MARKET

Market and Retail-rate Knowhow for the Energy Transition

Deliberate Design: Creating Electricity Rates with Purpose

January 2025

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ACKNOWLEDGEMENTS

The authors would like to thank participants in a workshop that established the framework for this report: Paul Spitsen (U.S. Department of Energy), Andy Satchwell and Jason Ball (Berkeley Lab), Elaine Hale and Christina Simeone (NREL), and Sylvia Tang (The Brattle Group). Additionally, we are grateful to the following reviewers of this report: Mark LeBel (Regulatory Assistance Project), Rob Margolis (NREL), Andy Satchwell (Berkeley Lab), and Rodney Sobin (NASEO).

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DELIBERATE DESIGN: CREATING ELECTRICITY RATES WITH PURPOSE

This document accompanies a web tool developed by The Brattle Group and Berkeley Lab to assist regulators, utilities, and industry stakeholders in navigating the opportunities to better achieve policy outcomes with more deliberate retail electricity rate designs. This document and the web tool contain the same information. We encourage the reader to visit the website for a more dynamic and interactive format: **https://www.brattle.com/deliberate-design/**

Introduction

Today's electricity rates often are legacy designs that do not reflect the dynamics of an evolving power grid or align with current policy objectives. Four steps will assist utilities, regulators, and industry stakeholders in modernizing outdated electricity rate designs.

1. **Understand the context for rate design change:** The electricity system is changing at a pace that the industry has not experienced for decades. It is essential to understand the implications of these changes so rates can evolve to remain consistent with changes to state policy objectives, the underlying cost profile, customer preferences, and power system requirements.
2. **Establish ratemaking objectives:** Rates can do more than recover utility costs. They can be a tool for achieving desired outcomes such as improved energy affordability, flexible and efficient electricity consumption, or promoting technology adoption. First, these objectives must be clearly defined and prioritized.
3. **Account for tradeoffs when designing new rates:** Rate design is the art of balancing tradeoffs. It is essential to understand these tradeoffs when designing new rates, particularly if the rates are being used as a tool for achieving desired outcomes that extend beyond the basic goal of cost reflectivity.
4. **Transition to the new rates with a plan:** The move to well-designed rates requires a transition plan. This will ensure that rate design changes do not happen in isolation and are consistent with a long-term, holistic vision.

While the content presented here is broadly applicable to all rate classes, examples heavily rely on the residential class due to recent regulatory emphasis on residential rate reform.

Step #1: Understand the context for rate design change

The following are evolutions of the electricity system that could drive the need for rate design change. Decision-makers will need to assess the timing and extent of these changes in their jurisdiction.

Electric Vehicle Adoption

- Power system impact: EV charging can create large, geographically concentrated spikes in electricity demand. This peak demand increase could range from a few kilowatts per customer for residential charging to several megawatts per site for high-speed fleet charging, contributing to the need for increased system capacity at all points in the power generation and delivery chain and, as a result, higher capacity-related costs.
- Primary implications for rate design: Rates can provide price signals that encourage shifting of EV charging load to times when the power system is less constrained and the need for additional system investment can be mitigated.

Development of Large New Loads

- Power system impact: In many utility jurisdictions, requests to connect large new loads such as data centers and advanced manufacturing exceed the available generation and transmission capacity, which can lead to both accelerated utility investment in new infrastructure and delays in connecting the new load. Further, many of these customers have strong corporate decarbonization goals and are seeking to supply their load from sources of clean energy, which may cost more than other available resource options.
- Primary implications for rate design: A point of emphasis in rate design for large customers may be to ensure that the significant costs of serving these customers are not shifted to other customer classes. Rates can be designed to incentivize customers to reduce the incremental capacity additions needed on the grid and increase the speed of interconnection by providing their own capacity in the form of on-site generation, reduced impact on system peak demand (e.g., through demand response or energy efficiency), or contracts for power generation that can count toward satisfying the utility's resource adequacy requirement. Rates also can be designed with the flexibility to accommodate the unique clean energy needs of these customers.

Building Electrification

- Power system impact: In many jurisdictions, building electrification focuses primarily on converting the source of space and water heating from fossil fuels (e.g., natural gas, oil) to electricity (e.g., heat pumps). In regions that are currently summer peaking, significant levels of building electrification may result in a switch to a dual- or winter-peaking system. In winter peaking regions, there could be a significant increase in the need for bulk system or distribution system capacity in the winter, thus driving an increase in capacity-related costs.
- Primary implications for rate design: Customer adoption of electric space and water heating will depend in part on the cost advantages of doing so with electricity relative to other sources. Therefore, an important consideration for rate design will be the extent to which rates reflect the cost of using electricity for that purpose, particularly on a seasonal basis.

Growing Dependence on Wind and Solar Generation

- Power system impact: Wind and solar generation are non-dispatchable, meaning that, on their own, they cannot be "shaped" to match load. Further, wind and solar output is variable. As a result, investment in additional flexible resources will be needed as a complement to wind and solar additions to address gaps between supply and demand. Additionally, wind and solar are capital-intensive assets with low variable costs. Further, transmission system costs may increase in order to connect remotely located renewable generation to the grid, and to improve power system flexibility through increased resource diversity.
- Primary implications for rate design: Rates will need to reflect that a growing share of generation has high capital costs and low variable costs. Additionally, the possibility of curtailment during times of over-supply introduces the possibility that the energy portion of electricity rates could be low or negative at those times. Further, it will be important to consider that renewables-related transmission system expansion is not driven by peak demand; while transmission costs historically have been recovered through charges related to peak demand, the drivers of transmission capacity costs are increasingly diverse.

Growing Dependence on Grid-scale Energy Storage

- Power system impact: Recent technology cost declines and the need to supplement variable wind and solar generation have led to a significant increase in energy storage deployment, particularly batteries. Batteries will generate during times when load significantly exceeds supply from renewables and charge during times when supply from renewables is sufficient or even exceeds load, in addition to providing real-time grid balancing services.

- Primary implications for rate design: Given that rapidly growing deployments of grid-scale energy storage can quickly change the load shape and cost profile of a given utility system, an important consideration for rate design will be how frequently and substantively rates can be modified or updated to remain reflective of system conditions.

