SMUD Rate Design Refinement Proposal

Shared Principles and Objectives

The draft rate design proposal presented here reflects SMUD's principles of cost recovery, economic efficiency, customer equity, rate simplicity, and minimal cost (including environmental costs) to customers. Compared with the current System Infrastructure Fixed Charge, it should perform better in achieving SMUD's objectives of reflecting the cost of energy used, reducing energy use during on-peak periods, encouraging energy efficiency and conservation, and equitably allocating costs. What follows is a review of the NRDC proposal itself, including some alternatives for further analysis, with special attention in the final section to issues posed by electric vehicle ownership. We look forward to further discussion with the SMUD staff, board and other interested parties.

Summary of Residential Rate Refinement Proposal

As a refinement to SMUD's current residential rate redesign, the improvements below will allow SMUD to continue to be a leader on clean energy projects while maintaining its financial health. These changes would be revenue neutral.

1. Reduce the System Infrastructure Fixed Charge ("fixed charge") from the proposed $20 per month to no more than $10 per month.
2. Convert the resulting fixed charge into a minimum bill requirement.
3. Institute a variable demand charge that recovers an average of at least $10 per month from customers.

SMUD is now raising its residential monthly fixed charge in stages, with a target of $20 per month by 2017. NRDC's rate design refinement proposal would still allow SMUD to recover, on average, $20 per month per customer by 2017. However, this refinement would provide better incentives for customers to adopt clean energy technologies.

Cap the Fixed Charge at no more than $10 per Month

The monthly fixed charge should be reduced to actual costs of distribution that do not vary with consumption, which we estimate to be no more than $10 per month. In accordance with SMUD's rate design principles, the monthly fixed charge should be set to reflect only fixed costs that are actually fixed and do not vary with consumption even in the long run (e.g., costs of billing and meter reading).

Convert the Fixed Charge to a Minimum Bill

What is now a $10 fixed charge should be converted into a monthly "minimum bill" requirement. A $10 minimum bill is achieved by assuming a fixed charge of $0 when setting volumetric rates. After calculating a customer's total monthly bill based on those volumetric rates, SMUD would charge the customer the greater of that total bill or $10.

From a revenue perspective, this minimum bill requirement is effectively the same as a fixed charge, because it ensures a minimum amount of monthly revenue from each residential customer. However, from customers' perspective, it comes with a significant benefit: it preserves incentives to save energy and invest in clean distributed energy and energy efficiency. Whereas a fixed charge reduces volumetric rates, by removing ten dollars before determining the volumetric rates needed to recover system costs, a monthly minimum bill keeps the volumetric rates at the appropriate level to recover those costs—it does not reduce rewards to a customer who saves energy, as long as that customer's use exceeds a minimum threshold.

A monthly minimum bill is compatible with both tiered and time-of-use volumetric rates, and would not alter the trajectory of the current SMUD rate redesign process

Institute a Variable Demand Charge

SMUD's is phasing in a $20 fixed charge to recover, in addition to the fixed costs described above, residential customers' share of distribution grid costs. However, a 3 kW home places different demands on the distribution infrastructure than a 10 kW home. Charging all customers the same amount to recover long-run variable costs does not align with SMUD's principles of economic efficiency and customer equity. Instead, recouping grid costs through a variable demand charge better achieves SMUD's goals.

A variable demand charge would be designed to recover the same revenue as the grid portion of the $20 fixed charge (at least $10), but would vary depending on the customer's usage of the distribution grid. We recommend basing demand charges either on maximum monthly demand, or an average of customers' highest monthly demands. SMUD could restrict this charge to maximum demand(s) that occur during peak hours, and could cap the bill impact associated with a demand charge. These options are described below:

1) Maximum Demand Charge

The simplest version of a variable demand charge is based on the customer's highest level of demand at any time during a month. The benefits of a pure maximum demand charge are that it incentivizes conservation and energy efficiency efforts, incentivizes electric vehicle charging during off-peak hours, and provides a way to collect revenues from customers based on their proportional use of the grid. In the electric vehicle scenario, a customer achieves the lowest demand charge by charging the vehicle off-peak, when household demand is low; conversely, charging on-peak would create the highest demand charge possible. A downside is that customers who make an aberrant large demand during one afternoon in the month, but otherwise conserve or shift load significantly to off-peak hours, will not be credited for those efforts in the demand charge itself. For an electric vehicle customer, a single charging event outside off-peak hours would significantly increase the monthly bill.

