



September 25, 2019

FILED

The Honorable Chair and Members of the
Hawai'i Public Utilities Commission
465 South King Street, First Floor
Kekuanaoa Building
Honolulu, Hawai'i 96813

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PUBLIC UTILITIES
COMMISSION

Dear Commissioners:

Subject: Docket No. 2018-0141 – Grid Modernization Strategy Phase 1
Advanced Rate Design Strategy; and Data Access & Privacy Policy

In accordance with Ordering Paragraphs 8 and 9 of Decision and Order No. 36230, filed March 25, 2019 in the subject proceeding (“D&O 36230”), the Hawaiian Electric Companies submit for the Commission’s review and acceptance, their:¹ (1) *Advanced Rate Design Strategy* (see Attachment 1);² and (2) *Data Access and Privacy Policy* (see Attachment 2).

Pursuant to Ordering Paragraph 7 of D&O 36230:

The commission will withhold seven and one half percent (7.5%) of any otherwise allowed MPIR recovery until the Data Access and Privacy Policy is filed and accepted; and an additional seven and one half percent (7.5%) of any MPIR recovery request until the Advanced Rate Design Strategy is filed and accepted.

Accordingly, the Companies respectfully request that the Commission make a determination on its acceptance of these submissions at its earliest convenience.

Attachment 2 contains confidential costing information that has been redacted and is being provided under seal pursuant to Protective Order No. 35591, filed July 20, 2018. Exhibit A provides the basis for the confidential treatment of that information.

Sincerely,

to / Kevin M. Katsura
Director
Regulatory Non-Rate Proceedings

cc: Division of Consumer Advocacy

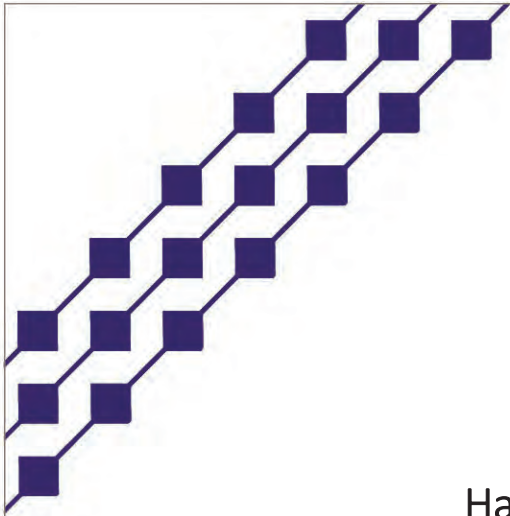
¹ The “Hawaiian Electric Companies” or “Companies” are Hawaiian Electric Company, Inc., Maui Electric Company, Limited and Hawaii Electric Light Company, Inc.

² As directed, the Companies are concurrently filing a copy of the Advanced Rate Design Strategy in Docket No. 2019-0323 (Commission’s Investigation of the Companies’ DER Policies).

This log (1) identifies, in reasonable detail, the information’s source, character, and location; (2) states clearly the basis for the claim of confidentiality; and (3) describes, with particularity, the cognizable harm to the producing party or participant from any misuse or unpermitted disclosure of the information.

Reference	Identification of Item	Basis of Confidentiality	Harm
Attachment 2, Page 3	Confidential vendor pricing.	Confidential commercial, financial and pricing information which falls under the frustration of legitimate government function exception of the Uniform Information Practices Act (“UIPA”). ¹	Public disclosure of the confidential information could place the Company at a competitive disadvantage in future contract negotiations; impact the Company’s bargaining power relative to its vendors; harm the Company’s relationships with existing and/or prospective vendors and customers; discourage vendors from doing business with the Company and making confidential disclosures to the Company in the future; and infringe upon certain privacy and/or proprietary rights of the Company/employees/vendor.

¹ Haw. Rev. Stat. § 92F-13(3).



Hawaiian Electric Company, Inc.,
Maui Electric Company, Limited,
Hawai'i Electric Light Company, Inc.

Advanced Rate Design Strategy

September 25, 2019



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Preface

The Hawaiian Electric Companies respectfully submit this Advanced Rate Design Strategy to comply with Decision and Order No. 36230 issued by the Hawai'i Public Utilities Commission in Docket 2018-0141 and Order No. 36476 issued in Docket 2014-0192, as amended by Order No. 36538 issued in Docket 2019-0323.

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1 Executive Summary

The nature of the electric utility business is evolving rapidly. This transition is particularly pronounced in Hawai'i. The Hawaiian Electric Companies (the Companies) have embarked upon a transformation to become more customer-focused and innovative while striving to achieve ambitious State energy goals. Among other things, the Companies have developed plans to realize 100 percent renewable energy generation by 2045, modernize our electric grids, increase integration of distributed energy resources (DER), and support electrification of transportation (EOT). As a critical component to the Companies' ongoing transition, customer rate designs must also be modernized to further advance and sustain progress. In short, we need 21st-century rate designs that are enabled by a modern grid.

In its Grid Modernization Strategy (GMS) Phase 1 Decision & Order (D&O) No. 36230, the Commission directed the Companies to develop and file an Advanced Rate Design Strategy (ARDS). The Commission provided the following guidance:

The commission expects the Advanced Rate Design Strategy to include at a minimum: (1) a timeline for the Companies to offer updated dynamic rates for all residential and commercial customers (including, the introduction of time-varying rates, critical peak pricing, and real time pricing rate structures); (2) potential rate reform considerations to support low-income customer participation in these offerings; (3) enrollment mechanisms for convenient customer participation in the advanced rate offerings; (4) implementation plans for offering advanced rates, including education and outreach to customers; and (5) evaluation plans for monitoring, verifying, and improving the effectiveness of advanced rate designs. The Advanced Rate Design Strategy should also describe how the advanced rate offerings will complement the Data Access and Privacy Policy discussed above. . . . The commission . . . directs the Companies to summarize [efforts to explore advanced rate designs] in the Advanced Rate Design Strategy, along with best practices developed in other jurisdictions and related industry literature.¹

This document presents the Companies' ARDS. It describes how advanced rate designs will expand customer choice and participation through an evolution in rate design and enable and sustain progress on State energy goals. Although the scope of the ARDS is broad and extends to long-term objectives, this document describes the Companies' strategy for implementation, thereby responding directly to Commission expectations expressed in D&O No. 36230. The Companies have responded to each of these requirements in the following sections for timeline, customer engagement, evaluation, and data and privacy concerns:

- Timeline: Section 4.1
- Low Income Considerations: Section 3.6
- Enrollment Mechanisms and Implementation Plans: Section 4.2

¹ Docket No. 2018-0141, Decision and Order No. 36230, issued on March 25, 2019, (D&O No. 36230), at 52–53 (footnotes omitted).

- Evaluation: Section 4.3
- Data and Privacy: Section 5

Current trends in retail rate design reflect a progression toward more sophisticated rate structures. This is driven, in part, by customer preference for increased choice and control, as well as the ability for granular rate structures to help integrate variable, renewable, and distributed resources, including electric vehicles and customer-sited storage. Advanced rate offerings typically embody more precise cost-based price signals that unbundle discrete attributes (e.g., energy and capacity) and vary price by time period (e.g., time of use). An efficient transition to time-varying rates would decrease the Companies' overall costs and the bills of customers who are able to respond to time-varying pricing, while avoiding adverse billing impacts on customers who cannot participate in DER programs.

Consistent with industry direction overall, the Companies firmly believe there is a need to increase the sophistication of prices, programs, and tariffs for electricity services to empower consumers and place all resources on a level playing field for cost-effective grid planning and operation. Advanced rates should be viewed as a long-term evolution, for which the degree of rate sophistication may increase over time to accommodate changing customer and system needs while taking advantage of technology and business process advancements.

The ARDS was informed by stakeholder engagement as well as experience gained with pilot pricing programs² and developed consistent with industry rate design principles and best practices. Some efforts to implement this strategy can be considered in the near term. Others will need to be developed over time and will benefit from experience gained along the way. The Companies plan to make specific rate design proposals consistent with the ARDS in future filings.

2 Introduction and Background

2.1 Industry Factors Driving the Need for Change

The electricity system upon which we all depend is undergoing a significant transition powered by technological innovation, increased use of DER (on what has traditionally been a centralized power system), and changing customer needs and preferences in an increasingly connected and dynamic marketplace. These factors driving the energy transformation are helping to make the grid more efficient, flexible, resilient, and renewable.

A critical element to this transition is developing rate designs and dynamic customer offerings that enable the equitable allocation of costs; fairly compensate DER for the value provided; and sufficiently recover system costs in proportion to how much electricity customers use and when they use it, to maintain a system that provides safe, reliable, and universal service.

² See Appendix G (TOU-RI Lessons Learned).

States across the country are facing the challenges of adapting commercial and residential rate designs to meet rapidly evolving customer needs. Recent trends have forced utilities, regulators, and other stakeholders across the country to examine customers' evolving needs and how these drivers of change are impacting the electricity system overall. Industry-wide, existing default rates for small commercial and residential customers largely reflect a simple combination of a flat volumetric energy rate and a fixed customer charge. Although this approach has functioned to date, recent trends have demonstrated that these rates are inadequate to meet changing customer preferences and the evolving needs of the modern electric grid.

2.2 A Modern Grid Platform to Enable Advanced Customer Options

For Hawai'i, an advanced, resilient, and modernized grid is foundational to enhancing customer choice and ensuring affordable and reliable electric service, while also transforming the system to achieve a renewable energy future. The new generation of advanced meters to be deployed in Phase 1 of the Grid Modernization Strategy will enable the collection and presentation of interval usage data for both residential and commercial customers.

Advanced rates require certain enabling technologies to be effectively implemented. The deployment of advanced meters, along with the associated communications infrastructure and backend systems, is an integral element and prerequisite to developing more sophisticated rates. The functionality provided by these technologies permits energy interval data, load forecasting, and two-way communication between the utility and end user, which are critical to the development of more advanced rate designs. In addition, access to interval data from advanced meters allows customers to more effectively manage their energy use and respond to price signals.

The rollout of the advanced rates through a series of pilots and phases will complement the ramp up of the enabling technology as filed in the Grid Modernization (Grid Mod) Phase 1 timeline displayed in Figure 1.³

³ Docket No. 2018-0141, *Application of Hawaiian Electric Company, Inc., Hawai'i Electric Light Company, Inc., and Maui Electric Company, Limited, Verification, Exhibits "A"–"L" and Certificate of Service*, filed on June 21, 2018, at 10.

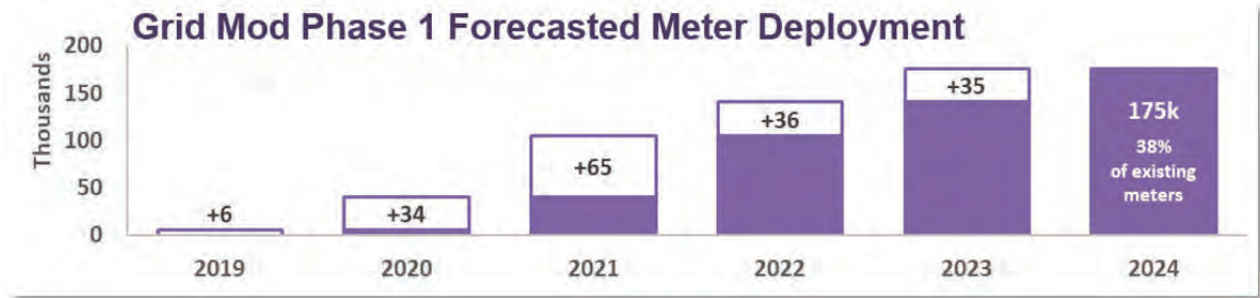


Figure 1: Grid Mod Phase 1 Forecasted Meter Deployment

2.3 Current Trends in Retail Rate Design

The Companies examined industry literature and best practices utilized in other jurisdictions when developing this strategy. A brief summary of these topics can be found in Appendix A (Industry Literature Review) and Appendix B (Jurisdictional Review). In addition, the Companies hosted an Advanced Rate Design Strategy workshop. In that workshop, industry and utility professionals presented rate design best practices and related issues, and stakeholders provided feedback in breakout sessions. See Appendix C (Hawaiian Electric ARDS Stakeholder Workshop) and Appendix F (Presentations from the ARDS Workshop). Some of the key findings and lessons learned are highlighted in this section.

Retail electricity pricing is evolving in the context of a broader shift in how customers pay for grid services and how they are compensated for customer-sited generation. These retail rate reforms are driven by trends in energy technology deployment; policy and legislative directives; and concerns among utilities, regulators, and stakeholders about gaming the benefits of time-differentiated pricing, while maintaining fairness and equity in the overall ratemaking process.

The Companies' review of best practices and industry literature surfaced current retail rate design trends among residential and commercial customer classes as discussed in Appendix A (Industry Literature Review), Appendix B (Jurisdictional Review), and Appendix F (Presentations from the ARDS Workshop). Highlights from this review of these rate design trends include the following:

- Increased pursuit of time-based rates that are more reflective of when the power system is both long and short of energy
- Development of rates and programs to promote “beneficial electrification” and support load shifting that encourages moving load from the evening peak period into the midday period
- Development of new DER programs to more equitably compensate customer-sited generation
- Development of new electric vehicle (EV)-specific rates
- Increased application of residential and small commercial multi-part time-variant rates reflecting both fixed and variable costs

These trends all involve some incremental evolution from current rate structures in terms of increased attribute unbundling, increased temporal granularity, and in some cases, increased locational granularity. The movement toward increased sophistication across these three spectra is discussed further in Section 3.3 (Building Blocks for Advanced Rate Design).

2.4 Stakeholder and Customer Engagement

An important step in developing an effective advanced rate design strategy is to seek and incorporate ideas, needs, and feedback from customers, regulators, the Consumer Advocate, the DER industry, academics, government entities, and other stakeholders.

Stakeholder and customer feedback were gathered through several avenues, including an Advanced Rate Design workshop (and subsequent stakeholder survey), residential and small-to-midsize commercial customer survey, and additional stakeholder meetings. The feedback helped inform the vision and principles of the ARDS.

2.4.1 Advanced Rate Design Workshop and Subsequent Survey

On July 15, 2019, the Companies held a workshop and invited seven experts in rate design to discuss their views and best practices with local stakeholders. The Companies solicited feedback from workshop invitees through breakout sessions and a post-workshop survey.

A few key takeaways from the seven presentations include the following:

- Speakers had a similar goal of a multi-part, time-varied, efficient rate design, but differed on the paths to get there.
- Rate design isn't the entire solution—it is one tool in the toolbox.
- Rate change takes time. Regulatory flexibility helps quicken iterative rate design.
- Customer engagement is critical to rate design rollout success.

Common themes from the workshop breakout sessions and subsequent survey included fairness, alignment with costs, and customer choice. We have incorporated these into Section 3.2 Guiding Principles to Inform ARDS Development. Additional considerations for advanced rate designs surfaced from the ARDS workshop and are briefly discussed in Section 4.1 Timeline.

A summary of the workshop and survey feedback can be found in Appendix C Hawaiian Electric ARDS Stakeholder Workshop, and the presentations from the workshop can be found in Appendix F Presentations from the ARDS Workshop.

2.4.2 Residential and Small-to-Midsize Commercial Customer Survey

The Companies sent separate surveys to residential and small-to-midsize commercial customers to obtain feedback on advanced metering, time-of-use (TOU) rates, prepay, and programs to support low-income customers.

A few critical results identified from the surveys are listed below:

- **TOU-RI Awareness:** Just under a third of all residential customers are aware that a time-of-use rate is available.
- **TOU-RI Participation Experience:** Among the participants randomly selected through the survey, most were profiled as retirees along with some telecommuters and shift workers who cited that their current behaviors fit well with the lower midday rates. Some also commented on their efforts to shift their usage of high consumption appliances between 9 a.m. and 5 p.m. whenever possible.

- **Prepay:** Overall, less than 5 percent of the residential customers say they would be interested in a prepay billing program once their advanced meter is installed.
- **Low-Income Support:** Around a quarter of our residential and small-to-midsized commercial customers would be willing to contribute an amount of their choosing to help qualified low-income customers reduce their electric bills through clean energy programs.

An overview of this research is included in Appendix D Customer Survey Results.

Over time, as advanced meters are deployed and new rate designs are introduced, the Companies will continue researching, evaluating, and addressing customer preferences and experiences.

2.4.3 Additional Stakeholder Meetings

The Companies presented brief updates on the ARDS in the Companies' DER stakeholder meetings on June 6, 2019, and July 24, 2019. The Companies made available and discussed a draft ARDS (as of August 21, 2019) with stakeholders on August 23, 2019. The stakeholder invitees to this meeting were the same as those invited to the July 15, 2019 ARDS workshop. Stakeholders were also invited to submit additional feedback via email. The Companies received written comments from the Consumer Advocate on September 18, 2019.

During the August 23 stakeholder meeting, additional considerations for advanced rate designs surfaced (e.g., curtailable rates, standby rates). These are briefly discussed in Section 4.1 Timeline. There were also several questions regarding how the proposed rates would be implemented. However, the Companies intend that details for implementation will be developed with subsequent specific rate design proposals consistent with this ARDS. Additional feedback from the stakeholder meeting included a request to further describe what the Companies have learned from their current TOU pilot programs (see Appendix G TOU-RI Lessons Learned), and identification of an opportunity to partner with Hawai'i Energy for education and outreach efforts.