Growing Trend Toward Customers Generating and Exporting Electricity

- Power system impact: Customers with on-site generation (e.g., rooftop solar, backup diesel generators) and batteries can serve their own load and also export energy to the power grid. This can displace electricity supplied from utility-scale generators, and reduce the losses associated with distributing electricity to customers from remotely located generators. However, distribution system upgrades and advancements in distribution system visibility and operations may be needed to accommodate two-way flows of electricity.
- Primary implications for rate design: Retail rates will determine the price at which output from customer-sited generation is compensated. Important considerations in this regard typically focus on the time-varying nature of the value of that generation, and the degree to which it decreases or increases distribution system costs. Rate design for distributed generation often must address the tradeoff between cost-reflective pricing and consistency with policy goals to promote customer adoption of clean energy resources.

Improved Connectivity of Appliances and Higher Levels of Controllable Loads

- Power system impact: Controllable end-users (e.g., smart thermostats, grid-interactive water heaters) enable flexible energy consumption. By managing the electricity consumed by individual end-uses, customers can shift load from higher-cost hours to lower-cost hours and provide a range of grid benefits. Those grid benefits could include avoided or deferred capacity investment, reduced energy costs, and avoided renewables curtailments, among others.
- Primary implications for rate design: Time-varying rates are one option for incentivizing demand flexibility. Studies have shown that customers respond to time-varying price signals, and automating technology boosts this response. An important consideration is the degree of price granularity to provide to customers (i.e., the tradeoff between simplicity or highly cost-reflective prices designed to fully enable demand flexibility).

Rising Costs of Serving Load

- Power system impact: Inflation, supply chain shortages, and an aging power grid all have contributed to a rising cost of serving load in many utility jurisdictions. The per-unit cost of electricity has grown in part due to these factors.
- Primary implications for rate design: Rates typically are set to recover embedded (i.e., historical) costs. However, in an environment of rising costs, the cost of serving new load could be higher than those embedded costs. Rates that consider the difference between marginal and embedded costs when establishing prices can provide economically efficient, forward-looking price signals to customers without over- or under-recovering total costs. The use of rate design to address energy affordability concerns is another important consideration in this regard.

More Frequent/Extreme Weather Events

- Power system impact: Extreme weather – such as wildfires, winter storms, or summer heat waves, which can cause prolonged outages – can significantly increase utility costs due to measures that must be taken to mitigate those risks. Such measures could include higher insurance costs, new investments in grid hardening, or increased reliability standards.
- Primary implications for rate design: A primary consideration for rate design is whether the extreme weather risk mitigation costs should be recovered through rates or funded through other means. If recovered through rates, an important decision is how to design the charge without incentivizing uneconomic energy consumption behavior.

Step #2: Establish ratemaking objectives

The following are examples of objectives that decision-makers may have for new rate designs. While rate design improvements can simultaneously address multiple objectives, tradeoffs will be necessary. Clear definition and prioritization of the objectives is critical to providing meaningful direction to any changes in rate design.

Revenue sufficiency

The ratemaking objective of revenue sufficiency means that rates are designed to recover the authorized revenues of the utility with some degree of certainty. However, technology adoption, weather, customer behavior, costs, and other factors are not perfectly predictable. This leads to uncertainty in load forecasts and can increase the risk of the under- or over-recovering costs when rates are not perfectly cost-reflective.

Cost-reflectivity

The ratemaking objective of cost reflectivity means aligning rates with the underlying profile of costs to serve customers (e.g., temporal variation and differences between peak-related and energy-related costs). Doing so can promote fairness by ensuring that customers pay for the costs that they impose on the system, and promote economic efficiency by exposing customers to an accurate price that will inform their electricity consumption decisions. However, taken to the extreme, a highly cost-reflective rate would introduce a significant amount of complexity that may be difficult for customers to understand and respond to.

Bill stability

Bill stability provides predictability to customers and allows them to manage budgets accordingly, and it also benefits utilities by providing. Bill stability also benefits utilities by providing consistent revenues and managing customer service costs through reduced customer confusion or high bill complaints. However, providing bill stability may require a tradeoff in reflecting the actual temporal variation in costs that occurs when serving load.

Equity

The principle of equity in the context of rate design means that there should not be unintentional subsidies between various customer types. In other words, customers will pay for electricity in proportion to their use of the power system while minimizing arbitrariness in the way they are charged. Given significant variation in the cost of serving a heterogenous customer base and practical constraints on the number of rates that rate classes that can be implemented, achieving equity in rate design can require tradeoffs with the objective of simplicity. In some cases, the term equity is used to include considerations for affordability among low-income or disadvantaged communities. We address the issue of affordability separately.

Energy Affordability

To improve energy affordability for target customer segments, rates may be designed to limit bill increases – or to reduce bills – for those segments (such as low-income or disadvantaged communities). This objective has become increasingly relevant in an environment of rising energy costs due to inflation, supply chain shortages, load growth, decarbonization constraints, and other factors. Important considerations include the extent to which bills can or should be increased for other customers to support this objective, and whether affordability should be promoted through the rate design itself or through other interventions (e.g., bill discounts).

Simplicity

The ratemaking objective of simplicity means designing rates that are easy for customers to understand. A benefit of a simple and understandable electricity rate is that it is actionable – it can elicit a response from customers. Simple rate designs may limit the granularity of the price signal to which a customer is exposed, or limit the number of charges on a customer's bill. An important tradeoff with simplicity is that, by limiting the complexity of a rate design, it limits the precision with which costs can be reflected to customers.

Promote Electrification

Reducing the use of fossil fuels in buildings and transportation through electrification has become a cornerstone of decarbonization plans in many jurisdictions. Rate design can promote this policy objective by ensuring that customers with electric appliances or electric vehicles (EVs) are not being charged more than the cost of serving that load. An important tradeoff to consider is that reducing energy rates to encourage electrification will reduce the incentive for customers to adopt other decarbonization measures, such as on-site generation or energy efficiency.

Promote Energy Efficiency and DER Adoption

Many state energy policies include a distinct focus on promoting the adoption of energy efficiency and/or rooftop solar. Rate design can promote energy efficiency and distributed energy resource (DER) adoption through rates that rely primarily on energy charges, and which recognize the extent to which these technologies reduce home energy use during the times of day when the cost of supplying electricity from the grid is high. In contrast, higher energy charges will reduce the incentive for customers to adopt electrification measures. Another important consideration is the tradeoff between offering universally applicable rates versus technology-specific rates.

Encourage Demand Flexibility

Rates that reflect the time-varying nature of electricity costs can promote demand flexibility, which is recognized as a cost-effective tool with significant potential to facilitate the energy transition. For example, grid-interactive efficient buildings can respond to signals to provide significant benefits to the power system. An important consideration is whether those benefits will be achieved through rate design or through incentive-based programs with automated control of end uses.