2) Average Maximum Demand Charge

A variant on the maximum demand charge is to charge based not on the customer's absolute highest level of demand in the month, but rather, an average of several meter readings. This average could be taken from the four highest hourly demand levels in that month. The main benefit of an average maximum demand charge is that customers with one aberrant day of high demand will not get a monthly demand charge based solely on that one day. In addition, since isolated instances of peak demand are less likely to result in long-term cost impacts to the distribution system than more sustained and regular patterns, an average maximum demand charge could more accurately reflect and recover actual costs to the system. The main downside is that this alteration adds complexity.

3) Restriction to On-Peak Hours

SMUD could restrict the designation of either a Maximum Demand Charge or an Average Maximum Demand Charge to demand that coincides with peak hours. The particular amount that a customer pays would depend on that peak period meter reading, after applying the same formula as in (1) or (2). The peak demand could be defined as system peak, as local neighborhood distribution peak, or as a time period, such as 4pm through 7pm.

The main benefit of using a peak demand metric is that the demand charge is more closely aligned with stress on the grid and further encourages sustained load-shifting to off-peak hours. The main drawbacks are that it creates complexity and uncertainty over when the peak demand will be (which can be countered by using the set 4pm-7pm time period), and that it does not ensure equitable contributions from customers whose principal demand occurs off-peak (e.g., a fully net-metered customer with a large home and hot tub might record no on-peak demand, and pay no demand charge).

4) Capping the Variable Demand Charge

In order to prevent excessive disparities in demand charges among customers and to prevent single instances of peak demand from resulting in seemingly punitive bills, SMUD may wish to consider a cap on the monthly demand charge. Such a cap could provide electric vehicle customers with greater certainty that they would achieve the significant savings relative to gasoline necessary to justify the incremental

acquisition cost associated with electric drive technology. This cap works with all of the types of variable demand charges identified above. Revenue not recovered from customers whose bills exceed the cap could be recovered from the body of customers, perhaps with periodic true ups to ensure revenue certainty.

Regardless of which type of variable demand charge is selected, compared with a fixed charge, it will enhance customers' incentives to reduce their impact on the grid. It also will provide a more equitable means for customers to pay their fair share for grid use. In the context of distributed generation, a variable demand charge provides an incentive to size the PV system appropriately; with electric vehicles, it can help ensure that customers pay their fair share of distribution grid use and charge off peak. With all customers, it promotes energy efficiency, conservation, and demand response.

Small Commercial Rate Refinement Proposal

In order to preserve incentives to reduce energy consumption, we propose similarly converting the monthly small commercial customer fixed charge of $20 into a $10 minimum bill (at most), and instituting a variable demand charge that recovers the remainder of this revenue requirement.

Electric Vehicle Considerations

NRDC shares SMUD's interest in ensuring its continued leadership in the plug-in electric vehicle market. Customers should have options to meet their transportation needs in a manner that maximizes savings relative to petroleum fuels and minimizes electrical grid stresses. The bill impact associated with the proposed variable demand charge could vary greatly depending on the options described above, as well as the precise $/kW amounts in question, vehicle choice, and charging behavior. Accordingly, NRDC urges SMUD to analyze how the options described above would affect EV customers' fuel savings relative to petroleum fuels, and how they compare with the current phase-in of a $20 fixed charge. Examples include:

1. The bill impact of a "Maximum Demand Charge" associated with a single instance of on-peak charging, at various levels of non-EV peak demand and various levels of EV charging available in the market (e.g., 1.2kW, 3.3kW, 6.6kW, 10kW, and 20kW).
2. The bill impact of an "Average Maximum Demand Charge," at various frequencies of peak demand (i.e., an average of four highest demand days per month, an average of the six highest demand days per month, etc.), at various levels of EV charging currently available in the market.
3. The impact of the restriction of maximum or average maximum demand designation to peak hours on these results.
4. The bill impact associated with a demand charge cap set at various amounts, at various levels of EV charging available in the market.

All of these bill impact estimates should be compared to the current fixed charge regime in terms of projected fuel savings relative to gasoline for electric vehicle operators. Under each scenario, how much can customers who normally charge during off-peak hours save by displacing petroleum fuels? This is important to maintaining the fundamental economics of vehicle electrification, in which incremental technology acquisition costs are offset by lower operating costs.