As stated, on September 18, 2019, the Companies received written comments from the Consumer Advocate on the ARDS draft released on August 21, 2019. These comments, noted by the Consumer Advocate to be preliminary and not all-inclusive, can be found in Appendix H Preliminary Comments from the Consumer Advocate. The Companies appreciate the Consumer Advocate's preliminary comments and, in particular, the Consumer Advocate's view that the draft ARDS addresses the elements required by the Commission's D&O No. 36230,⁴ and the Consumer Advocate's support of a multi-part time-variant rate.⁵ Within the limited time it had to do so, the Companies have attempted to address herein certain points raised by the Consumer Advocate.

⁴ Consumer Advocate's preliminary comments and recommendations regarding the Hawaiian Electric Companies' draft ARDS ("Consumer Advocate's preliminary comments"), letter dated September 18, 2019, at 3.

⁵ Ibid, at 9.

We also look forward to the opportunity for a more comprehensive collaboration with the Consumer Advocate and other stakeholders within the DER docket.⁶

3 Advanced Rate Design Strategy

3.1 Overview and Context

All customers deserve fair and equal access to the benefits of expanded customer choices and clean energy. This ARDS is intended to provide an approach and roadmap to guide development of rate designs and proposals to serve multiple important objectives. As the Commission has noted, it is necessary to “determine fair cost allocation and fair compensation for electric grid services and benefits provided to and by customers and other non-utility service providers.”⁷ We must move to a modern rate structure that reflects the ways customers interact with and make use of the grid — particularly where, as here, the grid is being used in non-traditional ways that historical rate designs do not address.

The need for rate reform is not unique to Hawai‘i. Many jurisdictions across North America have implemented or are considering multi-part time-variant rates (i.e., rates made up of customer and time-differentiated demand and energy charges) that better align rates and cost of service than simple two-part rates (i.e., customer charge and flat energy rate), such as those currently used for residential and small commercial customers. In addition, some jurisdictions have implemented or are considering DER tariffs that more fairly compensate DER customers’ energy or ancillary services to the grid. The Companies are following a similar path with the simultaneous offering of DER programs, grid services tariffs, and voluntary TOU rates that provide the greatest discount during the midday period.

Rate design must also evolve to help customers actively participate in this transition. Customers need information they can act on and the technology to help them manage their electricity. Advanced rate design will play an important role in facilitating and sustaining the incorporation of the large amounts of DER, the control of these resources (DR), and other grid services necessary for achieving Hawai‘i’s clean energy future.

This Advanced Rate Design Strategy is intended to provide a roadmap to guide development of rate designs and proposals to serve multiple important objectives. Well-designed rates should do one or more of the following:

- Promote customer engagement
- Promote affordable customer bills aligned with system costs
- Support low-income customer options
- Advance and sustain progress on clean energy, including acquisition, integration, and utilization (i.e., DR) of distributed energy resources

⁶ Docket No. 2019-0323, Order No. 36538, issued on September 24, 2019, opened the new DER docket.

⁷ Docket No. 2016-0087, Order No. 34281, issued on January 4, 2017, Section D Guiding Principles.

- Support electrification of transportation
- Fairly allocate costs
- Reflect fair value of grid services

This strategy serves as an overview of the Companies' approach to the necessary evolution of rate structures and presents a roadmap to modernize rate design. Consistent with the ARDS, the Companies will offer more specific rate design proposals in future filings.

3.2 Guiding Principles to Inform ARDS Development

The development of advanced retail rates is guided by foundational rate design principles set forth through seminal works in the mid-20th century by authors including James Bonbright. Revised principles have been proposed by a variety of organizations to reflect 21st century conditions.

The Companies have harmonized these various sets of principles into the following guidelines to inform ARDS development:

- **Sufficiency:** Rates should be designed to produce enough revenue to recover utility costs so that the Companies can continue to provide reliable service with a low cost of capital.
- **Fairness:** Rates should be designed to accurately incorporate the impact of customers' use on the system's cost of service. The cost of the grid should be fairly apportioned among customers such that there is no "undue discrimination" in rate relationships. Rates should be designed to accurately value both services provided by the grid and services from customers.
- **Enabling and Empowering Customers:** Rates should provide economically efficient price signals based on the utility marginal costs, discourage wasteful usage, and align with the interests of all customers.
- **Alignment:** Rates should support desired outcomes and complement other utility objectives aimed at enhancing customer choice and achieving the State's energy policy goals.
- **Customer-Centric:** Rates should be relatively stable, predictable, simple, and easily understandable.⁸
- **Accessibility:** Rate offerings should be structured so that vulnerable customers have access to affordable electricity.
- **Gradualism:** Rates should be implemented gradually over time so that changes do not cause larger, abrupt increases in bills.

These principles require a balancing of sometimes competing interests. For example, developing cost-based fair rates free from subsidies could conflict with the principle of stability and predictability of the rates themselves. Also, developing economically efficient rates could conflict with customer acceptability if the rates become too unpredictable and the revenue sufficiency goal if the forward-looking, cost-based rates are materially different from the historical embedded cost-based rates.

⁸ Melissa Whited, with contributions from Paul Chernick and Jim Lazar, *The Ratemaking Process*, Synapse Energy Economics, Inc., July 2017.

To sustain its financial integrity, a utility must be able to recover its reasonable costs. The proposed approach is to design retail rates based on the principle of cost-causation. This means that if costs vary largely by customer, energy, or demand, they should be recovered by the appropriate customer, energy, or grid usage charge. To that end, a minimum charge may be used instead of, or in addition to, a grid usage charge to ensure that some contribution to fixed costs is provided by all customers.

3.3 Building Blocks for Advanced Rate Design

The Companies view the transformation toward advanced rates as increasing levels of sophistication along three spectra:

- **Temporal:** Where rates can evolve from unchanging flat rates to include time-differentiated prices that reflect benefits and costs that vary by time.
- **Attribute:** Where rates can unbundle and separately price the various sources of benefit and cost (e.g., energy, capacity).
- **Locational:** Where price signals can shift from standard system-wide values to prices that reflect site-specific costs and benefits.

Although increasing the sophistication of rates along one or more of these spectra can help send appropriate signals to adapt consumption behaviors to the evolving electricity system and customer needs, this enhanced granularity and complexity must be balanced against the Companies' guiding principles outlined in Section 3.2 Guiding Principles to Inform ARDS Development.

The following sections explore prominent and frequently proposed advanced retail rate design alternatives. These rate design categories can be thought of as building blocks that moderately increase sophistication from traditional rate structures as a means to recover sufficient costs while providing price signals that are more reflective of the utility system cost.

3.3.1 Time-Varying and Dynamic Rate Design

Time-varying and dynamic rates include time-of-use (TOU) rates, critical-peak pricing (CPP), peak-time rebates (PTR), multi-part time-variant rate design, and dynamic rates. Each design presents a different degree of price volatility and uncertainty for customers, but also presents a different opportunity to reduce their electric bill by shifting consumption from higher-priced hours to lower-priced hours.

3.3.1.1 Time-of-Use (TOU) Rates

TOU rates provide customers with the appropriate price signals to encourage efficient use of electricity and deployment of DER. They offer customers the opportunity to lower their bills by shifting electricity use to when rates are the lowest or by offsetting demand via DER when rates are the highest.

TOU rates can have time-varying energy charges and customer charges only, or can include grid usage charges as further discussed in Section 3.3.1.4 Multi-Part Time-Variant Rate Design for Residential and Small Commercial Customers. A key advantage of TOU rates is that they separate historical costs of the system (customer- and demand-related) from the forward-looking short-run marginal costs driven by

customer behavior and short-term energy usage.⁹ They achieve this with energy charges that reflect the marginal cost of providing power as well as non-volumetric charges to collect the historical embedded costs of service that do not vary with energy usage. For example, an energy charge would cover the cost of fuel and other variable costs involved in production; customer charges would cover the cost of the service drop, meter, and monthly billing; and grid usage charges would cover the grid's fixed cost. The grid usage charge may be measured based on demand or subscription service requests.

3.3.1.2 Critical Peak Pricing (CPP)

Under a CPP rate, participating customers pay higher prices during the few days or hours when demand is the highest or when the power grid is severely stressed—typically up to 15 days per year during the season(s) of the system peak. This higher peak price reflects both the energy and longer-term capacity costs and, as a result of the capacity portion of those costs being spread out over relatively few hours of the year, can exceed \$1 per kWh. In exchange, CPP participants receive a discount on the standard tariff price during the other hours of the season or year to keep the utility's total annual revenue constant. Customers are typically notified a day in advance of an upcoming critical peak event.

3.3.1.3 Peak-Time Rebate (PTR)

Peak-time rebate is essentially the inverse of critical peak pricing. It is a standard rate coupled with a rebate when customers reduce their usage during a peak demand event. Typically, if PTR customers do not want to participate in the called event, they simply pay the standard rate. There is no rate discount during non-event hours. While all forms of time-varying rates are designed to provide customers with the opportunity to save on their electric bill, PTR provides an increased level of bill protection because costs can only be reduced during the event.

3.3.1.4 Multi-Part Time-Variant Rate Design for Residential and Small Commercial Customers

An increasing number of utilities are now offering a residential multi-part time-variant rate consisting of (1) a customer charge; (2) a volumetric charge (which can be time-variable); and (3) a grid usage charge (which also can be time-variable). The grid usage charge collects revenue based on a customer's peak demand during a defined period. Grid usage charges (i.e., demand charges) have a long history of use by commercial customers, but only more recent experience with residential customers. The volumetric charge can be time-varying and dynamic, integrating one or more of the rate design structures outlined above.

The Companies' existing residential and smaller commercial customers are currently on two-part rates that do not provide efficient, cost-based signals to customers that reflect the costs of either time-varying energy- or demand-related costs. Accordingly, these smaller customers lack reasons to reduce

⁹ Marginal costs represent the cost savings from usage reductions or the costs added from usage increases. Marginal costs are often referred to as *forward looking* or *future* costs. Embedded costs, conversely, are the total costs of a utility and include the costs of historical investments. A large portion of embedded costs are unaffected by reductions or increases in usage. Multi-part time varying rates combine charges that collect costs with charges that collect time-varying energy charges.

their power use at peak system load, which over the long-term can result in increases to capacity costs. Grid usage charges can provide a price signal to reduce maximum demand and potentially allocate peak-driven costs more fairly. Customers may respond by changing their consumption patterns to reduce their bills and benefit the grid.

3.3.1.5 Dynamic Rates

Participants in dynamic rates programs pay for energy at a rate that is linked to the hourly market price for electricity. Participants are informed of hourly prices on either a day-ahead or hour-ahead basis. Dynamic rate programs communicate granular price signals that most accurately reflect the cost of producing electricity during each hour of the day, giving customers a precise incentive to reduce consumption at the most expensive times.

3.3.2 Rate Combinations

The rate options described above can also be offered in combination to take advantage of the relative advantages of each. One common combination is critical peak pricing and time of use. The TOU component of the rate reflects the average daily variation in peak and off-peak energy prices. The CPP component during a small percentage of hours each year reflects the cost of capacity during the seasonal system peak. Together, these rates can facilitate greater energy awareness among customers and provide greater opportunities for bill savings through a more heavily discounted off-peak rate. However, the added complexity of a combined rate design would likely require additional customer education to maximize the potential benefits and improve customer satisfaction.

3.4 Current Rate Design Landscape

Hawai'i's situation is fairly unique among utilities. Hawai'i has islanded grids that, while transitioning, still rely on energy generated from fossil fuels. Unlike mainland utilities, the Companies are unable to acquire additional power from interconnected grids, so the Companies must maintain or acquire enough generation (from third-party providers) to meet customers' maximum demand while accounting for the possibility of power plant outages. This increases the importance of tying rate design to the Companies' cost structure to ensure that all customers contribute to the costs of maintaining a reliable, standalone grid. The relatively small, isolated nature of the Companies' separate grids also leads to some limitations on how often it should update its estimates of costs to produce accurate but also practical estimates of real-time pricing. Hawai'i has no spot market prices produced by an independent system operator (ISO) to serve as a proxy for the real-time price of energy. Finally, the Companies have a 100 percent Renewable Portfolio Standard (RPS) mandate by 2045 and the industry's highest level of (and need to further increase) DER adoption by customers.

With respect to rate design, the Companies are currently in a transitional state. The Companies have unbundled fuel recovery from all base rates and re-aligned existing TOU rates to better reflect the timing of peak net loads that have moved from midday to early evening. At the same time, the Companies have a static, non-time-variant energy charge for each default rate schedule, with time-variant rate schedules that customers can opt-in to.

3.4.1 Retail Rates

3.4.1.1 Residential

The existing default residential rates at the Companies are a two-part rate: a volumetric, non-time-variant energy charge and a customer charge. These tariffs have a single-phase customer charge of \$11.50 per bill and a single-phase minimum charge of \$25 per bill. The customer charge is intended to recover customer-related costs, and the minimum charge is intended to recover customer- and grid-related (demand) costs. These charges do not recover 100 percent of these related costs.

The Companies also have an optional residential time-of-use rate (TOU-RI) available to customers, which may also be used for residential electric vehicle (EV) charging. TOU-RI has a very low midday energy rate during the 9 a.m. to 5 p.m. period, and a very high on-peak energy rate during the 5 p.m. to 10 p.m. period. Fixed grid costs are recovered in the on-peak and off-peak periods to make the recovery revenue-neutral in comparison to the regular residential energy rate based on the residential class load profile.

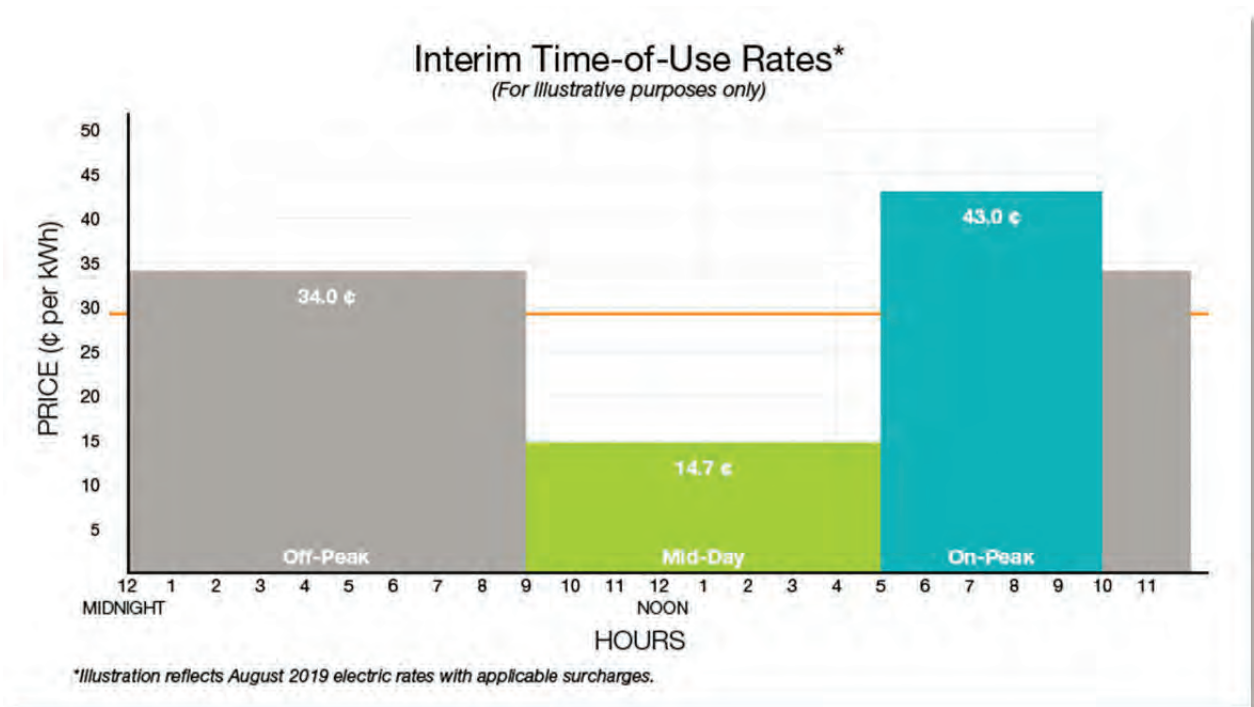


Figure 2: Interim TOU Rates for Hawaiian Electric (Oahu)

3.4.1.2 Commercial

The main rate designs currently available to commercial customers are:

- Schedule G: General Service Non-Demand
- Schedule J: General Service Demand
- Schedule P: Large Power Service
- Schedule F: Public Street Lighting, Highway Lighting and Park and Playground Floodlighting
- Schedule DS: Large Power Directly Served Service (O’ahu only)

Schedules J, P, and DS have customer, energy, and demand charges. The demand charges are based on billing demand, where billing demand for the month is the highest of either: (1) the measured demand for the month or (2) the average of the measured demand for the month and the highest measured demand of the previous 11 months. Measured demand is the highest demand averaged in a 15-minute interval in a month. Schedules G and F have customer, minimum, and energy charges, but they do not have demand charges. There are also adjustments available to customers who take service at a higher voltage level, manage their power factor, or take service in the downtown Honolulu network area.