Improve System Reliability

The objective of improved system reliability refers to ensuring that there is sufficient generation available to serve periods of very high electricity demand or insufficient supply. Rate design can primarily address system reliability by encouraging peak demand reductions. It is important to distinguish this objective from resiliency, which refers to the ability of a distribution system to quickly recover from outages; there is not a clear role for rate design in addressing that objective.

Step #3: Account for tradeoffs when designing new rates

The following are rate design elements that could be used to achieve desired ratemaking objectives. For each, we indicate the extent to which the rate design element is applicable to achieving the stated objective on a scale of low-medium-high, and provide discussion of the tradeoffs when using the rate design element for that purpose.

It is important to note that these ratings reflect Brattle/LBNL perspectives given our rate design experience in various jurisdictions, assisting both utilities and regulators. Perspectives of the user of this tool may differ, and we encourage the user to go through this exercise after reviewing the content for each objective.

While most of the discussion in this report is applicable to rates for all customer classes, the discussion in this section mostly uses residential customers to illustrate the tradeoffs and rankings. This is due to a significant recent regulatory emphasis on residential rate reform.

Overview of the Rate Design Elements

Fixed Charge

A fixed charge does not vary with a customer's usage or demand. The most common type of fixed charge is a customer charge, which is the same charge per customer, per month. A variation on the fixed charge is subscription pricing, in which a portion or the entirety of a customer's bill is fixed (but the fixed bill amount is customer-specific). At the other end of the spectrum, a minimum bill would apply only if the customer's bill drops below a pre-defined threshold in a given billing cycle. Some recent proposals have varied the fixed charge based on an estimate of a customer's income or other factors.

Demand Charge

A demand charge is based on the maximum measure of a customer's electricity demand. There are many ways to design a demand charge. Design considerations include the measurement interval (e.g., instantaneous, 15-min, 30-min, or 60-min), peak coincidence (i.e. whether the measurement is taken during a system peak window, or based on each customer's individual maximum demand), and whether it is based on measured demand or a static capacity level.

Energy Charge

An energy charge is based on a customer's energy use over the billing period. Design considerations include whether to vary the price seasonally, the extent of temporal variation (e.g., peak/off-peak, multi-period, hourly, or sub-hourly), and notification of the price signal (static, day-ahead, hour-ahead, or real-time). Energy charges also can vary with usage during the billing period (i.e., a "block rate" in which the price increases or decreases with tiers of increasing usage).

Ratemaking Objectives

This section discusses how each rate design element relates to the ratemaking objective in question and then explores how the design or level of the rate design element can positively or negatively affect the achievement of the specific ratemaking objective. We apply a rating (High/Medium/Low) for each rate design element to highlight how impactful the design element is for meeting the objective in question.

Revenue Sufficiency: The ability of a utility to generate enough revenue cover its total cost of providing service to all of its customers

Fixed Charge (High)

Fixed charges typically improve revenue sufficiency by providing the utility with a greater degree of certainty of revenue sufficiency for cost recovery since the charge does not vary with a customer's usage. Nevertheless, most utilities do not set the monthly fixed charges at a level that is implied by the embedded cost-of-service due to historical practices of keeping fixed charges at low levels, mostly due to concerns for low-income customers. A minimum bill, a fixed bill, or subscription pricing are alternatives to monthly fixed (customer) charges, essentially mimicking a single fixed charge for all customer consumption.

While higher fixed charges or fixed bills are favorable for improving revenue sufficiency, they dampen the price signals that incentivize energy efficiency, demand response, and efficient adoption of new technologies. Therefore, it is important to balance the tradeoff between revenue sufficiency and the benefits of being able to rely on price signals to harness energy efficiency, price response, and load flexibility.

Demand Charge (Medium)

For most vertically-integrated utilities, electricity demand-induced costs account for a large portion of the total cost to serve customers and may vary between 40% to 80% of the total revenue requirement. These costs scale with the maximum demand customers place on the system peak, and affect the sizing of the infrastructure to deliver reliable service. In a typical cost-of-service exercise, such costs are allocated to customer classes based on some measure of coincident or non-coincident peak demand. The introduction of a demand charge, which is a charge levied on the single greatest observed demand, will ensure greater revenue certainty because customer's maximum demand is generally more stable even if their overall usage decreases substantially.

In most existing residential rate designs today, these costs are recovered through an energy charge. Therefore, when customers alter their total usage, it has a disproportionate impact on recovery of demand-related costs. Many large commercial and industrial customer rates involve demand charges. In fact, sophisticated energy managers, like those for large industrial customers, respond to demand charges by managing their demand. In response, utilities have used elements like demand ratchets to ensure a greater degree of revenue certainty. While this approach leads to a better outcome for revenue sufficiency, it reduces the incentive for customers to curtail their demand and slow the pace of future capacity upgrades.

Energy Charge (Low)

For decades, utilities have relied on a two-part rate for residential and small commercial customers comprised of a small fixed charge and a higher energy charge, the latter of which accounts for an overwhelming portion of cost recovery. While this approach historically worked well for utilities due to sustained periods of increasing electricity consumption, the same approach is starting to hinder revenue sufficiency as customers reduce their volumetric electricity consumption and contribute less to the recovery of customer and demand-related costs of the grid. When customers reduce their overall usage through the installation of rooftop PV systems or invest in energy efficiency measures, they end up avoiding payments for the fixed costs of the grid. These uncollected revenues may need to be absorbed by the utility unless there is a revenue decoupling mechanism.

While higher energy charges may negatively impact revenue sufficiency, they provide stronger price signals for energy efficiency and load management, especially if they are time-varying.

Cost-Reflectivity: The alignment of rate structures with the underlying cost drivers

Fixed Charge (Medium)

While some utility costs are variable in nature, others are fixed and do not vary with the volume of electricity produced and sold, at least in the short run. There are three categories of utility costs typically observed in embedded cost-of-service studies: customer-related costs, demand-related costs, and energy-related costs. Customer-related costs vary by the number of customers and do not vary with the volume of electricity produced and sold. While the definition of customer-related costs varies by utility, customer-related costs most commonly include meters, billing, and service drop and line transformers line transformers; some utilities also classify portions of underground and overground lines as customer-related.

Regardless of the classification, a purely cost-reflective rate design would collect all of the customer-related charges through a fixed charge (or a monthly customer charge) since these costs do not vary with the level of electricity consumed. Setting a fixed charge to recover most, if not all, of the customer-related costs ensures that the costs that do not vary with the volume of electricity produced are not shifted to energy charges for collection, thereby inflating the level of energy charges. Artificially inflated energy rates provide price signals higher than the levels that will lead to efficient levels of consumption and adoption of new technologies.

