occurs. SDG&E has done some forecasting, and expects their peak demand to be met by utility resources to shift dramatically into the late afternoon and early evening hours by 2020. These sharp ramp rates may imply a need to include energy storage, particularly thermal storage of air conditioning, into these systems and perhaps into state energy codes in the future. We do not propose specific time periods, and believe that they should change over time. There is a large benefit to having that change be predictable and gradual, so consumers can adapt their appliance mix and energy management technology and practices.

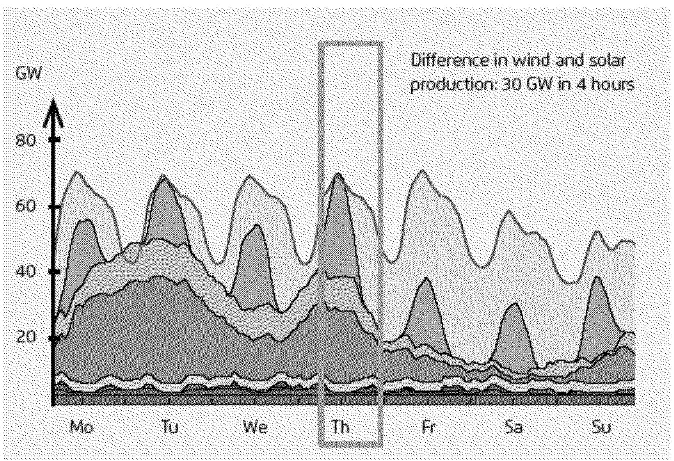
We do, however, propose specific block ratios for both the inclining block rate design and the TOU rate design, of 1.0, 1.5, and 2.0; we believe that increments of this size are necessary to get consumers focused on the differences. This means that the hours assigned to each time period may need to be carefully selected so that these TOU period ratios remain relevant, and those hours may shift over time as the systems evolve into a more heavily renewable environment.

It is likely over time that as customers self-select to the most economical rate design for their usage that the revenues received will decline very slightly. This will lead to a need for unit price adjustments, but we anticipate these will be very minor compared to unit price adjustments that occur due to resource retirement and development over the same period. Between general rate cases, these revenue variations will be managed through the decoupling adjustments, and in general rate cases, assigned to time periods and rate blocks as part of overall cost allocation.

Experience in Germany is an indicator of what we may be seeing in California in the future. The graphic below shows how rapidly the non-renewable system must ramp at certain times. This suggests that bringing additional loads (in particular, water heating and space conditioning loads) under demand response programs may be very important.

Need for Rapid Ramping In Germany With High Wind/PV Saturation[43]

(PV in Yellow; Wind in Blue)



However, the principal finding in Germany is that "grids are cheaper than storage." It may be that increased intertie capacity may be important for California as the mix of resources changes. This is well beyond the scope of this proceeding, but may inform the

[43] "12 Insights on Germany's Energiewende: A Discussion Paper Exploring Key Challenges For The Power Sector." Agora Energiewende. February 2013.

process of setting TOU time bins in the future.

#10. *How would your proposed rate design structure impact the safety of electric patrons, employees, and the public?*

We anticipate no safety impacts from our proposal on employees or the public. Our proposed design would not negatively impact the utilities' revenue requirement or ability to collect it, an thus would not negatively impact its investment in safety. We do recognize the risk to certain households with high usage (thus placed on the TOU tariff) with high daytime consumption may face sharp bill increases, which may create budget issues indirectly affecting health and safety. We address this in part by establishing bill limiters in the early years of TOU service, and by offering the customers the option to switch to the tiered rate at any time. The long-term solution to these problems is first to help them with their high consumption (efficiency, renewable, and fuel switching programs) and then to ensure they are served on the most economical tariff.

Dated: May 29, 2013

Respectfully submitted,

Sheryl Carter

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