The Companies also have optional commercial time-of-use rates available to commercial customers. These rates have the highest energy rate in the on-peak period of 5 p.m. to 10 p.m., the lowest energy rate in the midday period of 9 a.m. to 5 p.m., and a middle energy rate which is higher than the regular rate schedule rate in the off-peak period of 10 p.m. to 9 a.m. Hawaiian Electric and Hawai'i Electric Light also proposed in their most recent rate cases¹⁰ a higher on-peak demand charge and a discounted excess demand charge for demand outside of the on-peak period that exceeds the maximum on-peak demand. This rate design is subject to approval by the Commission.

3.4.2 Distributed Energy Resource Offerings

The sections below describe the historical and current state of all DER and demand response programs and offerings. While these options have been developed separately in the past by different divisions and within different dockets, as the DER and DR worlds converge, these efforts will be developed under a single initiative.

3.4.2.1 DER Programs

The Companies’ DER programs are briefly summarized in Table 1. These programs allow customers to interconnect their onsite generation with the grid and may provide compensation for energy exported to the grid.

Table 1: Current DER Programs

Program	Description
Standard Interconnection Agreement (SIA)	Designed for larger customers who want to offset their electricity bill with onsite generation.
Net Energy Metering (NEM)	Participants receive retail rate compensation for electricity sent to the grid. This program is closed to new applicants.
Customer Self-Supply (CSS)	Intended only for private rooftop solar installations that are designed to not export any electricity to the grid. Customers are not compensated for any export of energy.
Customer Grid-Supply (CGS)	Participants receive a Commission-approved credit for electricity sent to the grid and are billed at the retail rate for electricity they use from the grid. The program remains open until the installed capacity has been reached.

¹⁰ Docket No. 2018-0368, HELCO-T-23, at 31–32, and Docket No. 2019-0085, HECO T-27, at 37–39.

Program	Description
Customer Grid-Supply Plus (CGS Plus)	Systems must include grid support technology to manage grid reliability and allow the utility to remotely monitor system performance, technical compliance, and if necessary, control for grid stability.
Smart Export	Customers with a renewable system and a battery energy storage system have the option to export energy to the grid from 4 p.m. to 9 a.m. Systems must include grid support technology to manage grid reliability and system performance.
Net Energy Metering Plus (NEM Plus)	Allows current NEM customers with a signed agreement to add additional non-export capacity to their system.
Community-Based Renewable Energy (CBRE)	Provides an additional option for customers who are not already enrolled in a DER program to benefit from electricity generated by a renewable energy facility in their utility service territory.

3.4.2.2 Demand Response Portfolio

The Companies’ demand response programs are briefly summarized in Table 2. These programs enable customers to contribute to grid operations by allowing the Companies to call for alterations to customer demand. Customers are compensated for this service.

Table 2: Demand Response Programs

Program	Description
Commercial Industrial Direct Load Control (CIDLC)	Compensates commercial and industrial customers with monthly incentives to be available and callable to provide peak load reduction. Technologies include behind-the-meter generators, pumps, HVAC (heating, ventilation, and air conditioning), water features (hotel), and non-critical loads (e.g., lighting).
Small Business Direct Load Control (SBDLC)	Compensates small business customers with monthly incentives to be available and callable to provide peak load reduction. Technologies include water heaters and air conditioning.
Residential Direct Load Control (RDLC)	Compensates residential customers with monthly incentives to be available and callable to provide peak load reduction. Technologies include water heaters and air conditioning.
Fast DR	Compensates commercial customers with enablement payment and monthly incentives to respond to capacity needs within 10 minutes of an event call. Supporting technologies include behind-the-meter generation, behind-the-meter storage, and load control such as HVAC.
Grid Services Procurement	A market-based procurement model that contracts with third-party aggregators to enroll, enable, and manage portfolios of customer assets to deliver committed levels of various grid services. Services include load building, load reduction, fast frequency response (FFR), and likely in the near future, regulating reserves. Technologies currently include grid interactive water heaters, behind-the-meter photovoltaic (PV) systems, and storage systems.

3.4.3 Electrification of Transportation

The Companies have identified 10 key initiatives in their Electrification of Transportation (EoT) Strategic Roadmap¹¹ (EoT Roadmap) that help to enable the electrification of transportation for Hawai‘i.

Table 3 identifies and maps five key EoT initiatives to existing programs that are directly related to advanced rate design.

Table 3: EoT Initiatives with Existing Programs Relating to Advanced Rate Design

Initiative #	Description	Existing Program Relating to Rate Design
1	Work with partners to deliver education and outreach to drivers, dealerships, fleet managers, and taxi and transportation network companies (TNCs).	Participation in ride-and-drive events sharing information about the Companies’ direct current fast charge (DCFC) stations and current rates available under EV-U and EV-F, as well as non-EV rate tariffs.
3	Work with partners to find ways to lower EV purchase costs	Be an advisor to our customers when informing them of TOU programs—e.g., bus fleet conversions and E-BUS tariff information sharing.
7	Expand availability of public charging	Provide educational materials at community events about TOU programs relating to EV-U, EV-F, EV-MAUI, E-BUS, etc. Be an advisor to customers considering the installation of new charging infrastructure.
8	Engage the tourism industry (via hotels, rental cars, TNCs, destinations)	Provide educational materials at community events about TOU programs relating to EV-U, EV-F, EV-MAUI, E-BUS, etc.
9	Encourage and enable electrification of smart charging of buses	<ul style="list-style-type: none"> • Implemented E-BUS tariff • EPRI E-BUS program to study daytime charging

The EoT Roadmap also outlined an illustrative case that could potentially increase the benefits by incentivizing “smart charging”—charging during hours of higher renewable penetration and lower system cost—through rates or DR programs.¹² Smart charging will also increase the use of the State’s renewable energy resources, allowing Hawai‘i to realize the synergies between EoT and RPS targets set forth in State law. Figure 3 demonstrates the direct economic costs and benefits to O‘ahu per personal

¹¹ Docket No. 2016-0168, *Electrification of Transportation Strategic Roadmap*, filed on March 29, 2018 (EoT Roadmap), at 65; Docket No. 2018-0135, *Addendum to Hawaiian Electric Companies’ Electrification of Transportation Strategic Roadmap*, filed on November 29, 2018 (EoT Addendum).

¹² EoT Addendum, Exhibit A, at 2–3 (Oahu); Exhibit B, at 3–4 (Maui); and Exhibit C, at 3–4 (Hawai‘i Island).

light duty electric vehicle, net present value from 2018–2045, for non-managed and smart charging (illustrative) cases.¹³

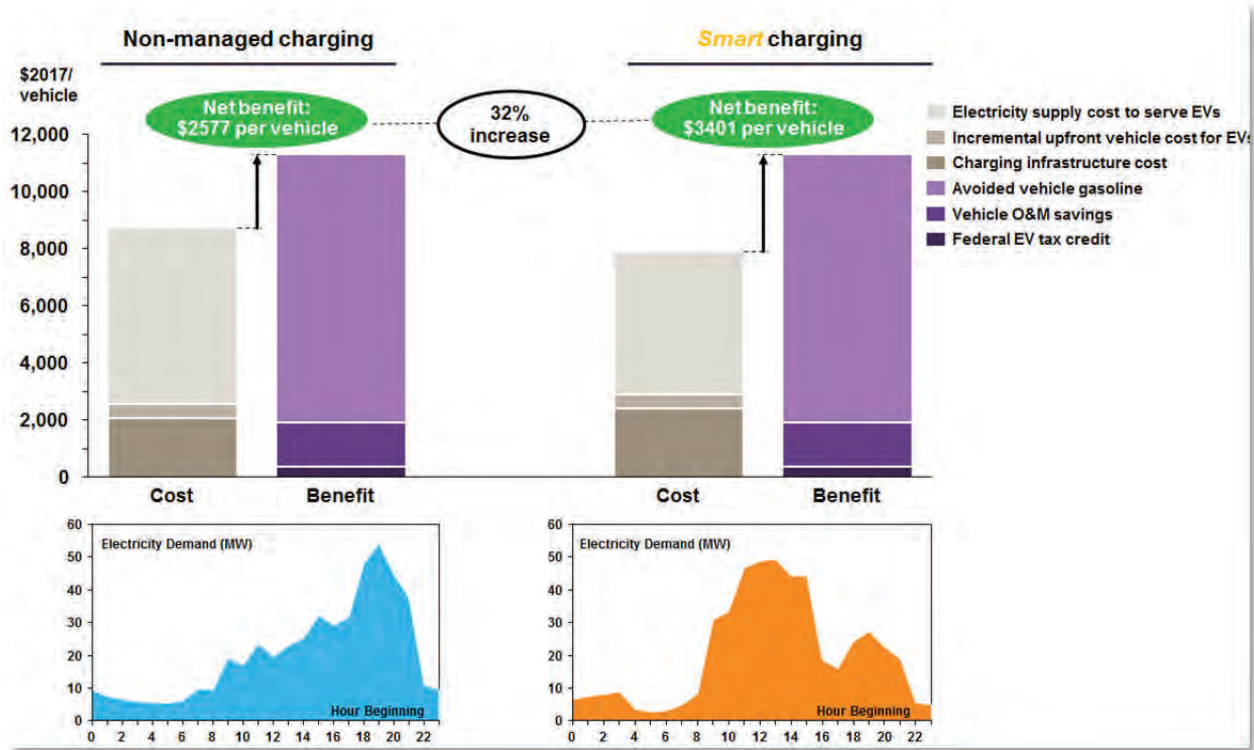


Figure 3: Non-Managed Charging vs. Smart Charging

Smart charging analyses include the cost of the additional charging infrastructure needed to support an increase in workplace charging but does not consider any other expenses that may be incurred to induce drivers to shift their charging behavior beyond providing charging at their workplaces. These could include, for example, changes to workplace EV rates. In reality, some portion of the ~\$800 per-vehicle net benefit may need to be put to this purpose. However, the benefits shown do not include additional value that could be created by EV provision of grid services that contribute to system stability, such as fast frequency response, regulating reserve, and replacement reserve. Hawaiian Electric’s DR Potential Study¹⁴ anticipates that EVs will be an important provider of these services in the future, which will create significant value for the utility’s customers which is not captured in this analysis. Several EoT Roadmap initiatives seek to induce smart charging of EVs and develop the capabilities of the utility to use EVs as a demand response resource in mid- and long-term plans.

¹³ EoT Addendum, Exhibit A, at 2.

¹⁴ Docket No. 2015-0412, *Revised DR Portfolio*, filed on February 10, 2017 (Revised DR Portfolio), Attachment A *Potential Study*, at 69.

Table 4 summarizes two of the current EoT initiatives with established rates that relate to advanced rate design.

Table 4: EoT Initiatives With Established Rates Related to Advanced Rate Design

Initiative #	Description	Current Rates Relating to Advanced Rate Design
7	Expand availability of public charging	<ul style="list-style-type: none"> Schedule EV-U: Commercial Public Electric Vehicle Charging Service and Schedule EV-F: Commercial Public Electric Vehicle Facility Charging Service Pilot Schedule EV-MAUI (pending PUC approval)¹⁵
9	Encourage and enable electrification of smart charging of buses	<ul style="list-style-type: none"> Schedule E-BUS-J Schedule E-BUS-P

In designing the E-BUS tariffs, the Companies worked with customers to align grid operations, resource availability, and customer operations. Toward that end, the E-BUS tariffs encourage daytime and overnight charging, providing new load on the electric system when there are abundant renewable resources and aligning with participants’ operations.

The tariffs offer energy discounts during the midday when there is an abundant amount of solar energy, as well as off-peak, when the battery electric buses are not in use. Demand charges are not applied to these time periods to further encourage charging during these optimal periods. To discourage charging during peak hours, the tariffs impose an energy premium and an incremental demand charge for demand in excess of the customer’s host meter.¹⁶ Figure 4 illustrates the rate design used for E-BUS-J and E-BUS-P.

¹⁵ Docket No. 2018-0422, *For Approval to Establish EV-MAUI Electric Vehicle Fast Charging Service and Related Accounting Treatment; Maui Electric’s Revised Schedule EV-MAUI Tariff*, filed on August 30, 2019.

¹⁶ If a customer’s host meter demand charge is 300 kW, anything over 300 kW during on-peak hours will be assessed a demand charge. For example, if a customer uses 325 kW during on-peak hours, the customer will be assessed a demand charge for 25 kW (325 kW minus 300 kW).

The E-BUS tariff encourages charging by imposing discounts and premiums based on time of use

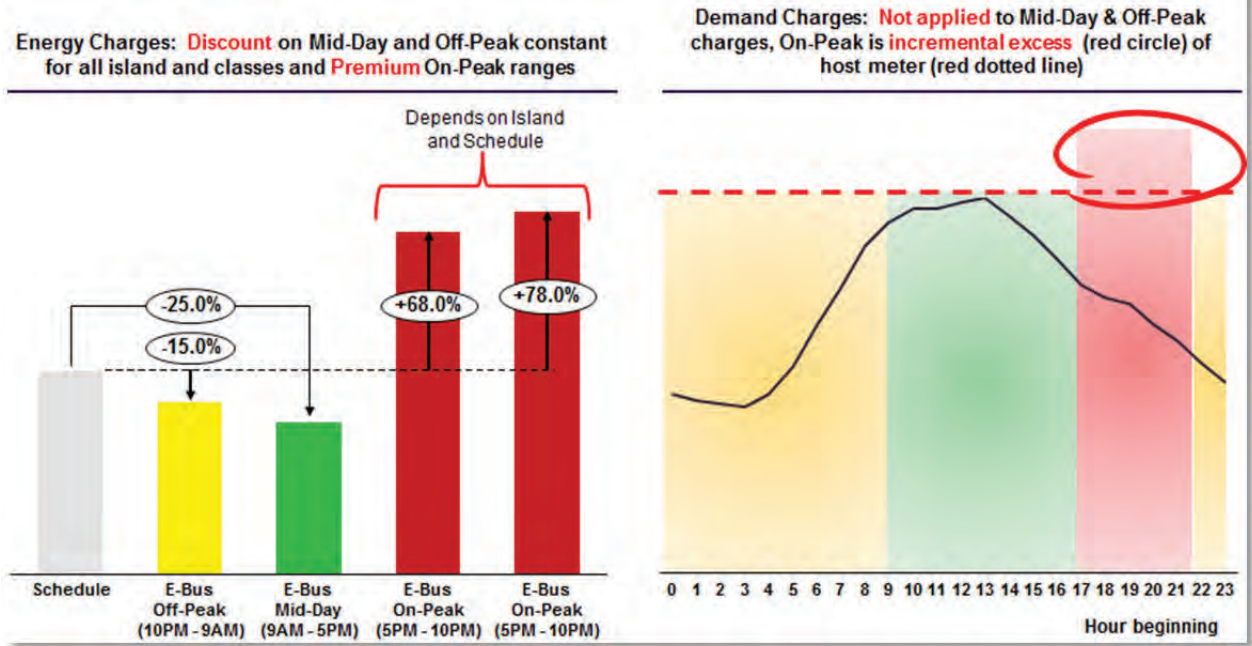


Figure 4: E-BUS-J and E-BUS-P Rate Tariffs

Regarding the development of rates that support the electrification of buses under Initiative 9, the Commission recognized the recently approved E-BUS-J and E-BUS-P tariffs as a positive step toward rate design to support electrification of transportation and expects that future rate design proposals will build upon the Companies' experience with Schedule E-BUS-J and E-BUS-P.¹⁷

The Commission also directed the Companies to prioritize rate design in the short term, and to revisit currently available rates as part of the ARDS.¹⁸ Table 4 outlines the existing programs available, as part of Initiative 7's Schedule EV-U rates. The Companies will follow the guidance provided by the Commission for the new rates by building upon the approved rate design structure established for the E-BUS tariff. The revised Schedule EV-MAUI¹⁹ has a reduced rate ranging from 35–42 percent less than the prior corresponding rates for all time periods (e.g., Mid-Day, On-Peak, and Off-Peak), with the greatest percent reduction in rates during the midday period. The revised rate design incentivizes charging when

¹⁷ Docket No. 2018-0135, Order No. 36448 *Providing Guidance and Directing the Hawaiian Electric Companies to File a Workplan*, filed on July 31, 2019 (Order No. 36448), at 16, footnote 49.

¹⁸ *Ibid.*

¹⁹ EV-Maui Tariff.

there is extra generation on the grid, sending appropriate price signals to current and potential EV drivers, and is tailored for Maui's specific grid needs.²⁰

Additional details on future rate design programs to implement the EoT Roadmap in the short term (e.g., over the next 12–18 months) will be filed with the Commission in the Companies' Workplan, as directed by the Commission.²¹

3.5 Future State Pricing: A Smooth Glide Path to Modern Rate Designs

The Companies propose a gradual transition toward advanced rate designs. We intend to use a disciplined and iterative approach, evaluating new pricing and programs at key intervals and making refinements as necessary and appropriate. Enabled by the deployment of advanced meters, incremental changes in existing rate designs and the development of innovative pilot offerings for more sophisticated rate designs will provide customers with access to more granular data. Empowered by actionable information and enhanced choices, customers will be able to enroll in the specific offering that best meets their individualized energy needs.