One way to make fixed charges more cost-reflective is to set them based on the size of a customer's panel (this could also be structured as a demand charge, but it will end up being a fixed charge as the size of the panel is fixed). This approach results in a higher fixed charge for customers with higher demands, as the cost to connect them to the grid is higher than that of customers with smaller maximum demands. This approach improves the cost reflectivity of the fixed charge while at the same time improving the equity.

Demand Charge (Medium)

Demand-related costs scale up with the units of demand imposed on the system, and may involve generation, transmission, and distribution-related capacity costs. Introducing a demand charge to recover demand-related costs could improve cost-reflectivity, signaling the cost of generation, transmission, and distribution peak capacity that must be reserved to ensure reliable service to the customer.

A perfectly cost-reflective rate design would essentially have two different demand charges. A "non-coincident peak demand charge" recovers those demand-related costs related to *local* *facility investments* – such as service drops and line transformers – that are driven by customers' maximum usage. A "coincident peak demand charge," on the other hand, recovers demand-related costs driven by customers' maximum demand <u>during</u> the system peak coincident window, such as those for *shared facilities*, e.g., distribution substations. However, due to concerns related to simplicity of the rate designs, typically only one of these two demand charge concepts is included in the rate design, and is used to collect the demand charges regardless of local vs. shared nature of the costs.

While a perfectly cost-reflective rate design would recover the demand-related costs through demand-based rate components, this is not a common practice for residential rate design due to concerns associated with complexity and acceptability of demand charges by smaller customers. Often, demand-related costs are allocated to fixed charges and/or energy charges. If some of the demand-related costs would be allocated to a fixed charge, it may make sense to allocate demand-related costs that are driven by the maximum billing demand (i.e., non-coincident peak). Maximum demand drives the need for infrastructure put in place to connect individual customers, and the cost of this infrastructure is fixed in the short-term even if a customer reduces their maximum demand in a given month. Once a portion of the demand-related costs are allocated to the fixed charge, the residual can be allocated to the energy charges, ideally on a time-varying basis. This way, some of the demand changes that are driven by the coincident peak demand can be allocated to the peak period, and as customers respond to the peak price signals, they can avoid future capacity costs.

Energy Charge (Medium)

The third category of utility costs are energy-related, and they scale with the units of electricity consumed, such as the cost of fuel and wholesale purchased power. A cost-reflective rate design would have an energy charge that only recovers these energy-related costs. However, in reality, most residential energy rates today recover energy-related costs, the majority of demand-related costs, and some customer-related costs and result in inflated energy price signals relative to what they would have been, had they only recovered energy-related costs. This practice results from the long-held status quo in residential rate design that maintains relatively small fixed customer charges, and does not involve demand charges. This heavy reliance on energy charges for cost recovery, and the resulting artificially high energy price signal, can lead to inefficient outcomes such as underinvestment in electrification technologies. Nevertheless, energy charges are an important part of cost-reflective rate designs especially when they take the form of time-varying rates.

Bill Stability: The ability for customers to have predictable bills over time

Fixed Charge (High)

Fixed charges as part of a rate design can be introduced in several different forms such as fixed monthly or daily customer charges, or sometimes as minimum bills. This charge ensures that customers make a contribution to cost recovery regardless of the volume of electricity or gas they consume. Since a portion of the bill remains constant, even if energy usage fluctuates month to month, fixed charges in principle lead to more predictable bills. This is especially beneficial for customers on tight budgets or those trying to avoid significant fluctuations in their monthly expenses.

However, the tradeoff is that higher fixed charges imply a smaller fraction of the bills that can be managed by customers altering their electricity consumption. This is essentially the reason why fixed charges still represent a very small share of the customer bills across many jurisdictions in the US, and that they are typically set at a fraction of the fixed costs implied by cost-of-service studies. While a smaller fixed charge means a larger energy charge, all else equal, and provides stronger signals for energy efficiency, it reduces electrification incentives.

A single fixed charge in tariffs for all customers is sometimes criticized because it may also disproportionately impact low-income customers, who generally use less energy but still pay the same fixed amount as higher-usage customers. California recently moved to an "income graduated fixed charge" approach that sets the fixed charge at lower levels for low-income customers.

Demand Charge (Medium)

In general, demand charges do not improve bill stability in the same way as fixed charges, and may contribute to increased bill volatility. The degree of potential variability changes based on the type of demand charges. Non-coincident peak demand charges are set based on customers' maximum usage in a given month, and may lead to the greatest variability. Coincident peak demand charges are set at customers' maximum usage during a shorter peak window every day, and gives customers more control over managing this demand, leading to potentially less variability. Ratchet-demand charges lead to the highest bill stability at the expense of reducing customers' opportunities to lower their demand charges during other months of the year.

Energy Charge (Low)

Energy charges in the rate design typically do not improve bill stability. A higher share of the revenues collected through variable charges imply that energy charges will be higher, and customers' monthly bills can vary substantially month-to-month if their energy consumption also varies substantially month-to-month. To the extent that energy charges are time varying, that price volatility could contribute to greater bill fluctuations. However, having a larger share of the bill driven by the energy charges (as opposed to fixed charges) also means that customers have more control over their bills by closely monitoring their consumption patterns.

Equity: The recovery of costs from customers in a just manner

Fixed Charge (High)

Fixed charges can improve the fairness and equity of electricity rate designs by ensuring that all customers contribute to the fixed costs of the infrastructure for delivering electricity. Fixed charges can allow utilities to recover these costs more equitably, ensuring that all customers contribute toward maintaining the grid, even those who use very little electricity.

When fixed charges are disproportionately smaller compared to the levels implied by cost-of-service, the recovery of these costs is shifted to the energy charges and that customers' contribution to the recovery of these costs change as a function of their total electricity consumption. This implies that higher usage customers contribute more to the recovery of these fixed grid costs and lower usage customers contribute less. This becomes particularly problematic for equity and fairness since higher-income customers are more likely to take advantage of energy efficiency improvements and install rooftop solar PV, reducing their overall consumption significantly and shifting their share of the fixed costs to lower-income customers.

However, high fixed charges may disproportionately and negatively impact low-usage, low-income customers by increasing their overall bill, especially if the fixed charge is a significant portion of the total bill. Very high fixed charges may also reduce the incentive to lower electricity consumption through energy efficiency since part of the bill becomes unavoidable regardless of usage.

Demand Charge (Medium)

Demand charges can improve the fairness and equity of electricity rate designs by aligning customers' costs more accurately with their grid impact and reducing the subsidization of high-demand customers by lower-demand users. The distribution system must be designed to meet customers' maximum demand, not just their average demand or overall consumption. More specifically, locational facilities such as service lines and line transformers must be designed to meet customers' maximum demand at any time, while shared facilities such as distribution substations are designed to meet customers' demand coincident with the system peak and/or local substation peaks. Demand charges ensure that customers who put more demand on local and/or shared facilities pay more given the additional infrastructure and capacity required to serve them.

In the absence of demand charges, energy charges typically collect demand-related costs, and customers with high peak demands but lower usage are subsidized by those with lower demand and more overall usage. This creates a fairness/equity issue, especially when those high peak demand/low usage customers are higher-income customers who can lower their usage with distributed generation.

On the other hand, some small businesses or households may struggle to manage their demand effectively due to limited resources or knowledge. If their demand during a pre-determined peak window is high but their overall consumption is low, demand charges could disproportionately impact their electricity bills. This issue can be mitigated by educating customers on ways to manage demand in their businesses or premises such as staggering the use of different end uses.

Energy Charge (Medium)

When rates are cost-reflective, fixed, demand, and energy charges are aligned with the underlying cost to serve customers, and low usage and high usage customers pay their energy charges in proportion to their consumption levels. Similarly, if energy charges are time-varying in that the peak prices are higher, reflecting the higher-cost of generation, customers with heavy peak usage pay more than customers with relatively flat usage. This improves the fairness and equity relative to most *status quo* time-invariant energy rates in which peaky customers are subsidized by the flat usage customers.

Conversely, in a situation where energy charges also recover costs related to customer and demand-related costs, thereby inflated above the cost-reflective levels, high-usage customers may pay more than they would under a three-part cost reflective rate. Similarly, when customers reduce their usage but not necessarily their demand, as likely in the case with distributed generation customers, they end up bypassing some of the demand-related costs that were intended to be recovered through the energy charges. This leads to an inequitable outcome.

This implies that the design of the energy charge is essential for determining its impact for fairness and equity.

Energy Affordability: The aspects of the rate structure that ensure bills remain affordable for all customers

Fixed Charge (High)

The ability of fixed charges to improve energy affordability for vulnerable customer segments is highly contingent on how they are designed and the usage characteristics of low-income customers. Fixed charges, as they are largely designed today for residential customers, are too low compared to the levels supported by cost-of-service studies. As a result, the residual costs are recovered through a higher energy price signal. If low-income customers have lower usage, then they benefit from this status quo implementation. However, low-income customers are not always low-usage customers (e.g., due to residing in older homes with poor insulation), in which case lower fixed charges and higher energy rates would negatively impact affordability for these customers.

On the other hand, a rate design that relies solely on a fixed monthly charge may give greater predictability to vulnerable customers but may go against equity principles because not all customers impose the same fixed connection costs on the grid. Such a proposal will need to be accompanied by some differentiation in cost responsibility that different groups of customers impose. A novel example of differentiation in fixed charges is the recent adoption in California of an income-graduated fixed monthly charge. Per this proposal, high energy-burden customers that qualify for income-based assistance programs will pay a lower fixed charge while all other customers that do not rely on assistance programs will pay higher fixed charges.

Demand Charge (Low)

The impact of demand charges on affordability may not be as easy to assess as those of fixed or energy charges. However, demand charges can help address affordability concerns because they can further equitable outcomes for customers. While there has been commentary on the disproportional impact of demand charges on low-income customers, these concerns mainly pertain to the use of a non-coincident peak demand charge, which is assessed on a customer's maximum usage during any time of the day.

A demand charge, when designed to be cost-reflective, will recover higher-costs from customers with peaky demand during system peak hours and lower-costs from customers with flatter load profiles. It is crucial that utilities design such demand charges after closely studying the underlying costs to serve customers – a utility that incurs a significant portion of costs to serve customers during peak periods will exacerbate affordability concerns if the demand charge is entirely assessed on non-coincident peak demand.

Demand charges are also perceived to be more difficult for customers to understand than a fixed or energy rate. Therefore, in order to deploy demand charges as a tool to further energy affordability, it is also important for utilities to invest in customer education so that vulnerable customers can learn ways to manage their demand over the course of a day, and based on the design of the demand charge.

Energy Charge (Medium)

The long-held status quo of two-part rates in which most utility costs are recovered through a flat energy charge is partly responsible for the energy affordability concerns that utilities are contending with today. Under this structure, every customer pays the same rate for all their usage – it implicitly indicates that all utility costs are driven almost wholly by total usage, which is incorrect. Such a rate structure unfairly penalizes customers who may have flatter load profiles – or in other words, less peaky consumption – as they subsidize customers with relatively higher peak demand. This problem is further exacerbated today with the increasing adoption of DERs, where customers with solar PV avoid energy charges, resulting in the net metering cross-subsidy. To make up for these lost revenues, utilities then have to raise rates, which again unfairly places the burden of cost recovery on vulnerable customers who do not have the means to adopt such technologies.

If energy affordability is the goal, efficient rate design dictates that the status-quo rate be updated to reflect the costs incurred by the utility to serve customers especially in periods where the utility is constrained for capacity. In this regard, time-varying rates, while being cost-reflective, can also help address affordability concerns. By providing lower price signals during periods when electric service is cheaper, customers can shift load to realize lower bills. In addition to improving affordability outcomes, these rates can provide system-wide benefits. However, similar to demand charges, customer education on time-varying rates is paramount. Without proper knowledge of rate structures or the best ways to go about shifting load, low-income customers may actually be saddled with significantly higher bills under time-varying rates.

Simplicity: The elements of the rate structure that make the rate easy to understand or actionable

Fixed Charge (High)

Fixed charges represent a fixed amount each customer pays every month to receive service from their electric utility. As such, it is an extremely simple rate structure for customers to understand because the charges are perfectly predictable. Fixed charges – as part of rates offered in many jurisdictions – do not reflect the full customer-related costs implied by cost-of-service studies, and proposals to adjust fixed charges can be contentious in state ratemaking proceedings. Therefore, today, the simplicity of the fixed charge is restricted to a small part of customers' rates.

Taken to the extreme, a rate design that only has a fixed component to it, such as a fixed-bill or subscription-based rate design, offers customers the simplest rate structure – no matter how much they consume, their bills will be fixed on a monthly basis. While this may help customers understand their rates better, such rate design may contradict other objectives that a utility may have as customers would no longer have an incentive to adjust their usage.