The following sections outline the Companies' high-level, strategic perspective on how retail rates will continue to evolve in greater sophistication along the **temporal spectrum**, toward dynamic, time-varying rates, and along the **attribute spectrum**, toward residential and small commercial multi-part time-variant rates. In addition, the Companies offer a more equitable and system-based approach to provide appropriate price signals for more efficient customer grid participation and adoption of DER (e.g., a standard DER tariff). The Companies do not intend to introduce rates that increase sophistication along the **locational spectrum** at this time because of the inherent complexity involved and the risk for customer confusion to outweigh any additional value. That said, in the long-term, it may be worth exploring concepts of locational value to inform DER compensation, where it could help direct customer investment to parts of the grid that need it most, potentially deferring the need for traditional grid investment and benefitting all customers in the process.²²

3.5.1 Time-of-Use (TOU) Rates

The Companies propose introducing additional residential and commercial TOU rates, enabled by the capabilities of advanced metering, which would involve greater time granularity than the Companies' existing TOU rates. This would provide more accurate price signals to customers and similarly offer more granular ways for customers to control their bills. Smaller commercial customers and residential customers will initially see two-part rate options with time-varying energy charges.

²⁰ Docket No. 2018-0422, Decision and Order No. 36229, issued on March 11, 2019, 35–36.

²¹ Order No. 36448, 19–20.

²² Although the Companies are not planning on offering rates that include locational sophistication in the near-term, the Companies recognize the locational value that DER may provide to address grid needs, and are in the process of procuring non-wires alternatives (NWAs) as part of a soft launch of the Integrated Grid Planning process.

A further enhancement of the TOU rates for residential and commercial customers is an additional grid usage charge reflective of the grid demand costs. The current residential rate design offers a single method of bill control—reducing energy usage. A rate design based on a multi-part rate with a time-variant energy charge and a demand-based charge, would offer three methods for customers to control their bills. The customer could:

- Continue to reduce usage
- Shift usage from higher-priced periods to lower-priced periods
- Control demand by staggering high-demand activities

Over 40 utilities have a residential multi-part time-variant tariff on either a voluntary or mandatory basis.²³

The Companies intend to offer more granular TOU rates initially on an opt-in basis and over time make them the default for all customers. TOU rates are largely enabled by advanced meters and the meter data management system (MDMS). It is expected that these rates will not be implemented on a default basis to all customers until well after the Grid Modernization Phase 1 timeframe (as advanced meters are expected to be deployed to less than half of the Companies' customers at the end of Grid Modernization Phase 1). Upon full deployment of advanced meters, the two-part flat rate designs for residential and small commercial customers would be phased out and replaced with more efficient, cost-reflective multi-part tariffs.

3.5.2 Critical Peak Incentive

The Companies have outlined plans to initiate a Critical Peak Incentive (CPI) program option, which would pay customers incentives for their responsiveness to critical peak event calls. The decision as to if and when to proceed with CPI programs will depend upon the effectiveness of the current and planned procurement efforts as they pertain to the commercial customer segment. The Companies will make a determination on CPI by the fall of 2020. While CPI is not an advanced rate, its purpose is similar to the CPP opportunities described earlier. The main difference is that instead of customers making choices on the basis of altered pricing for a given period, customers are committing to making themselves available if and when the Companies are in need of peak load reductions. Typically, this event-based approach sees more reliable responsiveness than pricing options. However, the Companies may consider a parallel CPP offering or deviate from the CPI plans and redirect efforts to a CPP model given the impending deployment of advanced meters and the acknowledgement and consideration of stakeholders concerns over CPP and CPI.²⁴

²³ Direct Testimony of Ahmad Faruqui on behalf of Northwestern Energy before the Public Service Commission of the State of Montana, Docket No. D2018.2.12, filed on September 28, 2018, at 52–53, Table 7.

²⁴ Consumer Advocate's preliminary comments, at 4–7.

3.5.3 Dynamic or Real-Time Pricing

As articulated in the Revised DR Portfolio Application,²⁵ the Companies intend to develop and make available directly to customers day-ahead pricing as a rate within the Capacity Service Tariff. This rate would be a programmatic opportunity for customers to enroll directly with the Companies to deliver both capacity and energy in response to day-ahead price signals. This rate was specified as to be made available to residential customers and was portrayed, as each of the grid services tariffs were, as explicitly technology-neutral.

In addition, this rate was designed to allow customers to respond to price signals with either load reduction or the supply of energy by way of export—especially in situations where the behind-the-meter asset had fully exhausted its load-serving function. Technologies contemplated in this rate design included, but are not limited to, electric hot water heaters, thermostats and air conditioning units, behind-the-meter storage, behind-the-meter photovoltaic, and electric vehicles. The new DER tariffs described in the following sections would serve as the foundational prerequisite for DER customers wishing to participate in a day-ahead pricing rate opportunity.

3.5.4 DER Tariff Options: A Standard DER Tariff and a Bundled Grid Services Tariff

The Companies envision that DER customers may follow one of two paths. The first path is based on a kWh-based approach in which the customers utilize DER behind the meter to primarily serve their own load first, then export any excess energy and services to the grid. Bill savings are in the form of reduced retail energy charges and energy export credits. The second path is where customers seek higher value for their DER and allow the utility to have complete control of the resource. The Companies would compensate customers based on the availability (kW) of DER. Doing so would provide clarity, transparency, and value to customers, DER providers, and the utility—a “win-win-win” situation.

A standard DER tariff is proposed for the first path (as described in Section 3.5.4.1) and a bundled grid services tariff (as described in Section 3.5.4.2) is proposed for the second path.

3.5.4.1 A Standard DER Tariff: Streamlining DER Programs While Aligning Customer Rates with Utility Costs

Widespread adoption of DER has profoundly changed the way residential and commercial customers use the grid. Nearly 4,000 new private rooftop solar systems came online in 2018 for a total of nearly 80,000 systems across the Companies’ service territory. One in three single-family homes on O’ahu has rooftop solar—the highest percentage in the U.S.

The goal for rates is to transition current rates to facilitate customers being paid for the fair value of energy and grid services received from the customer, and to ensure that customers pay for the fair value of energy and grid services they receive.

²⁵ Docket No. 2015-0412, *Revised DR Portfolio*, filed on February 10, 2017.

This transition has been occurring over the last two decades. Net energy metering, enabled by state legislation in 2001,²⁶ originally applied to a very small subset of customers. In 2006, for example, growth in net metered PV capacity was only 150 kW. But due to steep declines in PV costs, generous pro-solar tax incentives, and Hawai'i's high electricity rates,²⁷ new installations grew exponentially in the following years (from just over 1 MW in 2007 to more than 107 MW in 2013). Both system and circuit saturation began limiting new NEM installations, which tapered to 70–80 MW per year, and in 2015, the Commission closed the NEM program to new customers.

In 2015, while closing NEM to new customers, the Commission approved two interim successor programs: Customer Grid Supply and Customer Self Supply. In 2018, the Commission approved the Customer Grid Supply Plus and Smart Export interim programs.

These programs are interim, with defined megawatt program capacities and timelines (e.g., five years). To simplify and standardize customer options going forward, the Companies propose a new long-term standard DER tariff to succeed the interim tariffs currently available (e.g., CSS, CGS, CGS Plus, and Smart Export). A standard DER tariff would simplify market options and could provide both DER suppliers and customers a more efficient and understandable basis for DER adoption. The standard DER tariff offers the Companies and stakeholders an opportunity to streamline existing DER tariffs and facilitate the greater adoption and operationalization of DER, while fairly charging customers for the services that they use and fairly compensating them for the services that they provide to ultimately reduce costs for all customers.

An appropriate place to introduce the multi-part time-variant rate would be in a standard DER tariff. Such a tariff would better allow the utility to recover its costs in the manner they are incurred, while also compensating customers based on the market rate (i.e., short-term marginal avoided cost) for the energy they export to the grid.

To address potential customer concerns or disruptive impacts of implementing a multi-part time-variant rate, the Companies propose including a Market Transition Credit (MTC) in a standard DER tariff that would provide additional export compensation to DER customers. In doing so, the MTC would support customers' continued rooftop solar adoption and sustain Hawai'i's thriving DER industry. The adjustment would decline over time as the costs associated with DER decline, providing a glide path and reasonable stability for customers and the market. The Companies understand that this is a new concept

²⁶ In 2001, the Hawai'i State Legislature passed a bill allowing net energy metering for Hawai'i's electric customers, and the PUC approved Rule 18 – Net Energy Metering and changes to Rule 14. Additional legislative mandates and rule changes followed.

²⁷ In 2011, electric rates on O'ahu substantially increased, driven by an increase in fuel oil prices. The increase was primarily due to the upward pressure on low sulfur fuel oil prices brought on by Japan having to use thermal generation to replace nuclear power lost in the 2011 Fukushima earthquake and tsunami. These higher fuel prices persisted through the 3rd quarter of 2014.

and acknowledge the Consumer Advocate's concerns surrounding the MTC,²⁸ and anticipate continued discussion among parties and stakeholders.

Further, customers who provide grid services to the utility, either via utility or third-party programs, would be compensated for the full value of those services. Shifting to a multi-part time-variant rate is an important step in ensuring a fair and financially viable transition to Hawai'i's clean and distributed energy future.

A standard DER tariff would be available for non-dispatchable DER systems and would include compensation for exported energy.²⁹ It is expected that annual megawatt program limits would be needed to appropriately manage adoption of this tariff based on changes to the grid and to the resource portfolio over time. The annual megawatt program limits would be tied to the amount of non-dispatchable energy each island grid can reasonably accommodate without adversely impacting a customer's DER generation value.³⁰

Figure 5 illustrates the components of a standard DER tariff compared to current tariffs and a tariff for dispatchable DER systems providing grid services under a procurement or program.

²⁸ Consumer Advocate's preliminary comments, at 9.

²⁹ DER resources installed under a standard DER tariff will not be directly controlled or dispatchable by the Companies except in system emergencies—system energy imbalances where DER systems are separated from the utility grid using the second advanced meter or through an aggregator service. However, customers may participate in dispatched grid services programs under this tariff (e.g., faster frequency response or capacity).

³⁰ The Power Supply Improvement Plan calls for resources such as bulk storage and synchronous condensers to be installed to manage the issues associated with uncontrolled non-dispatchable resources displacing dispatchable synchronous resources on the grid. The timing of the installation of these mitigation resources will influence annual megawatt limits.

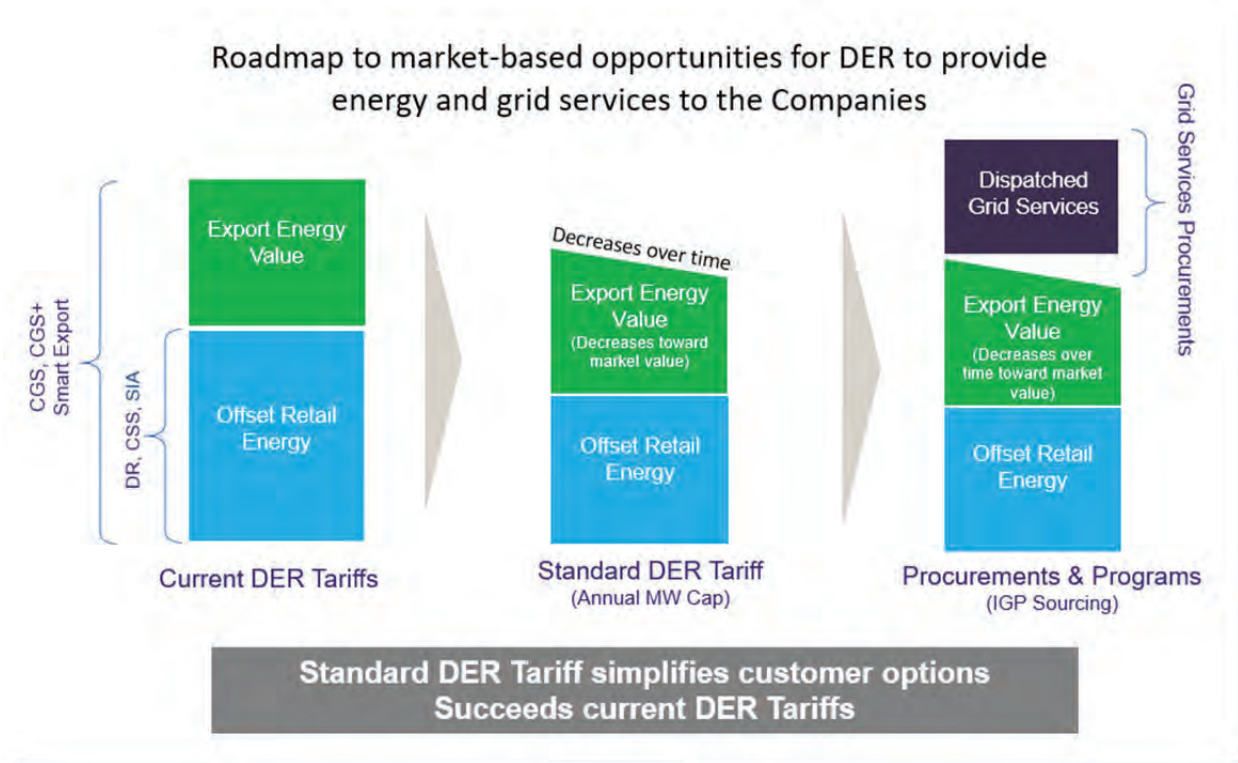


Figure 5: Evolution of DER Tariffs

Under a standard DER tariff, energy exported to the Companies’ electrical systems by customer generators would be compensated based on the market value of those exports to the grid. A standard DER tariff would be coupled with a retail rate design that better aligns with the cost to serve DER customers. For example, a customer who chooses to participate in a standard DER tariff would have a default TOU rate or be able to opt in to other optional TOU rates which may be better suited to their needs.

Export compensation has progressed and evolved to more fairly reflect the benefit such energy provides to the system through various DER tariffs primarily based on avoided cost. However, as the number of tariffs has grown, so has their complexity. Simplifying customer choices and market options could provide both DER suppliers and customers a more efficient and understandable basis for DER adoption. Therefore, the Companies believe that a standard DER tariff offers an opportunity to streamline existing DER tariffs. For customers who would like a different option, the Companies are also exploring the bundled grid services tariff options discussed below.

3.5.4.2 Bundled Grid Services Tariff Options

The Companies are exploring the development of tariff options that bundle energy and grid services to allow for full value realization for customers and full operational value to the Companies. This concept aims to develop an enhanced customer option that combines an advanced rate design with a grid service commitment. Such a mechanism may serve as an alternative to a standard DER tariff, offering maximum operational flexibility and compelling economic value to customers.

Details still need to be worked out, but one possible version would involve the customer enrolling in a tariff that assigns fixed costs in addition to a monthly kWh energy cap. The customer would then be eligible for engagement with a third party to help them enable, manage, and present their system’s availability to the Companies for operational flexibility. The customer would receive a monthly bill rebate for this availability.

Progress in this area will be marked by a proof-of-concept stage, a pilot stage, and a formal tariff filing targeted for mid-2022.

3.5.5 Electrification of Transportation

Electric vehicles have the potential to provide substantial benefits to society by reducing emissions while lowering both transportation fuel costs and electricity rates. Effective EV rate design is critical for ensuring that these benefits are realized. Through rate design, electric utilities are in a unique position to ensure that EVs charge in a manner that minimizes costs to the grid while providing customers with fuel savings relative to gasoline, which helps to drive EV adoption.

Table 5 summarizes the timeline for the EoT initiatives that are related to advanced rate design.

Table 5: Timeline for EoT Initiatives Related to Rate Design

Initiative #	Description	Current Programs Relating to Rate Design	2019 to 2023
4	Investigate and develop opportunities to lower customer bills in return for smart charging of vehicles and provision of grid services	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Schedules for new programs to be filed with the Commission will be provided in the Companies’ Workplan³¹
7	Expand availability of public charging	<ul style="list-style-type: none"> Schedule EV- U: Commercial Public Electric Vehicle Charging Service and Schedule EV-F: Commercial Public Electric Vehicle Facility Charging Service Pilot Schedule EV-MAUI (pending Commission approval) 	<ul style="list-style-type: none"> Expand EV-U and EV-F program to be permanent and adjust EV-U and EV-F rates to reflect the Companies’ cost and send proper pricing signals to customers Refiled EV-MAUI tariff³²

³¹ Order No. 36448, at 19–20.

³² Docket No. 2018-0422, *For Approval to Establish EV-MAUI Electric Vehicle Fast Charging Service and Related Accounting Treatment; Maui Electric’s Revised Schedule EV-MAUI Tariff*, filed on August 30, 2019.

Initiative #	Description	Current Programs Relating to Rate Design	2019 to 2023
9	Encourage and enable electrification of smart charging of buses	<ul style="list-style-type: none"> Schedule E-BUS-J Schedule E-BUS-P 	Monitor uptake throughout pilot program (effective March 31, 2019 through December 31, 2023) and recommend adjustments if necessary

Consistent with Commission guidance in the EoT Roadmap docket, the Companies will continue to prioritize EV rate design in the near term, developing rates that:

- Incentivize charging when there is extra generation on the grid
- Send appropriate price signals to current and potential EV drivers
- Are tailored to each island’s specific grid needs

As outlined in Initiative 4 of the EoT Roadmap, the Companies will investigate and develop advanced rates for both residential customers and commercial fleets, and transportation network company vehicles and taxis. For residential customers, the Companies will look to leverage development efforts pertaining to time-varying and dynamic retail rate designs, with a particular focus on facilitating smart charging to benefit the electric grid. TNC and taxi vehicles could also be targeted through bulk discounts for off-peak purchase of electricity at public chargers and depots.³³

The Companies will address plans for future EV rate design in the EoT Workplan.³⁴

3.6 Low Income Considerations

The Companies have a long tradition of giving back to the Hawai’i community and our employees are strongly committed to serving the people of Hawai’i. We strive to align our policies, procedures, and programs to assist low-income customers while maintaining fairness and equity to all customers. We recognize that ensuring the affordability of electricity for all customers, including our low-income customer segment, is a critical factor in achieving Hawai’i’s 100 percent renewable goal.