Demand Charge (Low)

While demand charges send more cost-reflective price signals to customers as they seek to recover demand-related costs, they tend to be perceived as more complex and difficult to understand for residential customers. Given this observation, it is not surprising that the instances of demand charges for residential customers are more limited (compared to commercial and large industrial customers). While most utilities support the use of demand charges, they have received pushback from consumer advocacy groups in part due to concerns that they are difficult to understand. An effective education strategy for customers is to explain which devices drive demand so that customers can stagger the use of those devices in order to moderate demand and reduce their bills.

Energy Charge (Medium)

Rate designs with a flat energy rate represent the simplest form of an energy charge, because customers know that regardless of the total usage or when they consume power, they will pay the same energy rate for each unit of consumption. Variations of energy charges, such as block rates (inclining or declining), reflect slightly more complex rate designs relative to the flat rate structure. Under block rates, customers need to be cognizant of a usage threshold over which rates may either increase or decrease. Although they are relatively more difficult to understand, they still send a simple price signal that within a given block, all usage is valued at the same energy rate.

While rates based largely on flat energy prices are a simple structure for customers to understand, they can compete with other utility objectives. For example, a flat energy rate is not reflective of the time-varying nature of costs. Time-varying rates such as time-of-use (TOU), critical peak pricing (CPP), and peak time rebates (PTR) provide a more efficient price signal to customers while retaining a usage-based structure to rate design. Although implementation of such rates require utilities to invest more in customer education, there is overwhelming evidence that customers do respond to time-varying rates.

Promote Electrification: The impact of rate design in enabling and accelerating decarbonization efforts through electrification

Fixed Charge (High)

Higher fixed charges typically improve the economics of conversion from fossil fuels to electricity for space and water heating as well as adoption of electric vehicles. When higher fixed charges recover all of the customer-related costs, along with some or all of the demand-related costs, the energy charges tend to be lower. Since adoption of heat pumps for space and water heating and EVs will significantly increase the level of total electricity consumption for customers switching from fossil fuel-based heating, lower energy rates will lead to lower electricity bill increases and may even lead to overall reductions in total energy bills.

However, higher fixed charges also reduce bill saving opportunities for lower-income customers, and lead to reduced incentives for energy efficiency, creating tradeoffs among electrification aspirations, energy efficiency goals and affordability objectives. California recently adopted the "income graduated fixed charge" concept to advance state's electrification goals without burdening lower-income customers with higher fixed charges.

Demand Charge (Medium)

Demand charges function similarly to fixed charges in terms of improving the economics of fossil fuel to electricity conversions by reducing the level of energy charges. When there is a demand charge in the rate design, most or all of the demand-related costs are recovered through the demand charge, and these costs are not shifted to the energy charges for cost recovery. As we established above, since the overall electricity usage increases materially after electrification, lower energy charges are helpful for mitigating large bill increases. Moreover, heat pumps typically operate with high load factors which is beneficial for rate designs involving demand charges. Demand charges may not be favorable for EV economics, unless EV charging is managed to avoid charging during a peak window where coincident peak demand is determined.

Demand charges are not very common in residential electricity rate design today due to concerns associated with residential customers' capacity to manage their demand. However, several utilities are starting to offer optional rates with demand charges for customers who would like to electrify their space heating and moderate their electricity bill increases.

Energy Charge (High)

Energy charges are still ubiquitous in electricity rate designs, and easy to understand for the customers. The level of energy charges is one of the most influential factors that can drive or hinder electrification. When customers switch from heating with fossil fuels to electricity, their electricity consumption will increase materially even with the improved efficiency from heat pumps. This implies that their electricity bills will go up, and the extent of the increase will be driven by the level of energy charges. Customers will only be motivated to adopt building electrification measures if the decrease in their gas bills is greater than the increase in their electricity bills; that is if they achieve net savings in their total energy bills. Therefore, rate design is very influential in accelerating or slowing down the pace of building electrification. Energy charges, when they are seasonally differentiated for summer peaking systems and lead to lower energy charges in the winter, may also be beneficial for customers with heat pumps, especially if the overall levels of energy charges are consistent with the underlying costs.

Similarly, energy charges can help promote EV adoption if they are time-varying. When the energy rates are higher during peak and lower during off-peak periods, EV owners can program their charging to take place during off-peak (and super off-peak periods in most EV-focused rate designs) and achieve lower bills compared to a time-invariant rate design. These lower bills improve the economics of owning EVs relative to internal combustion engine (ICE) vehicles and promote the adoption of EVs. However, if energy rates are higher than the marginal costs by a large margin, and recovering some of the fixed and demand-related costs in addition to the energy-related costs, then they will lead to large increases in electricity bills with the adoption of the EVs. This expected outcome will likely deter adoption of EVs for some customers.

When considering the level of energy charges, an important tradeoff is the incentives for energy efficiency and adoption of distributed solar. This tradeoff often becomes contentious when jurisdictions try to reconcile their electrification and energy efficiency goals. However, at least for the building electrification, the tradeoff may not be too stark, because switching heating from inefficient furnaces and inefficient resistant electric heating to efficient heat pumps reduces the total energy need to achieve the same heating output.

Promote Energy Efficiency and DER Adoption: The impact of rate design in enabling and accelerating energy efficiency and DER adoption

Fixed Charge (Low)

Under a cost-reflective rate design, fixed charges recover all of the customer related costs incurred to provide electricity for the customers. Higher fixed charges imply a greater portion of the bill, which cannot be avoided by customers through the installation of energy efficiency measures or rooftop solar, and therefore may negatively impact investments in technologies reducing the level of energy consumed. On the other hand, higher fixed charges imply lower energy charges, all else equal, and will be beneficial for technologies that increase the volume of electricity consumed, such as electric vehicles and heat pumps.

While the level and presence of fixed charges affect the adoption incentives of different technologies differently, higher fixed charges in electricity rates are often seen as harmful for smaller customers, which are more likely to be lower-income customers. California's income-graduated fixed charge concept was developed to address this issue, charging low-income customers a smaller fixed charge compared to the higher-income customers, while lowering energy rates for all customers to advance electrification.

Demand Charge (Medium)

Demand charges affect the adoption incentives of various technologies differently. The introduction of demand charges into a rate design, which consist of a fixed charge and energy charge, will likely lower the level of energy charges. Lower energy charges reduce incentives for the adoption of energy efficiency and distributed solar, as the avoidable portion of the bill becomes smaller.

Energy Charge (High)

Customers contemplating solar PV and energy efficiency investments will benefit from higher energy charges, as this will lead to larger bill savings and reduce their expected payback period for the investments. Time-varying energy charges such as TOU rates typically increase solar PV customers' bills, especially if the peak periods are later in the day, when solar production is substantially lower.

Since the level and type of energy rates affect the adoption of different technologies differently, setting them as close as possible to the cost-reflective levels prevents giving one technology an advantage at the expense of another. As a general principle, these tradeoffs should be evaluated carefully, and also within the context of broader state and public policy goals.

Encourage Demand Flexibility: Reducing peak demand or shifting load from one time period to another

Fixed Charge (Low)

Fixed charges typically do not encourage price-response-driven demand response because they reduce the "avoidable" part of the electricity bill that can include demand charges or time-varying peak and off-peak prices. This in turn reduces potential bill savings and undermines customer incentives to participate in load management programs that involve price signals. While it is important to provide customers with meaningful price signals, it is also important not to distort the price signals by recovering too little or too much through the fixed charges and stay as close as possible to the cost-reflective levels.

For demand response programs that include direct load controls or other forms of automated dispatch signals, fixed charges do not materially affect the incentives for participation in these programs. Participation rebates and customer experience and convenience attributes of these programs play a large role in encouraging demand response through these programs.

Demand Charge (Medium)

Demand charges can promote demand response depending on the design of the demand charge. Non-coincident demand charges are typically determined based on the customer's maximum demand in a given month. Even if customers respond to the level of this demand charge, there is no guarantee that this demand reduction is beneficial for the system as it may not coincide with the system or distribution peak periods. Coincident peak demand charges are, however, determined based on a customer's maximum demand during a peak window, which often coincides with the system peak window. In this case, when the customer responds to the level of coincident demand charge, and reduces their demand, this demand reduction is beneficial for the system.

However, the addition of a demand charge to a rate design with time varying rates will reduce the level of time-varying rates, and thereby reduce incentives to respond to peak and off-peak prices if the portion of the bill recovered through these rates becomes relatively small.

Energy Charge (High)

Energy charges have significant potential to promote demand response when they take the form of time-varying rates. Alternative rate designs such as time-of-use rates, CPP, and real-time prices all reflect the cost of producing (and sometimes delivering) electricity at different levels, and provide different levels of incentives for price-driven demand response. It is possible to increase the demand response impact by increasing the peak to off-peak price differentials on a TOU rate, or making the "event day" peak prices substantially higher than those on other days on a CPP rate. However, if these higher prices are not consistent with the underlying system costs and overstate the price signals for demand response, they may create other inefficiencies such as under-consumption during peak periods, lowering customer utility, or overinvestment in technologies and program that may help reduce peak impacts at the expense of others.

Improve System Reliability: The ability of the electric power system to provide continuous and uninterrupted power to the end-use customers

Fixed Charge (Low)

Fixed charges perform poorly with regard to improving service reliability because customers have no incentive to alter usage to help alleviate constraints on the grid. A rate structure with just a fixed component may exacerbate reliability needs, especially when utilities are capacity constrained. Relatedly, increasing the level of fixed charges in a two-part or three-part rate means that the residual costs are now recovered through a lower level of energy/demand charges, which in turn provides a lower incentive for customers to respond to capacity constraints on the system.

Efficient rate design means customers receive a price signal for not just how much power they consume, but when they consume it, and fixed charges fail to account for this. This is precisely why innovative rate designs that have a larger fixed price component to them, such as subscription pricing, are now coupled with other demand response elements so that customers have an incentive to help alleviate system reliability concerns.

Demand Charge (Medium)

Demand charges are intended to recover some of the costs that are related to distribution, generation, and transmission capacity. When a demand charge is assessed on customers' maximum demand during a system peak window, it can help address reliability concerns by mitigating the capacity needs. A demand charge that charges customers for their maximum usage during the window when the entire system peaks serves as a stronger price signal that one that values usage during all hours of the day equally. A coincident peak demand charge encourages customers to alter usage during the system peak window, which in turn can alleviate capacity constraints on the utility's system.

A non-coincident peak charge may not have the same effect as that of the coincident peak. However, a portion of the distribution capacity costs are driven by customers' individual non-coincident peak demand. Therefore, a non-coincident peak demand charge may still encourage customers to reduce their maximum consumption and thus, help mitigate growth and overloading on local facilities. It is important that such charges are designed after careful consideration of the utility's underlying costs. Otherwise, demand charges assessed on customers' individual maximum demand may penalize them for consuming power at times that in reality may not drive the utility's cost to provide service. In some cases, utilities may couple a coincident demand charge with an inclining block structure for the billing demand. In this case, the coincident peak demand charge may progressively increase as customers' coincident peak demand increases, thereby providing a stronger peak price signal.

Energy Charge (High)

An energy charge that has a flat rate for all hours of the year or in a season does not help address system reliability concerns. Like issues with the fixed charges, a flat energy rate does not provide a price signal for customers to change their behavior, especially when the entire system is peaking. In other words, a flat rate means that the value obtained from a customer reducing load at 7 p.m. on a summer evening is exactly the same as reducing load at 7 a.m. in the morning.

However, this is just not reflective of modern utility cost-of-service. Energy rates can still be designed so as to help address system reliability concerns by including a time-based component to it, where the energy rates are designed to mimic the underlying utility costs to provide service at different times during the day. Well-designed TOU, CPP, and PTR rates can help achieve this objective. These rates encourage customers to shift their usage to off-peak periods, when the cost to serve is cheaper and thus, may ease reliability constraints during peak periods.

As with the demand charge, it is paramount to design such an energy rate after careful consideration of the utility's costs and load profiles. Time-varying rates should not needlessly penalize customers if the utility does not truly have capacity constraints. For example, a TOU rate during the winter season when a utility has sufficient capacity may not make sense and will unnecessarily result in higher winter bills for customers.

Step #4: Transition to the new rates with a plan

A forward-looking rate modernization plan is analogous to an integrated resource plan or grid modernization plan, but for rate design. It lays out a long-term vision for how rates will evolve in the context of the utility's broader activities and initiatives, and the steps needed to get there. The following are potential elements of a rate modernization plan, though each utility or regulator should develop content that is most relevant to its jurisdiction.