Table 6 describes the Companies’ current programs for low-income customers.

Table 6: Low-Income Customer Programs

Program Name	Description
Green Energy Money Saver (GEM\$) On-Bill Money Saver Program	Helps customers reduce electricity costs of PV systems, solar hot water systems, heat pump water heaters, and commercial energy efficiency retrofits which are repaid through the customer’s electric bill.
Ohana Energy Gift Program	Allows customers to gift friends, families, and others with donations.

³³ EoT Roadmap, at 76–77.

³⁴ Order No. 36448, at 19–20.

Program Name	Description
Community-Based Renewable Energy (CBRE)	Allows electric utility customers to purchase an interest in a renewable energy facility and receive bill credits for energy production to offset their monthly energy use. This program will expand in Phase 2 to specifically target the low-income segment.
Low Income Home Energy Assistance Program (LIHEAP)	A federal program that provides qualifying low-income households with a one-time credit.
Special Medical Needs Pilot Program	Offers a discount on the first 500 kWh in any month for customers who depend on life support equipment or have increased heating or cooling needs due to a medical condition. This program will end on March 31, 2020.

3.6.1 DER to Benefit All Customers

The future of DER in the State of Hawai'i should not be limited to those who have the financial means to invest in rooftop solar. Access to DER should be a possibility for all.

These energy resources, all connected to the utility distribution system, are by nature flexible and variable, in some cases with on-off, up-down controllability, but in other cases consuming power in an interruptible manner.

Going forward, we must increase access by:

- Broadening choices for customers to directly benefit from DER
- Expanding the types of energy and grid services that may be provided
- Expanding the options to provide those services
- Providing a “one-stop shop” when applying for interconnection
- Consolidating data and streamlining reporting on multiple programs

By casting a wide net and being inclusive of the asset types that fall under the definition of DER, the Companies are providing an increasing number of customers the opportunity to participate in the DER marketplace. Historically, DER tended to focus solely on rooftop PV, but the DER landscape contemplated in this strategy is much broader. Whether it is the rooftop PV customer, the EV customer, or the customer who merely upgrades an electric hot water heater to become grid-interactive, there are more ways than ever to participate in DER. Also, through the integration of DR and DER, customers have simpler, unified opportunities to maximize value from DER.

The section that follows presents a collection of initiatives underway that create this opportunity to bring the benefits of DER to all customers.

3.6.2 Community-Based Renewable Energy Program

Many residents and businesses are currently unable to directly participate in renewable energy generation because of their location, building type, or access to the electric utility grid. The CBRE program allows electric utility customers to purchase an interest in a renewable energy facility and receive bill credits for the energy produced from their interest to offset their monthly electric bill. Thus

far in Hawai'i, distributed renewable energy systems, such as PV systems, have only been available to those who have the ability to generate electricity onsite.

On June 29, 2018, the Commission approved the first phase of the CBRE program, which is limited to 8 MW across the Companies' jurisdiction (5 MW for O'ahu, 1 MW each for Maui and Hawai'i Island, and 0.5 MW each for Moloka'i and Lāna'i).

The Companies have accepted and continue to accept applications from interested companies, organizations, developers, and groups that want to become a subscriber organization and propose a community solar project. Under the rules established by the Commission, customers who want to participate will contract directly with a subscriber organization. Once a community solar project is complete and approved to send electricity to the grid, customers who participate (called "subscribers") will receive a credit on their monthly electric bill based on the output of the community solar project and their level of participation in the project.

The second phase of the CBRE program will include other renewable technologies beyond standalone solar (e.g., renewable energy projects paired with energy storage), and significantly expand the available subscriptions for customers. Special provisions have been imposed on the Companies to participate in Phase 2, such as the requirement that 50% of the capacity of CBRE facilities developed by the Companies must be reserved for low-to-moderate income subscribers, though subscriber organizations may enlist such customers in the first phase. We acknowledge the Consumer Advocate's comments on the lack of a requirement for low-to-moderate income subscribers for non-utility subscriber organizations and anticipate further discussion on that issue in the CBRE docket.³⁵

The Companies have been directed to work with organizations to define low-to-moderate income subscribers. As stated within the Companies' comments on CBRE Phase 2 filed in Docket No. 2015-0389 on August 19, 2019:

The Companies worked with Aloha United Way, Hawai'i Green Infrastructure Authority ("GEMS"), the Participants, The Department of Business, Economic Development, and Tourism ("DBEDT"), and the Consumer Advocate to review the LMI metrics, discuss the benefits of the HUD metric, and gain alignment on the proposed use of HUD's LMI metric. The Companies recommend that an LMI customer be defined according to the HUD definition for a Low- and Moderate-Income Person: 'Low- and Moderate-Income Person means a member of a family having an income equal to or less than the Section 8 low-income limit established by HUD.'

3.6.3 Financial Assistance for Low-Income Customers

Companies in other jurisdictions, such as the California investor-owned utilities (IOUs), provide rate discounts in tariffs for low-income customers who qualify under certain criteria. The Companies have an existing discount to Low Income Home Energy Assistance Program (LIHEAP) customers. LIHEAP is a federal program that provides qualifying low-income households with a one-time credit. Applicants may

³⁵ Consumer Advocate's preliminary comments, at 11–12.

apply once per program year for either an energy credit or for emergency crisis intervention. Residential customers who receive a LIHEAP credit are automatically enrolled in our LIHEAP tier waiver for 12 months, in which all residential energy use is treated at the first tier (lowest) rate. The Companies propose to retain the existing discount to LIHEAP customers. The Hawai'i Electric Light test-year 2019 rate case, for example, retained the form of the current discount to LIHEAP customers. The Companies will also be collaborating with the Consumer Advocate and other stakeholders regarding expanded State support to administer the LIHEAP program to enable greater usage and therefore greater allocations from the federal LIHEAP program to Hawai'i.

The Companies do not propose to make other additional subsidies available to low-income customers directly, unless they are opt-in. The Companies are currently exploring opportunities for customers to make voluntary contributions on their bill to support low-income energy programs. For example, based on an online survey, over 25 percent of those surveyed indicated interest in rounding up their bill to contribute to low-income energy programs (see Appendix D Customer Survey Results).

As discussed earlier, the Companies also propose to offer additional rate schedules that provide customers the opportunity to control multiple dimensions on their bill. For example, a multi-part time-variant rate would introduce a demand component on which customers who could control their demand would have the opportunity to save on their bill. Similarly, a TOU rate would introduce the opportunity to save on the bill depending on when the customer uses electricity. These designs would allow *all* customers—including low-income customers—the potential opportunity to save on their bill.

In addition, as discussed in Section 4.2 Enrollment Mechanisms and Implementation Plans, the Companies will partner with organizations who work with low-income customers as appropriate to better inform this group about the potential savings of these future offerings as they are developed and implemented.

3.6.4 Prospective Rate Offerings for Low-Income Customers

The Companies strongly believe that advanced rate offerings should facilitate equitable participation by all customers, including the low-income segment.³⁶

Therefore, we propose to investigate the possibility of rate design options for low-income customers to help facilitate more active engagement and choice for this critical customer segment. While these programs would not exclude others, we would be encouraging low-income participation. Three prospective options to be explored further include: budget bill, peak-time rebate, and a subscription plan.

Each is discussed in greater detail in the sections that follow.

3.6.4.1 Budget Bill

The Companies are in the process of investigating the possibility of budget bill and average bill options. With budget billing, customers have the security of knowing the amount of each electric bill over the

³⁶ D&O No. 36230, at 52.

course of a period of time. The Companies would project the cost of the budget bill customer's electric usage for that period and divide it into equal monthly payments. The budget bill approach allows customers to budget their finances without worrying about ups and downs in their electric bill.

As implemented in other jurisdictions, customers on this rate would typically pay their estimated annual bill in 12 equal monthly payments.³⁷ A typical budget bill would show actual charges, the amount billed, and the actual account balance over the course of a year. If the customer's billed amounts are greater than actual charges, then the balance will be applied to the next bills. If the customer's actual charges are higher than billed amounts for the year, then that balance would be equally divided over the next 12 months and added to the next budget bill amount for the next 12 months.

Another approach the Companies are considering is average billing, where fluctuations in customer bills are smoothed out over a rolling period over some number of months. With this approach, a typical design would be to set the first month's average bill amount based on a historical average similar to the budget bill. At the end of each succeeding month, the balance of the differences between the billed amount and actual charges would be divided by the number of months in the cycle and added or subtracted to the average bill amount, becoming the current average bill amount. The key difference between the budget bill and average bill is that the budget bill amount stays the same for each month during a particular cycle, while the average bill changes slightly each month.

3.6.4.2 Peak-Time Rebate

Peak-time rebate would provide low-income customers another option to lower their bills. See Section 3.3.1.3 for a brief description of peak-time rebate.

3.6.4.3 Subscription Plan

A subscription plan design that allows customers to opt in to a fixed monthly subscription fee, similar to an energy-as-a-service concept, with usage flexibility up to a predetermined threshold for kWh usage and fuel price may be considered. Similar to how mobile phone data plans operate today, kWh usage above the threshold would result in additional fees. Average fuel prices that exceed the threshold would also result in additional fees. Much like budget billing described in Section 3.6.4.1, this option provides for bill stability and a natural incentive to manage kWh usage. Moreover, a subscription plan may provide a platform by which the Companies could help deploy advanced energy solutions for low-income customers. By facilitating adoption of technologies that reduce a low-income customer's cost of service, such as DER or energy efficiency measures, a subscription plan could allow the Companies to capture some of that enhanced value. Low-income customers, in turn, may benefit from bill stability and the potential for greater resilience benefits—through the use of customer-sited solar and storage, for example.

³⁷ For example, Minnesota Power has a budget billing option. See <https://www.mnpower.com/CustomerService/BudgetBilling> for more details. Accessed on September 20, 2019.

3.7 The Relationship of ARDS to Other Dockets

Hawai'i has begun the process to decentralize, decarbonize, and digitize its electric grid, enabling achievement of the State's energy policy goals. In addition to transforming the Companies' resource mix, this process will fundamentally transform the way the grid operates, the products and services offered to customers, the way those products and services are priced and delivered to customers, the methods the utility uses to recover its costs, and the way the utility and third parties interact with, learn from, and serve customers.

The ARDS addresses critical aspects of this transition, namely those related to designing electricity rates that send customers accurate price signals while allowing the utility to recover reasonable costs of building a modernized electricity grid. Other aspects of this transition are addressed in several distinct but related dockets currently before the Commission.

The ARDS should be read in conjunction with the Companies' overlapping and parallel efforts across multiple domains including Integrated Grid Planning, Grid Modernization strategy, EoT strategy roadmap and subsequent workplan, DER and DR projects, and efforts to develop an updated performance-based regulation framework. Taken together, these efforts are designed to enhance customer choice and satisfaction while establishing an equitable playing field for the provision and consumption of electricity services, whether via centralized or distributed resources. The goal is to remove inefficient barriers to the integration of cost-effective new sources of electricity services, rethink misaligned incentives for certain resources, and present a system of prices and charges that can animate customer choice and inform decision-making to benefit the whole electricity system.

4 ARDS Roadmap

4.1 Timeline

Pursuant to the Commission's order, the following sections describe "a timeline for the Companies to offer updated dynamic rates for all residential and commercial customers including the introduction of time-varying rates, critical peak pricing, and real-time pricing rate structures."³⁸ Given uncertainties around the introduction of new technologies and customer experiences with them, the proposed timeline is less detailed in later years. Figure 6 shows the proposed timeline of the Companies' plan to propose different rate offerings from 2019 to 2024 and beyond. The timeline is an illustration that represents an initial starting point for further discussion. It is expected to evolve over time as the Companies receive stakeholder and market feedback and as the deployment of advanced meters and related technologies develops.

³⁸ D&O No. 36230, at 52.

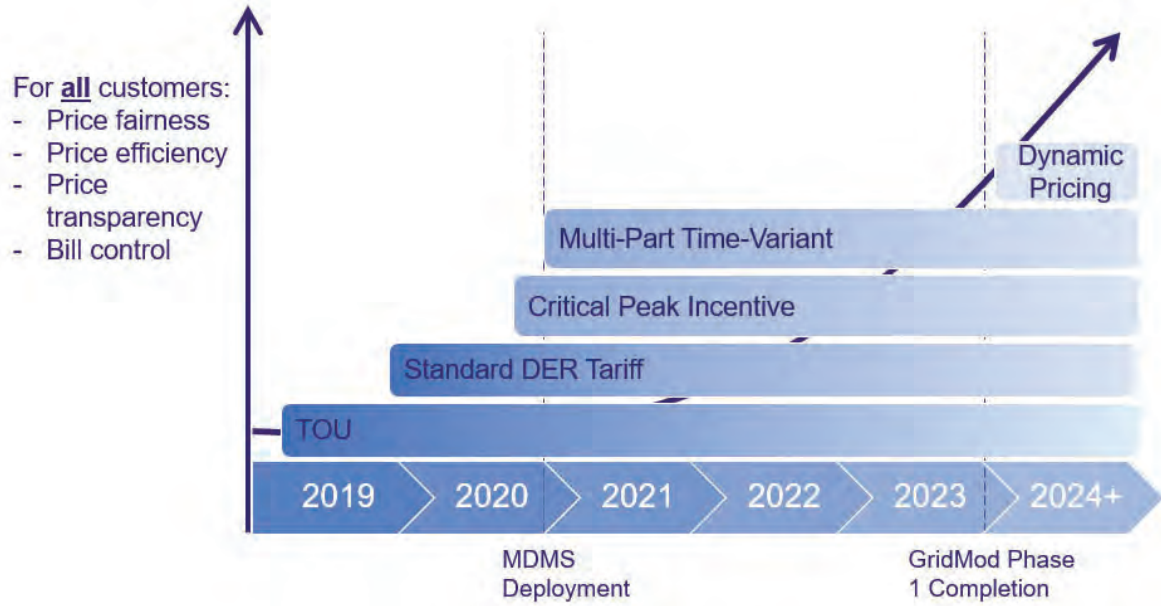


Figure 6: Proposed ARDS Timeline

Timeframe 1: Near Term (2019–2020)

The first step in this transition includes rates or rate modifications that can be proposed in the near term, without requiring the meter data management system (MDMS)³⁹ to be in service. The Companies currently propose filing the rate designs reflected in Table 7 in the near term.

Table 7: Timeframe 1 Rate Designs

Rate Design	Initial Rollout Methodology
Revised TOU rates	Opt-in for all customers
A standard DER tariff	<ul style="list-style-type: none"> • Opt-in for current DER customers • Default for new DER customers
Critical peak incentives	Determination to proceed on CPI
Multi-part time-variant rate structure	Pilot for small commercial and residential customers
EV rates	See EOT Roadmap and upcoming workplan

³⁹ Docket No. 2018-0141, *Grid Modernization Phase 1 Application*, filed on December 19, 2018, Exhibit B (*Project Justification with Business Case Support*), at 5.

Timeframe 2: MDMS to End of Grid Mod Phase 1 (2021–2023)

The second step begins when the MDMS enters service and continues until the end of Grid Modernization Phase 1. The Companies plan to evaluate the tariffs in Table 8 for possible filing, ranging from within six months after MDMS deployment to the end of Grid Mod Phase 1.

Table 8: Timeframe 2 Rate Designs

Rate Design	Initial Rollout Methodology
Revised TOU rates	<ul style="list-style-type: none"> • Opt-in for existing customers • Default for new customers
Critical peak incentives	Opt-in program for all customers if applicable
Multi-part time-variant rate structure	<ul style="list-style-type: none"> • Default for customers on a standard DER tariff • Opt-in for small commercial and residential
EV rates	<ul style="list-style-type: none"> • See EOT Roadmap and upcoming workplan

Timeframe 3: After Grid Mod Phase 1 (2024 and beyond)

The third step begins with the end of Grid Modernization Phase 1 in 2024. The Companies envision that we will begin addressing the issues in Table 9 after completion of Grid Mod Phase 1.

Table 9: Timeframe 3 Rate Designs

Rate Design	Initial Rollout Methodology
Revised TOU rates	Opt-out pilot, then default for all customers
Dynamic pricing	Pilot
EV rates	See EOT Roadmap

Additional Potential Rate Design Considerations

Based on ideas from presenters at the ARDS Workshop on July 15, 2019, discussion and feedback at the ARDS stakeholder meeting on August 23, 2019, and customer survey results, the Companies may also consider proposing the following additional rate designs within the DER docket or other appropriate venue, including residential rates for multi-family dwellings, consideration of exit fees, revisions to standby rates, establishing rates for curtailable loads, and prepay billing.

Two other considerations warrant some brief discussion based on the preliminary comments from the Consumer Advocate. The Consumer Advocate mentioned the need for the identification of the data required for each rate.⁴⁰ The Companies acknowledge their concern and believe that the underlying data required in the development of rate designs would be appropriately and thoroughly evaluated in the DER docket or related filings.

⁴⁰ Consumer Advocate's preliminary comments, at 3–4.

The implementation of an advanced rate design as a default regular rate would require substantial research and data acquisition, such as updated class load study data (as indicated in the Roadmap), cost-of-service studies, and potentially the data from the advanced meters themselves. In general, the Companies have the following data to support Timeframe 1 initiatives:

- The forecasted marginal cost of energy for 2019 for all divisions, with the forecasted marginal cost of energy for 2020 for all divisions expected in the November 2019 timeframe
- Customer, demand, and energy-related costs based on the most recent cost-of-service study as approved in the applicable rate case
- Class load study data that was used for the cost-of-service studies, and more recently updated class load study data for the Hawaiian Electric 2017–2018 study period which includes DER residential customers in the sample; a Hawai'i Electric Light class load study with a 2018–2019 period is in progress
- Historical billing determinants
- Additional interval data for certain customers

To avoid undue delay and following the proposed timeframe discussed above, the Companies generally propose to offer pilot rates first, which, due to their nature, can be offered on a revenue-neutral basis, and may not require the extensive analysis required of a permanent default rate. When advanced metering data becomes available on a widespread basis, the Companies will have substantially greater access to both updated class load study data as well as baseline customer data with which to improve advanced rate designs.

The Companies also acknowledge the Consumer Advocate's comment on supporting the unbundling of system costs,⁴¹ which certainly warrants further in-depth and thorough discussion in the DER docket or related filings. The Companies seek to better align retail rates with cost causation through greater use of attribute and temporal pricing, and fairly allocate embedded fixed costs.

4.2 Enrollment Mechanisms and Implementation Plans

Customer education and outreach are central to the Companies' ARDS implementation plans. The Companies' customer education and outreach activities seek to:

- Achieve participation in the advanced rate options through raising customer awareness
- Gain positive perceptions of the offerings
- Provide information that motivates enrollment
- Ensure that customers are obtaining their desired outcomes leading to both satisfaction and ongoing participation

Each customer's needs are unique, and a one-size-fits-all approach to encouraging customer participation in advanced rate options will not be effective. Targeted and customized communications to various sectors of our communities will help achieve desired levels of participation in advanced rate options. Segmentation will provide the ability to target the introduction of advanced rate options to

⁴¹ Consumer Advocate's preliminary comments, at 9.

groups who are able to participate and benefit. Targeted audiences will be determined through market research addressing factors such as:

- Rating a customer’s engagement level with their energy usage
- Understanding the opportunity to control energy usage and benefit from it
- Determining energy usage and patterns that dictate potential benefits
- Reaching customers “where they are”
- Identifying interest in fairness, renewable energy, cost savings, cost stability, etc.
- Grouping by geography, affiliations, ownership, campus, and facility types

Transparency in messaging and providing examples of relevant case studies will be used to avoid overselling individual cost benefits that may not be achievable through small behavior changes. Care will be taken with communications to set realistic expectations about the “what” and “when” of the tools, services, and functionality that will be available to customers. Once customers are aware, interested, and engaged, holistic details of participation in advanced rate options such as the inclusion of rooftop PV, energy storage, energy efficiency, and opportunities for demand response functionality will be communicated.

Outreach and education occur through customer engagement in multiple ways—newsletters distributed in bills and posted online; an e-newsletter for commercial customers; social media channels such as Twitter, Facebook, and Instagram; our mobile app and websites; and direct email, among others. These platforms can be employed to put out a call to action, and to educate customers about various rates. Customers also interact directly with the Companies’ employees through call centers and account managers.

Also effective are public meetings or community events where customers can hear from our in-house experts about advanced rates. Traditional media is available, and news releases are still picked up by broadcast and print media outlets.

When customers are aware of potential rate offerings and are interested in signing up for them, convenient enrollment mechanisms are necessary. The Companies offer multiple channels for both engagement and enrollment.

With the goal of ease of use and providing a seamless customer experience, our website’s customer-facing portal will educate customers about advanced rate options and provide tools to research, select, and enroll in the desired rate or program. It will also allow customers to access and make use of their energy usage data. The Companies will continue to use a variety of channels ranging from email to social media to expand education and outreach. Table 10 describes the Companies’ channels for engaging with customers and driving enrollment.

Table 10: Customer Engagement Channels

Channel	Description
Customer Care Representatives (CCRs)	Our call center continues to be the vehicle of choice for customers even with the introduction of our online customer portal in 2012. Enrollment by residential customers in rate programs such as TOU is managed by CCRs who are trained to enroll customers over the phone.

Channel	Description
SAP Utilities Customers E-Services (UCES) Portal	This portal provides self-service options such as starting, stopping, and transferring electric service and viewing and paying monthly electric bills.
Customer Energy Portal	As part of Grid Modernization Phase 1, this channel will provide customers with access to energy usage data from their advanced meters with standardized Green Button interface and functionality. ⁴²
Customer Interconnection Tool	This browser-based application tool gives customers and their contractors visibility into the DER program enrollment process.
Account Management and Customer Business Management Services	One-on-one services help commercial, government, and military customers meet their energy needs while operating efficiently and reducing costs. Generally, these managed customers use their relationships with their trusted energy partner to enroll in existing programs, riders, and tariffs.
Hawai'i Energy	Through ongoing collaboration with the State's energy efficiency programmatic entity, the Companies can convey customer options through an additional customer outreach channel. This is particularly well-aligned and targeted in that most customers with whom Hawai'i Energy interfaces are focused on cost-saving opportunities. Facilitating this partnership and aligning messaging is another means by which Hawaiian Electric delivers value in our role as a trusted energy partner.
Competitive Procurement	This is a newer pathway for the Companies. For all procurements, a third-party aggregator is responsible for direct customer engagement (recruitment, enrollment, and enablement). The Companies intend to offer third-party aggregators the opportunity to provide all relevant visualization as a service through our demand response management system customer portals as well, or instead of, the third-party option.

Our employees are our greatest resource in rolling out new rates and programs. Customer service agents can answer basic customer questions and know when to send customers to subject matter experts who can answer more complex inquiries. Commercial account managers will be able to meet one-on-one with customers to find advanced rate options best suited for their needs.

The upcoming UCES online portal replacement (expected to be completed at the end of 2020) and integration with the Customer Energy Portal will provide an opportunity for customers to select a solution that supports interval data presentation and modeling to easily identify and act upon desired advanced rates. Customers will be able to access their interval data information via the Green Button technology and then enroll in new TOU rates.

The Companies are on a path to an enhanced user experience where customers can see more and do more, especially in relation to rates. Just as we are modernizing our grid, we will also modernize our

⁴² U.S. Department of Energy, *Green Button*, Accessed August 14, 2019, <https://www.energy.gov/data/green-button>.

customers' experiences. The steps needed to take the Companies from current state to future state while ensuring alignment with corresponding efforts include:

- Including customer education and enrollment preferences in customer and stakeholder engagement conversations
- Aligning the expectations of customers with the projected advanced meter deployment schedule through education and outreach
- Reaching out to utility industry peers and identifying best practices for advanced rate design enrollment mechanisms
- Planning and executing deployment of appropriate processes and technology to support customer education and enrollment mechanisms as each new rate offering is developed and becomes available

4.3 Evaluation

The Companies plan to monitor, verify, and improve the effectiveness of advanced rate designs along the key spectra outlined in Section 3.2, Guiding Principles to Inform ARDS Development. Another key objective for advanced rate designs is that they facilitate development of the correct quantity of DER called for in the Power Supply Improvement Plan. To accomplish these goals, the Companies will apply a regimented approach in order to examine the effectiveness of the advanced rate designs and to identify any necessary improvements.

Findings will be fed back into the rates and, as a result, the rates will be refined, discontinued, or resumed, depending upon the outcome of the total evaluation process. In some cases, the findings will result in the development and piloting of a new rate.

Figure 7 illustrates the process for developing and improving rate designs. As rates are developed and deployed, they will be evaluated against various metrics, which will influence the next version of the rate.

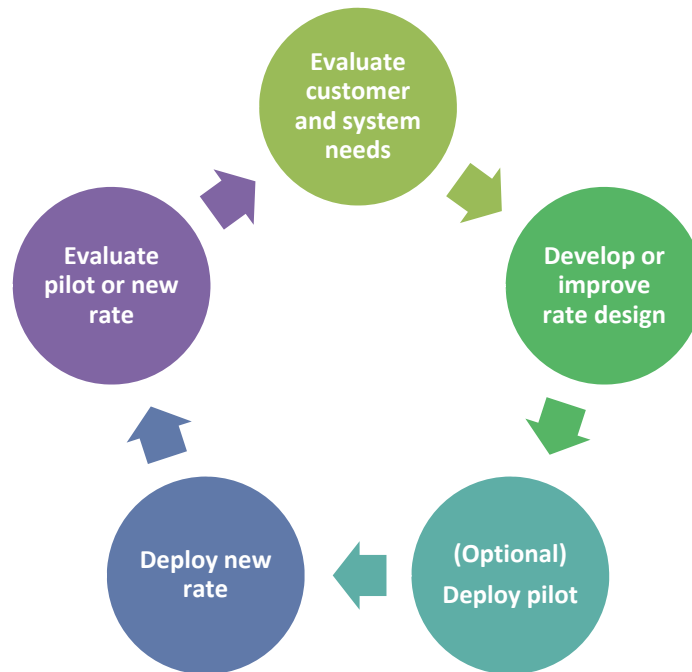


Figure 7: Process for Iterating on Rate Designs

For example, the Companies intend to propose a multi-part time-variant rate with fixed, demand, and energy charges that accurately reflects the underlying cost of service to help ensure both fairness among customers and efficient price signaling to customers. To do this, one approach might be to calculate the marginal and fixed costs via a cost-of-service study and compare that to the signals being sent through rate design. To the extent that these are misaligned, the Companies may propose to update the rate to improve its effectiveness.

Generally, the Companies will evaluate specific metrics associated with advanced rate design options. The following represents an illustrative set of metrics that could be considered in an advanced rate design evaluation:

- Number of meters deployed
- Total cost of meters deployed
- Number of customers using advanced rate design
- Total quantity of DER adopted (solar PV, battery storage, etc.)
- Estimated change in system and local load profiles using statistical baselining analysis
- Estimated change in short-run costs using the calculated marginal cost of energy
- Estimated change in long-run costs using a capacity expansion model that calculates long-run fixed investment and marginal operational costs
- Estimated reductions in CO₂ emissions caused by load shifting

The following sections are illustrative examples of how evaluation has been done or proposed for other initiatives. While we expect future evaluation of advanced rate designs to follow this general framework, they are not necessarily indicative of what will be done in the future, as different advanced rate designs or programs may have different goals and are designed around different system or customer needs.

4.3.1 Example: Demand Response Evaluation

Potential cost-benefit analysis for the entire DR Portfolio, and specifically for day-ahead pricing and CPI programs, was analyzed as part of the Revised DR Portfolio Application. The underlying value of all services, and in the case of the pricing programs, the capacity service, will be reassessed as part of the Integrated Grid Planning efforts beginning in early 2020. Once this has been done and a new avoided cost is determined for the capacity grid service, the Companies will reassess the cost effectiveness of the day-ahead pricing rate. Incorporated into this revised analysis, which is scheduled for mid-2020, will be the refinement of the costs associated with the enabling technologies. This information will be fed into the evaluation, measurement, and verification (EM&V) process as the Companies assess the realization of benefits.

The DR Portfolio is designed and intended to be a resource to be used by system operators while providing benefits to all customers. In order to continually improve this resource and ensure that benefits are being realized by the system—and therefore by our customers—the portfolio must be evaluated continuously through measurement and verification techniques, as well as more qualitative mechanisms. The Companies have selected an EM&V consultant to support these efforts over a three-year contract period. This contract is currently awaiting Commission approval.

In D&O No. 32538, the Commission agreed to a three-year EM&V cycle and reporting within the modifications and evaluations (M&E) yearly filing. The consultant’s scope of work centers on Goals 1–4, described in Table 11 below, to be reported within the Companies’ yearly M&E filing. In Phase 1, consultants will measure and verify participant and aggregator performance through an annual impact analysis. This effort incorporates an evaluation of the Companies’ approach to benefits realization, assessing the method used to calculate performance (i.e., settlement calculation). Phase 2 is focused on evaluating the structure and administrative effectiveness of the portfolio. The consultant will provide recommendations to decrease portfolio costs, increase renewables, enhance customer satisfaction, and recommend modifications to portfolio structures. The consultant will interview system operators, customers, planners, aggregators, and other key stakeholders and will use their industry relationships to bring a broader frame of reference to their recommendations. Key to the effectiveness of this evaluation and continuous improvement is the feedback loop established between the Companies and the customers, capturing participating customer feedback at regular intervals to inform the evolution of the offerings.

Table 11: Demand Response EM&V Portfolio Goals

Goals	Summary of Purpose
1. Cost effectiveness	The Grid Service portfolio is not successful unless it reduces cost to all of the Companies’ customers. These categories help determine if the Companies are successful in increasing financial benefits.
2. Target MW	
3. Reliable delivered capability	
4. System operation utilization	
5. Customers satisfaction	Customers must use the program and enjoy participating in it.
6. Low income	
7. Renewables	The portfolio should support the increase of renewables to help meet the State RFP goal of 100% renewables by 2045.

4.3.2 Example: Electrification of Transportation Evaluation

Currently, the Companies file annual reports to the Commission for the EV-U, EV-F, E-BUS-J, and E-BUS-P tariffs. E-BUS-J and E-BUS-P also include annual surveys that obtain customer feedback in their annual report.

Annual reports for the EV-U and EV-F program include analyses for each charge station by time-of-use period. Data is reported on the number of sessions, amount of energy consumed, and duration of charge. The annual report includes the revenues collected and costs for each charge station, as well as the capital costs. A recommendation to the Commission is also included on whether the rates should be adjusted.

For the E-BUS-J and E-BUS-P pilot program, the annual reports will include the following at a minimum:⁴³

- The number of customer accounts enrolled in the E-BUS program
- The number of battery electric buses acquired per customer account enrolled in the E-BUS program
- Based on the participants' responses to an annual survey, the participants' feedback regarding the overall experience with the effectiveness of the E-BUS program
- The estimated E-BUS program implementation costs
- Revenues collected under the E-BUS program
- The kWh consumption by TOU period
- Assessment of whether a demand charge is appropriate, including the supporting analysis and data
- The total number of battery electric bus miles in each pilot program year, as provided by participants
- The number of customer accounts expected to be enrolled in the next pilot program year
- The number of battery electric buses expected for each anticipated customer account
- The estimated reduction in greenhouse gas emissions associated with the pilot program, including a description of the methodology used in calculating the emissions and supporting data

5 Data and Privacy

Managing access to data is a key requirement for enabling customer choice and control. As distribution grids are transformed into integrated grids that support the two-way flow of data and power, the overall power environment moves from one of low data intensity to one of high data intensity.

Consistent with Commission guidance and direction, the Companies are simultaneously filing a Data Access and Privacy policy. This Data Access and Privacy Framework (the Framework) articulates how customers will be able to take advantage of access to their data, creating more robust customer

⁴³ *Transmittal No. 18-06 For Approval to Establish an Electric Bus Tariff for Schedule J - General Service Demand and Schedule P – Large Power Service, on a Pilot Basis, Order No. 36220, issued on March 20, 2019, at 41–42.*

engagement, as well as how customer data will be protected in the context of the Companies' grid modernization initiatives.

The Framework covers usage data from advanced meters and the ways and conditions under which the data may be used by the Companies, customers, and third-party entities. It specifies when data usage or sharing requires explicit customer consent and what obligations fall on the Companies and other entities to protect customer data and notify customers in the event of data compromises. Under the Framework, the Companies are required to provide a clear and comprehensive policy for data use and sharing, as well as processes under which customers can:

- Access or correct their data
- Revoke their consent
- Limit the collection or use of their data
- Provide authorization for a third party to access their data

The final section in the Framework includes procedural safeguards by which customers and the Commission can hold the Companies accountable to the Framework through complaints, recordkeeping, and reporting.

The ARDS complements the Data Access and Privacy Framework in that advanced meter data may be used by the Companies to design, implement, and evaluate advanced rate designs. The secure access that the Framework will enable will allow customers and trusted third parties to use the data to evaluate alternative rate offerings and potential cost savings.

The Framework defines four primary purposes. For each primary purpose, the Companies may access, collect, store, and use covered information without customer consent. The primary purposes covered by the Framework are to:

1. Provide or bill for electrical power
2. Provide for system, grid, or operational needs
3. Provide services as required by State or federal law, or as specifically authorized by an order of the Commission
4. Plan, implement, or evaluate grid services, demand response, energy management, or energy efficiency programs⁴⁴

The Companies may utilize the usage data in their design and implementation of new rate designs. The Companies may also use the usage data for ongoing evaluation of these rates and programs, as described in the Section 4.3 Evaluation. The relevant data for these purposes will be made available to the Companies through the deployment of the advanced meters and their corresponding infrastructure.

The Companies may also reference usage data to educate customers on the potential benefits of advanced rates. However, all identifying information must be removed before being presented to

⁴⁴ Docket No. 2018-0141, *Hawaiian Electric Companies' Data Access and Privacy Policy*, filed on September 25, 2019, Appendix C (*Data Access and Privacy Framework*).

customers to ensure that an individual, family, household, or residence cannot reasonably be identified or re-identified from the information provided by the Companies.