Summary of Current Rates

The rate modernization plan could begin with a summary of the utility's current rate offerings, focusing on the rate design elements. This will serve as the starting point for the remainder of the plan. Given that utility tariffs can be hundreds of pages long, and rate offerings have many nuanced elements, the summary should be kept as simple as is feasible while still capturing the important elements that differentiate the rate offerings. For example, TOU rate design elements that a utility may wish to include in its summary could include the number of pricing periods, the duration of the peak period, the design of the rate in the non-summer period (for summer-peaking utilities), and whether the TOU rate is layered on other rate features.

To the extent that information is available, utilities may also wish to include a discussion of the considerations that led to the current rate offerings. An understanding of the strategic objectives – or lack thereof – that contributed to the current offerings could serve as a useful starting point against which to contrast the new objectives that will drive future rate design changes.

Establish Ratemaking Objectives

The next step is to explicitly identify and prioritize long-term ratemaking objectives. A clear definition of the objectives – and a common understanding of those objectives across the organization – will establish the foundation that will guide the remaining elements of the rate modernization plan. Note that not all of a state's policy objectives can necessarily be addressed through changes in rate design, so an important consideration will be determining the role that rate design can and should play in this broader context. Potential ratemaking objectives and their tradeoffs are addressed in the preceding sections of this web tool.

Gap Analysis

The next step is to determine the extent to which there is a gap between the prioritized ratemaking objectives and the existing rate designs. This gap analysis could consider both whether revisions to the design of the existing rates is needed, and whether entirely new rate offerings are warranted. The gap analysis is an inherently subjective exercise. One method for identifying the gaps could be to conduct a scoring exercise in which relevant internal stakeholders fill out a scorecard based on their perception of the performance of the existing rates relative to the prioritized objectives. Benchmarking the "menu" of existing rate offerings against those of peer utilities can help to identify potential new rate offerings for further consideration.

Long-term Vision for Rate Design Changes

A defined long-term vision for rate design changes ensures that isolated changes in individual rate cases will be consistent and coordinated with the utility's broader prioritized ratemaking objectives. Elements of the long-term vision could include:

1. Identification of: a) revisions for existing rate offerings b) removal of existing rate offerings; and/or c) introduction of new rate offerings; that illustrate an increased ability to achieve these goals
2. Proposal of a realistic timeline for implementing the changes, considering staffing constraints, data availability, and the ratemaking principle of gradualism.

Deployment Method

The plan should indicate the deployment method for each new rate offering. In other words, whether the rate will be offered on a default or opt-in basis. Research has shown that the share of customers remaining on a new rate when deployed on a default basis can be multiples higher than the number of customers that sign up for the same rate when deployed on an opt-in basis.

Customer Engagement and Outreach Plan

Customer engagement and outreach is key to ensuring that the rationale for major rate design changes in the plan is understood by the utility's customer base and has a positive impact. While the approach to engaging customers will be utility-specific, recent LBNL and Brattle research identified common emerging practices in this regard. These include (1) providing customers with multiple notifications before changing the structure of the default rate, (2) using multiple communications channels, (3) providing ongoing support once the rate design transition is complete, (4) providing an online bill calculator/price comparison tool, (5) transitioning customers in waves, (6) offering shadow bills, and (7) targeting initial deployment toward customers who are likely to benefit from the new rate, among other practices.

Adverse Bill Impact Mitigation Plan

If the design of the default rate is being changed, consideration should be given to those customers that are likely to experience significant bill increases. In this case, the first step is to analyze the distribution of customer bill impacts using historical load data. The analysis should be conducted at a minimum for a representative load research sample. Ideally, the data will allow for evaluating the bill impacts of vulnerable customer segments and other specific customer segments that are at risk of a significant bill increase (e.g., customers with electric heat, small customers, low-income customers).

Upon identifying the customers at risk of significant bill increases, the next step is to establish options for mitigating the bill increases. Options include (1) rate design modifications, (2) gradual introduction of the new rate design over a few years, (3) temporary bill protection, (4) outreach and education materials along with opportunities to procure technology that help support ways to mitigate the bill impacts, and (5) separation of changes in the rate design from changes in the rate level.

Technological Needs

The rate modernization plan will need to identify any technological upgrades that are necessary to implement the proposed rate design changes. For example, to cost-effectively offer time-varying rates to the mass market, utilities need to have deployed advanced metering infrastructure (AMI). Often, upgrades to IT systems and billing systems are necessary to implement rates with increasing complexity. In some emerging cases, such as rates for EV charging, utilities may be able to measure usage through customer technology (e.g., the charger) rather than requiring a new meter. A thorough review of the utility's technical capabilities and gaps is necessary to address considerations such as these.

Organizational Plan

A clearly defined organization plan will ensure that the rate design transition has the necessary executive leadership, has established transparent areas of responsibility across the organization, and reduces the risk that decisions are being made in an isolated or uncoordinated fashion.

With the rates/regulatory group in the lead, the organizational plan could include additional roles for corporate strategy, government affairs, corporate communications, IT/billing, legal, finance, customer programs, and customer service, among others.

Partnership Plan

Ultimately, for the rate modernization plan to succeed, it will need support from regulators, policymakers, and stakeholders. The plan can include specific needs for these groups, which could range from data to input at workshops to policy or regulatory changes than enable elements of the plan.

Performance Metrics

The rate modernization plan could include a high-level description of methods that will be used to measure the ongoing success of actions proposed in the plan. For example, if the utility plans to introduce a TOU rate, with an objective of shifting load to off-peak hours, the rate modernization plan could identify the need for an ongoing load impact evaluation of the TOU rate to measure the load shifting effect. Other metrics to consider could include customer satisfaction, rate of uptake of the new rate offerings, or improvements in energy affordability for targeted customer segments, among other options.

Action Thresholds

The rate modernization plan could identify specific developments that would trigger actions in the plan to be taken. For example, consider a utility with growing market penetration of solar generation. As solar output shifts the utility's net load later into the evening, the utility's higher-cost peak period also will shift later in the evening. The utility may wish to define a specific threshold, such as megawatts of solar deployment or timing of the forecasted net peak demand, which would trigger an update to the definition of the pricing periods in the utility's TOU rates.

Description of Interactions with Other Utility Plans

The rate modernization plan can identify interactions of the proposed rate design changes with other utilities' plans and initiatives. This will ensure that the timing of the various initiatives is coordinated and will increase awareness of the rate design plans across the organization. For example, if the rate modernization plan includes the transition of EV customers to TOU rates, the IRP or distribution system plan would need to take into account the associated load impacts and the utility's electrification plans would need to take into account potential impacts on the economics of EV ownership.