Furthermore, the Framework defines policies related to individual access and control:

- **Access.** Upon request, covered entities must provide customers with convenient and secure access to their covered information in an easily readable format. Customers must be able to see all of their covered information in the same detail that it is being presented to third parties. Therefore, the data requested by and provided to customers must be at least as detailed as the information provided to third parties.
- **Control.** Covered entities must provide customers with convenient mechanisms for:
 - Granting and revoking authorization for secondary uses of covered information
 - Disputing the accuracy or completeness of covered information that the covered entity is storing or distributing for any primary or secondary purpose
 - Requesting corrections or amendments to covered information that the covered entity is collecting, storing, using, or distributing for any primary or secondary purpose⁴⁵

For company-administered program and advanced rate options, customer data will be integral to providing customers with information about their consumption and the economic impact of that consumption. For example, providing customers with the opportunity to see how their hourly usage choices impact their bills will empower them to make informed decisions or behavioral changes that will provide them some control over their bills. Under the Framework, customers will have access to their own advanced metering usage data to potentially enable better decision-making.

Customers may also provide third parties with access to this usage information. Unless the third party is acting under contract with the Companies, under contract with the Commission, or as part of a Commission-authorized program, the third party would need to obtain the customer's explicit authorization to access customer usage data. However, by providing such authorization, the customer could benefit as in the following examples:

- Allowing data access by a third-party demand response aggregator would allow the aggregator to send the customer real-time information about bill impacts giving the customer a chance to alter their behaviors.
- Since the aggregator manages an entire portfolio of similar customers, access to this data in real time allows them to continuously monitor and manage their entire portfolio to deliver their commitment to the Companies and allows the aggregator to realize the cost effectiveness of the procurement.

For more information on the Framework, see the Data Access and Privacy Policy that was filed in Docket No. 2018-0141 on September 25, 2019.

⁴⁵ Ibid.

6 Next Steps

As the Companies implement plans to modernize our island grids and usher in a clean energy future, it's imperative that rate designs are fashioned to better fit customers' needs by promoting equity and affordability. The Companies recognize that rate design must catch up with technology and consumer expectations, and this Advanced Rate Design Strategy outlines how that can be achieved in the near term and over time.

The Companies believe this strategy will help guide development of rate designs and proposals to, above all, give customers choices. Well-designed rates should:

- Inform and enable customers to better manage energy costs and create opportunity to participate in the energy transformation
- Encourage behavior and investments that optimize grid performance and lower system costs
- Fairly allocate costs and value resources and services
- Promote affordable customer bills aligned with system costs

These tenets will help guide the Companies as we oversee the progression toward more sophisticated, customer-focused rate structures.

Appendix A Industry Literature Review

In developing this ARDS, the Companies also reviewed suggested rate design best practices in industry literature. Table 12 summarizes key ideas and takeaways from these resources.

Table 12: Rate Design Best Practices: Summary of Industry Literature Review

Entity	Publication	Suggested Best Practices
Regulatory Assistance Project (RAP)	<i>Smart Rate Design for a Smart Future</i> ⁴⁶	<ul style="list-style-type: none"> • Modern rate design must reflect bidirectional, time-sensitive prices • The best way to reflect costs and encourage efficiency and equity is through time-varying and dynamic pricing • Advanced pricing mechanisms can provide more customer choices and fair allocations of costs and benefits to all ratepayers • Utilities should explore TOU rates, critical peak pricing, peak-time rebates, and real-time pricing • Customer charges should be limited to customer-specific costs associated with an additional customer (e.g., service drop, billing, collection) • Demand charges or connected load charges are generally inappropriate for residential and small commercial customers • Minimum bills are undesirable
Regulatory Assistance Project	<i>Electric Utility Residential Customer Charges and Minimum Bills</i> ⁴⁷	<ul style="list-style-type: none"> • Minimum bills would ensure that all customers contribute to distribution costs, but without significantly stimulating consumption by higher-use customers or raising the bills of lower-income, low-use customers
Rocky Mountain Institute (RMI)	<i>Rate Design for the Distribution Edge</i> ⁴⁸	<ul style="list-style-type: none"> • Advocates for unbundled rate structures, time-of-use or real-time pricing, and location granularity • Bundled, volumetric block rates may provide misaligned

⁴⁶ Jim Lazar, Wilson Gonzalez, *Smart Rate Design For a Smart Future*, The Regulatory Assistance Project, July 2015, <http://www.raonline.org/wp-content/uploads/2016/05/rap-lazar-gonzalez-smart-rate-design-july2015.pdf>.

⁴⁷ Jim Lazar, *Electric Utility Residential Customer Charges and Minimum Bills: Alternative Approaches for Recovering Basic Distribution Costs*, The Regulatory Assistance Project, November 13, 2014, <https://www.raonline.org/wp-content/uploads/2016/05/rap-lazar-electricutilityresidentialcustomerchargesminimumbills-2014-nov.pdf>.

⁴⁸ Devi Glick, Matt Lehrman, Owen Smith, *Rate Design for the Distribution Edge*, Rocky Mountain Institute, August 2014, https://rmi.org/wp-content/uploads/2017/04/2014-25_eLab-RateDesignfortheDistributionEdge-Full-highres-1.pdf.

Entity	Publication	Suggested Best Practices
		<p>price signals regarding DER implementation</p> <ul style="list-style-type: none"> • More granular sophisticated pricing is needed where prices fully reflect a two-way exchange of value and services between utilities and customers • Regulators can identify more sophisticated rate options (e.g., TOU rates with demand charges), which could become the default within a few years
The Brattle Group	<i>Rate Design 3.0 and the Pricing Frontier</i> ⁴⁹	<ul style="list-style-type: none"> • A three-part residential rate should replace the existing two-part residential rate • TOU energy rates should be integrated into the residential rate • Two-part residential rates are misaligned with the utility’s cost structure • Three-part rates are already common for commercial and industrial (C&I) customers and more accurately reflect the utility’s cost structure • Advanced metering can facilitate rolling out new three-part residential rates • 40+ U.S. utilities offer a three-part residential rate as either an opt-in or opt-out option⁵⁰
Ashley Brown (Harvard University)	<i>The Urgent Need for Retail Electricity Prices that Reflect Costs</i> ⁵¹	<ul style="list-style-type: none"> • Most residential rates do not offer a meaningful signal of how costs are incurred or reduced • A variable component of the bill collects most revenues even though much of that component recovers fixed or demand-related costs • Most retail pricing fails to reflect supply and demand at specific times and locations • Utility prices should include fixed, variable, and demand charges • Energy rates should be based on the real-time locational price

⁴⁹ Ahmad Faruqi, *Rate Design 3.0 and the Efficient Pricing Frontier*, The Brattle Group, May 15, 2018, https://brattlefiles.blob.core.windows.net/files/13846_rate_design_3_0_and_the_pricing_frontier_05-11-2018.pdf.

⁵⁰ *Application for Authority to Increase Retail Electric Utility Service Rates and Approval of Electric Service Schedules and Rules and Allocated Cost of Service and Rate Design, Testimony and Exhibits, Volume II*, Northwestern Energy, Docket No. D2018.2.12, September 28, 2018, 52–53, Table 7, <https://www.northwesternenergy.com/docs/default-source/rate-case-2018/volume-ii.pdf>.

⁵¹ *Leadership in Rate Design*, American Public Power Association, May–June 2019, <https://www.publicpower.org/system/files/documents/Leadership-in-Rate-Design.pdf>.

Entity	Publication	Suggested Best Practices
		<ul style="list-style-type: none"> • Cross-subsidies should be avoided, but where they are used, they should be transparent • Price signals to customers should be actionable • Customers who have distributed generation should be recognized as a partial requirements class of customer • A three-part residential rate better aligns customer prices with service costs⁵²
ScottMadden	<i>Distributed Resources and Utility Business Models – The Chronicle of a Death Foretold</i> ⁵³	<ul style="list-style-type: none"> • Grid costs should be recovered in the rate structure, regardless of whether customers self-supply • Further customer segmentation and different rate structures (e.g., standby service and unbundling) may be needed
National Renewable Energy Laboratory (NREL)	<i>Impact of Rate Design Alternatives on Residential Solar Customer Bills</i> ⁵⁴	<ul style="list-style-type: none"> • Reducing underlying bill impacts is better accomplished via minimum bills or demand charges instead of higher fixed charges • Unlike fixed charge increases (which generally increase all customer bills), minimum charge increases only impacted customers in months in which they used little grid-supplied electricity, and typically had a negligible impact on customer bills except for customers that offset a high percentage of their load with PV generation • Demand charges resulted in an increase in utility bills for some PV customers but not for others, depending on the rate design

The industry white papers discussed above all generally agree that the residential two-part rate, with a non–time-variant energy rate and a simple customer charge or minimum bill, has significant shortcomings. The Companies agree with this assessment. The question is how to address those shortcomings. The Companies have additional research of best practices in Appendix B, Appendix C, and Appendix F.

⁵² Affidavit of Ashley C. Brown, Docket No. 16-GIME-403-GIE, filed on March 17, 2017 on behalf of Westar Energy.

⁵³ ScottMadden Management Consultants, *Distributed Resources and Utility Business Models – The Chronicle of a Death Foretold?* 2013, <https://www.scottmadden.com/wp-content/uploads/userFiles/misc/afef86e13d483c06c91fefbc450893a92.pdf>.

⁵⁴ NREL, *Impact of Rate Design Alternatives on Residential Solar Customer Bills: Increased Fixed Charges, Minimum Bills and Demand-Based Rates*, September 2015, <https://www.nrel.gov/docs/fy15osti/64850.pdf>.

Appendix B Jurisdictional Review

The Companies' development of this ARDS was informed by rate design programs and offerings in other jurisdictions. This section presents brief summaries of pilot offerings by Oklahoma Gas and Electric (OG&E), Sacramento Municipal Utility District (SMUD), and Nevada Energy (NV Energy) under the U.S. Department of Energy's (DOE) Smart Grid grant.⁵⁵ These programs were chosen because they featured:

- Large-scale deployments of advanced meters
- Both TOU *and* either a critical peak pricing (CPP) or variable peak pricing (VPP) pricing structure available to a large number of customers
- Above-average enrollment in at least one time-of-use, CPP, or VPP pricing structure relative to other DOE grantees

The primary reported driver for customers in the programs at all three companies was the opportunity to save money. Marketing reinforced the customer's opportunity to save while also promoting other program aspects (e.g., environmental benefits). All companies had follow-up customer surveys and/or focus groups. TOU plans were generally seen as easier to understand than CPP or VPP programs, and participants reported enjoying feeling in control of their bill.

Despite the pilot proposals, the default residential rate offerings at OG&E and NV Energy remain a non-time variant two-part rate, as discussed below. SMUD transitioned to a time-variant default residential rate. We also looked at the New York REV proceeding and some of the rate structures and proposals of additional companies, including Arizona Public Service (APS), San Diego Gas and Electric (SDG&E), and Commonwealth Edison.

NV Energy

The NV Energy Pricing Trial was a two-year program which included TOU and CPP features on an opt-in basis. The intent of the trial was to monitor and understand household changes in electricity use that may occur in response to time-varying rates, education, and programmable thermostats.⁵⁶

Most—but not all—customers responded to the rate by changing their consumption, resulting in savings. Many did not save significantly but reported being satisfied with saving something and having additional prospects for savings in the future.

NV Energy had a consumer behavior plan developed in October 2010 and rate tariffs were approved (but not in effect) in March 2011. Rates were modified in October 2012 and went into effect in March 2013. A summary of the TOU rates is shown in Table 13 and Table 14. Note that there are two separate

⁵⁵ U.S. Department of Energy, *Advanced Metering Infrastructure and Customer Systems: Results from the Smart Grid Investment Grant Program*, September 2016, available at https://www.energy.gov/sites/prod/files/2016/12/f34/AMI%20Summary%20Report_09-26-16.pdf.

⁵⁶ NV Energy, *Nevada Dynamic Pricing Trial Final Report*, October 2015, at 9. Available at https://www.smartgrid.gov/files/NV_Energy_NDPT_Final_Report_20151026.pdf.

jurisdictions, for a total of four sets of rates—one each for TOU and CPP in the north, and one each for TOU and CPP in the south.

Table 13: NV Energy North Residential TOU Rates, Smart Grid Pilot

Period	Off-Peak	Mid-Peak	On-Peak
Winter (Oct through June)	6.785 cents/kWh	N/A	10.106 cents/kWh (5 p.m. to 9 p.m.)
Summer (weekdays)	6.785 cents/kWh	21.196 cents/kWh (10 a.m. to 1 p.m., 6 p.m. to 9 p.m.)	39.556 cents/kWh (1 p.m. to 6 p.m.)
Summer (weekends)	6.785 cents/kWh (all periods)	N/A	N/A

Table 14: NV Energy South Residential TOU Rates, Smart Grid Pilot⁵⁷

Period	Off-Peak	On-Peak
Winter (Oct through June)	7.218 cents/kWh	N/A
Shoulder (June, Sept)	7.218 cents/kWh	14.242 cents/kWh (2 p.m. to 7 p.m.)
Summer (Jul, Aug)	7.218 cents/kWh	44.871 cents/kWh (2 p.m. to 7 p.m.)

Rates were revenue-neutral (same bill for same consumption pattern) versus the flat rate and were based on the marginal costs by time period.

In terms of evaluation and outreach, NV Energy used a third party to test education treatments. These treatments included an online game application, a welcome kit, a second welcome kit with playing cards, monthly energy reports (mailed separately from the billing statement), and a smiley face graphic to indicate if the customer was saving money. They also conducted customer surveys, focus groups, and in-home interviews.

After the pilot, the default residential rates for NV Energy remain a two-part rate, with a non-time-variant energy rate and a fixed charge. The company does retain an opt-in TOU residential rate.

⁵⁷ Ibid., at 20.

Table 15: Default Residential Rates, NV Energy, as of September 2019^{58,59}

Location	Rates
Northern Nevada	<ul style="list-style-type: none"> 9.221 cents/kWh before surcharges/riders Fixed charge of \$15.25/month
Southern Nevada	<ul style="list-style-type: none"> 11.205 cents/kWh before surcharges/riders Fixed charge of \$12.50/month

Nevada Energy also offers a budget billing option to its customers.⁶⁰

Oklahoma Gas & Electric

OG&E offered pilot TOU rates with critical peak pricing as shown in Table 16. The goal of this study was to measure the impact of price responsive in-home equipment and the consumer acceptance of dynamic pricing on energy usage.⁶¹

Table 16: OG&E Residential TOU Rates, Smart Grid Pilot⁶²

Period	TOU Rate	Notes
Off-Peak	4.2 cents/kWh	N/A
On-Peak (summer weekdays, 2 p.m –7 p.m.)	23 cents/kWh	N/A
Critical Event	46 cents/kWh	Minimum of 2 hours of notice, maximum of 120 hours per calendar year

OG&E also offered a variable peak pricing (VPP) pilot program. Marketing collateral focused on on-peak versus off-peak consumption and potential bill savings. Their message of “Smart Study Together” resonated well with consumers who wanted to take control of their bill. The largest reasons cited for joining the study were to save money (30%) and to save energy and help the environment (22%). Very

⁵⁸ NV Energy, *NV Energy 2019 Q3 Southern Nevada Electric Rate Schedules for Residential Customers*, https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/about-nvenergy/rates-regulatory/np_res_rate.pdf, accessed September 20, 2019.

⁵⁹ NV Energy, *NV Energy 2019 Q3 Northern Nevada Electric Rate Schedules for Residential Customers*, https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/about-nvenergy/rates-regulatory/spp_nv_resrates.pdf, accessed September 20, 2019.

⁶⁰ NV Energy, *Equal Pay*, <https://www.nvenergy.com/account-services/payment-and-billing/equal-pay>, accessed September 11, 2019.

⁶¹ OG&E, *Consumer Behavior Study Evaluation Report*, August 2012, at 3.

⁶² OG&E, *Smart Study Together Impact Results*, Final Report – Summer 2011, at 1–2.

few joined to help the utility or to help the utility defer costs. The main cited behavior changes were shifting laundry (89%) and dishwashing (82%) outside of on-peak hours.⁶³

While OG&E offered an in-home display, some participants reported that the device did not work, and others reported that the information on the in-home display either was incorrect or did not reconcile with their billing statement. Some customers felt that they were inconvenienced to save, but a majority of those, especially low-income customers, reported that the inconvenience was worth the savings. Participants enjoyed being in control.⁶⁴

Customers found time-of-use pricing easier to understand than variable peak pricing. VPP created some uncertainty among customers. They were also concerned around the critical peak events that OG&E could call and were somewhat suspicious as to OG&E’s motivations behind those events.

OG&E’s current residential rates involve a non–time-variant two-part rate, with a tiered energy charge and a fixed charge. They also retain an optional time-of-use residential rate. OG&E’s default residential rates as of September 2019 for Oklahoma are shown in Table 17.

Table 17: OG&E Default Residential Rates (Oklahoma)⁶⁵

Period	Rate Structure
Summer (June–October)	<ul style="list-style-type: none"> • 6.35 cents/kWh (first 1,400 kWh) • 7.09 cents/kWh (each additional kWh) • Fixed charge of \$13/month
Winter	<ul style="list-style-type: none"> • 6.35 cents/kWh (first 600 kWh) • 2.43 cents/kWh (each additional kWh) • Fixed charge of \$13/month

OG&E also offers a flat bill option to its customers.⁶⁶

⁶³ OG&E, *Smart Study Together Research Summary*, August 2012, at 7.

⁶⁴ *Ibid.*, at 11.

⁶⁵ OG&E, *Standard Pricing Schedule: R-1*, <https://www.oge.com/wps/wcm/connect/9be438eb-c779-4322-afd7-cc0d28766738/3.00+-+R-1+Stamped+Approved.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-9be438eb-c779-4322-afd7-cc0d28766738-mhas4dQ>, accessed September 20, 2019.

⁶⁶ OG&E, *Standard Pricing Schedule: R-GFB*, <https://www.oge.com/wps/wcm/connect/b0dfb8a0-e14d-46df-89d5-ec440b121054/3.40+-+R-GFB+Stamped+Approved.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-b0dfb8a0-e14d-46df-89d5-ec440b121054-mhatdQf>, accessed September 11, 2019.

Sacramento Municipal Utility District

The planned goals of the Sacramento Municipal Utility District (SMUD) TOU rates in its SmartGrid pilot program were to provide a clear high-price signal during the summer peak, encourage customers to shift loads by lowering prices during non-peak periods, and ensure that customers who could not shift load were not penalized with bills significantly higher than under the otherwise applicable rate.

Table 18: SMUD’s TOU Rates, SmartGrid Pilot⁶⁷

Period	TOU Rate
Off-Peak	<ul style="list-style-type: none"> 8.46 cents/kWh for the first 700 kWh 16.6 cents/kWh each additional kWh
On-Peak (4–7 p.m. weekdays)	27 cents/kWh
CPP (12 events/yr, 4–7 p.m. weekdays)	N/A

SMUD started their rate development plans in December 2010. Marketing materials were developed in August 2011. New rates were in place for the SmartOptions pilot in July 2012.⁶⁸ Low-income customers were specifically included as about one-third of the pilot’s population. Several marketing channels were used to obtain and retain customers through continued engagement such as mass media, social media, websites, direct mail, email, outbound calling, door hangers, microsites, and “welcome back” kits for returning customers in the second year of the pilot. Survey results reported that customers preferred TOU plans over CPP plans by a factor of nearly 2 to 1.⁶⁹

More customers on the time-variant plan agreed that their current pricing plan provides them with opportunities to save money in comparison to those on the standard rate.

SMUD’s default residential rates as of September 2019 include a default time-variant energy rate with a fixed charge.

Table 19: SMUD Residential Rates⁷⁰

Season	TOU Period	Rate Structure
Summer	Off-Peak	<ul style="list-style-type: none"> 11.66 cents/kWh All day weekends, 12 a.m. to 12 p.m. weekdays

⁶⁷ SMUD, *SmartPricing Options Pilot Evaluation*, at 11–12.

⁶⁸ SMUD, *SmartPricing Options Final Evaluation*, at 16.

⁶⁹ SMUD, *SmartPricing Options Pilot Evaluation*, at 7.

⁷⁰ SMUD, *Residential Rates*, <https://www.smud.org/en/Rate-Information/Residential-rates>, accessed September 19, 2019.

(June–September)	Mid-Peak	<ul style="list-style-type: none"> • 16.11 cents/kWh • 12–5 p.m., 8 p.m. to 12 a.m. weekdays
	Peak	<ul style="list-style-type: none"> • 28.35 cents/kWh • 5–8 p.m. weekdays
Winter (October–May)	Off-Peak	<ul style="list-style-type: none"> • 9.69 cents/kWh • All day weekend, 12 a.m. to 5 p.m. and 8 p.m. to 12 a.m. weekdays
	Peak	<ul style="list-style-type: none"> • 13.38 cents/kWh • 5–8 p.m. weekdays
Fixed	\$20.30/month	

SMUD also offers its residential customers a budget billing option.⁷¹

NY Rev Proceeding

In its *Staff Whitepaper on Ratemaking and Utility Business Models*,⁷² State of New York Department of Public Service staff discuss rate design and distinguish the utility’s rates paid by consumers from the compensation paid to those providing DER to the grid. They promote TOU rates to better reflect costs and allow customers to participate in reducing overall system costs. They also propose a three-part rate based on peak-coincident demand, and note that a transition to a demand charge would require upgrading metering.

Arizona Public Service

Arizona Public Service (APS) offers residential customers a choice of the following service plans⁷³:

- **Lite Choice and Premier Choice:** These plans feature a fixed basic service charge and a volumetric non–time-variant energy charge for low- and moderate-use full requirements customers
- **Saver Choice:** This plan features a fixed basic service charge, a time-variant energy charge with two or three time periods depending on the season, and a grid access charge for solar customers based on the kW-dc generated

⁷¹ SMUD, *Bill Pay Your Way*, <https://www.smud.org/en/Customer-Support/Bill-Pay-Your-Way>, accessed September 11, 2019.

⁷² New York Department of Public Service, *Case 14-M-0101 - Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Staff White Paper on Ratemaking and Utility Business Models*, filed July 28, 2015.

⁷³ APS, *Residential Rate Plans*, <https://www.aps.com/en/ourcompany/ratesregulationsresources/serviceplaninformation/Pages/residential-sheets.aspx>, accessed June 11, 2019.

- **Saver Choice Plus:** This plan includes a fixed basic service charge, a two-period time-variant energy charge, and an on-peak demand charge
- **Saver Choice Max:** This plan includes a basic service charge, a two-period time-variant energy charge (both lower than Saver Choice Plus), and an on-peak demand charge (higher than Saver Choice Plus)

APS offers commercial schedules with time-variant and non-time-variant energy charges and, for small commercial customers and above, a demand charge. The customer's demand generally determines the rate schedule and available options. For time-of-use rates, there are separate demand charges for on-peak and off-peak demand. Both regular demand and TOU demand rates are tiered. The first 100 kW of demand (whether flat, on-peak, or off-peak) generally has a higher charge than demand exceeding the first 100 kW.

While there is a relatively small spread in the commercial TOU energy rate between on-peak and off-peak, there is a substantial spread between on-peak and off-peak demand charges. An example of the demand and energy charges for their medium commercial TOU schedule for secondary service, is shown in Table 20.⁷⁴

Table 20: APS Optional Medium General Service Time of Use Rates, Secondary Service

Charge	Off-Peak	On-Peak (3–8 p.m. Weekdays)
First 100 kW of period	\$6.742/kW	\$18.190/kW
Each additional kW of period	\$3.327/kW	\$11.744/kW
Energy (Summer: May through October)	5.952 cents/kWh	7.170 cents/kWh
Energy (Winter)	4.566 cents/kWh	5.783 cents/kWh

APS also offers a budget billing option to its residential customers.⁷⁵

California Investor Owned Utilities – SDG&E Example

California's three investor-owned utilities are transitioning to default TOU rates for all residential customers.⁷⁶ As a brief summary and example of what is being considered, San Diego Gas and Electric's (SDG&E) proposal included:

⁷⁴ APS, *Rate Schedule E-32TOU M, Medium General Service Time of Use*, accessed June 11, 2019. <https://www.aps.com/library/rates/e-32TOUM.pdf>.

⁷⁵ APS, *Budget Billing*, <https://www.aps.com/en/residential/accountservices/paymentprograms/Pages/equalizer-level-billing.aspx>, accessed September 11, 2019.

- Four rate design objectives: accurate price signals, transparent incentives, customer options, and customer education
- A three-period TOU residential rate as its default rate, providing more granular and more accurate price signals
- To promote customer choice, an optional two-period TOU rate and the optional continuation of the existing non–time-variant residential rate
- Implementation of a residential fixed charge, higher minimum charges, and the creation of an optional rate with a higher fixed charge and correspondingly lower volumetric charges.⁷⁷

SDG&E’s existing rates options also include a level pay billing option for customers.⁷⁸

As of September 2019, SDG&E also offers several rate schedules for residential electric vehicle customers. It offers a separately metered schedule for electric vehicles (EV-TOU) and two home and electric vehicle schedules (EV-TOU-2 and EV-TOU-5). These rates have time-variant energy features with the lowest rate in the super-off-peak period (midnight to 6 a.m. on weekdays, midnight to 2 p.m. on weekends). The main difference between EV-TOU-2 and EV-TOU-5 is that the EV-TOU-5 features a significantly lower super-off-peak period energy rate while also adding a fixed basic service fee.⁷⁹

Commonwealth Edison

Commonwealth Edison’s default residential rate structure has a fixed customer charge and an energy charge, both of which vary on whether the customer is in a multi-family building, and whether the customer has electric space heating.⁸⁰ Commonwealth Edison also offers a budget billing program to its customers.⁸¹

⁷⁶ California Public Utilities Commission, *Residential Rate Reform / R. 12-06-013*, <https://www.cpuc.ca.gov/General.aspx?id=12154>, accessed September 19, 2019.

⁷⁷ Direct Testimony of Jeffrey Shaughnessy and Cynthia Fang on behalf of San Diego Gas & Electric Company before the Public Utilities Commission of the State of California, SDG&E Rate Design Window Application, Docket No. A.17-12-013, filed on December 20, 2017.

⁷⁸ San Diego Gas & Electric, *Level Pay Program*, <https://www.sdge.com/residential/pay-bill/get-payment-bill-assistance/bill-payment-options-temporary-financial-help/get-predictable-bill>, accessed September 11, 2019.

⁷⁹ SDG&E, *Electric Vehicle Plans*, <https://www.sdge.com/residential/pricing-plans/about-our-pricing-plans/electric-vehicle-plans>, accessed September 21, 2019.

⁸⁰ Commonwealth Edison, *Summary of Typical Residential Line Item Charges*, <https://www.comed.com/SiteCollectionDocuments/MyAccount/MyBillUsage/TypicalChargesSummaryResidential.pdf>, accessed September 11, 2019.

⁸¹ Commonwealth Edison, *Your Electric Rates and Other Handy Information About Your Electric Service*, https://www.comed.com/SiteCollectionDocuments/MyAccount/MyBillUsage/Residential_Rate_Pamphlet.pdf, accessed September 11, 2019.

Summary and Additional Resources on Best Practices

A summary of the general positions supported by the entities in the reviewed literature in Appendix A Industry Literature Review and the above discussion in Appendix B is shown in Table 21. Additional guidance on industry best practices was provided by presenters at the July 15, 2019 ARDS workshop hosted by Hawaiian Electric. Please see Appendix C for a summary of the presentations and Appendix F for the presentations themselves.

Table 21: Summary of Actions Taken by Utilities or Positions Supported by Industry Literature

Entity	Time-Variant Options	Increased Minimum Charge	Increased Customer Charge	Increased Volumetric Charge	3-Part Residential Rate	Locational Value	Other
NV Energy	X						Budget billing
OG&E	X						Flat billing
SMUD	X	X	X				Budget billing
APS	X	X	X		Optional		Budget billing
Common-wealth Edison							Multi-family rates, Budget Billing
SDG&E	X	X	X				Budget billing, Multiple EV options
NY REV	X				X		
RAP	X	Partial		X			Multi-family rates ⁸²
RMI	X				Partial	X	
Brattle	X				X		
Ashley Brown	X				X	X	
ScottMadden	X						
NREL	X	Partial			Partial		

⁸² See summary of Jim Lazar's presentation in Appendix C and the presentation in Appendix F.

Appendix C Hawaiian Electric ARDS Stakeholder Workshop

The Companies held an Advanced Rate Design Workshop on July 15, 2019. Seven industry experts were invited to present their perspectives on advanced rate design best practices. Five presenters attended in person and two presented remotely. The Companies also solicited feedback and discussion on rate design, low income considerations, implementation, enrollment, and evaluation issues in breakout sessions, and obtained additional feedback on these items from a post-workshop survey that the Companies sent to all invitees. This appendix includes the workshop agenda; a summary of the presentations, breakout sessions, and survey data; and verbatim survey responses. The full presentations provided at the workshop can be found in Appendix F.

The agenda for the workshop is presented in Table 22.

Table 22: Advanced Rate Design Workshop Agenda

Planned Time	Agenda Item	Presenter
8:00–8:10 a.m.	Welcome, Safety, Introduction, and Agenda	Joe Viola, Vice President, Hawaiian Electric
8:10–8:20 a.m.	ARDS Context	Marc Asano, Director, Hawaiian Electric
8:20–8:50 a.m.	Presentation: The Brattle Group	Ahmad Faruqui, Principal
8:50–9:20 a.m.	Webex Presentation: The Regulatory Assistance Project	Jim Lazar, Senior Advisor
9:20–9:50 a.m.	Webex Presentation: R Street Institute	Travis Kavulla, Director, Energy & Environmental Policy
9:50–10:05 a.m.	Break	—
10:05–10:35 a.m.	Presentation: Hawai'i State Energy Office	Chris Yunker, Energy Systems & Planning Program Manager
10:35–11:05 a.m.	Presentation: Sacramento Municipal Utility District	Jennifer Davidson, Chief Financial Officer
11:05–11:35 a.m.	Presentation: San Diego Gas & Electric	Cyndee Fang, Manager of Energy Research & Analysis
11:35 a.m.–12:05 p.m.	Presentation: Energy and Environmental Economics (E3)	Ren Orans, Managing Partner
12:05–12:10 p.m.	Introduction to Breakout Sessions	Paul De Martini, Managing Partner, Newport Consulting Group
12:10–12:25 p.m.	Break	—
12:25–2:25 p.m.	Working Lunch and Breakout Sessions	—
2:25–3:25 p.m.	Breakout Session Debrief Breakout Group Leads	—
3:25–3:30 p.m.	Concluding Remarks	Shelee Kimura, Senior Vice President, Hawaiian Electric

Summary of Presentations at the ARDS Workshop

Summaries of each speaker’s half-hour presentation are provided in Table 23, and full versions of each speaker’s presentation are provided in Appendix F. The presentations given at the ARDS workshop may not necessarily be reflective of the viewpoints of the presenter’s organization.

Table 23: Summary of Presentations

Speaker	Summary
Dr. Ahmad Faruqui, The Brattle Group	Dr. Faruqui outlined how technology is changing the way customers interact with utilities and the existing paradigm of small fixed charges and flat energy charges is not suitable to this and needs to be updated. He posited that rate design should mirror the utility’s cost of generating and delivering electricity which is most efficiently accomplished via a three-part rate design consisting of a fixed charge (\$/mo), demand charge (\$/kW), and a time-varying energy charge (\$/kWh).
Jim Lazar, Regulatory Assistance Project	Mr. Lazar outlined three key rate design principles: (1) a customer should be allowed to connect to the grid for no more than the cost of connecting to the grid; (2) customers should pay for power supply and grid services in proportion to how much they use and when they use it; (3) customers delivering power to the grid should receive full and fair value—no more and no less. His key recommendations were to divide the residential class into single-family and multi-family, move toward residential TOU rates, and limit non-residential demand charges to site infrastructure only and use TOU principles to recover grid coincident peak costs.
Travis Kavulla, R Street Institute	Mr. Kavulla, a former Montana Commissioner, posited that rate design should align individual incentives with utility and societal costs. He outlined how Hawai’i can create a cost-based market to determine the locational marginal price of grid-delivered energy and how a baseline quantity could help mitigate bill impacts while still recovering all costs. He believes that regulatory flexibility is key and that the regulator should not be overly prescriptive in allowing special rates to match a customer’s particular situation.
Chris Yunker, Hawai’i State Energy Office	Mr. Yunker gave an overview of the Hawai’i energy system and the significant forecasted role of renewable energy going forward. He outlined how rate design would play a significant role in the customer decision to adopt distributed energy resources and explained that rates should not incentivize customers to defect from the grid.
Jennifer Davidson, Sacramento Municipal Utilities District (SMUD)	Ms. Davidson established that rate design principles should guide rate design and the result must strike a balance between these principles. There is an urgent need for rate structures to evolve due to the widening gap between cost causation and revenue collection. She outlined a number of SMUD experiences with these issues.

Speaker	Summary
<p>Cyndee Fang, San Diego Gas & Electric (SDG&E)</p>	<p>Ms. Fang gave an overview of SDG&E experiences with advanced rate design, including issues surrounding hourly dynamic rates, misalignment between circuit peaks and system peaks, and how rates cannot be designed for an “average” customer as they do not exist. She explained how solar customers are unique and can have significantly higher peak demand than non-solar customers. She outlined how a sustainable policy is direct and transparent and subsidies decline as policy objectives are achieved.</p>
<p>Ren Orans, Energy + Environmental Economics (E3)</p>	<p>Dr. Orans gave a summary recap of all experts’ presentations from the workshop and highlighted the key similarities in all presentations—that Hawai‘i must adopt an efficient multi-part rate that encourages the right amount of DER while maintaining both a financially healthy utility and customer equity. He presented a hypothetical rate design that gradually adopts key rate design changes and incorporates targeted subsidies to ensure adequate DER adoption.</p>

Advanced Rate Design Workshop Invitees and Attendees

Table 24 lists the invitees and presenters of the ARDS workshop. A total of 55 people attended in person, in addition to remote attendees. Some organizations were represented by multiple attendees.

Table 24: Advanced Rate Design Workshop Invitees and In-Person Attendees

Organization Type	Organization Name	Attended ARDS Workshop in Person?
Public Agencies and Offices	Public Utilities Commission staff	Yes
	Department of Commerce and Consumer Affairs	Yes
	Hawai'i State Energy Office*	Yes
	Hawaii Natural Energy Institute	Yes
	University of Hawai'i	Yes
	U.S. Department of Defense	Yes
	City and County of Honolulu – Office of Climate Change, Sustainability, and Resiliency	No
	County of Hawai'i	No
	County of Maui	No
Consultants	U.S. Department of Energy	No
	The Brattle Group*	Yes
	E3*	Yes
	R Street Institute*	No
	Regulatory Assistance Project*	No
	Ken Fong Consulting	Yes
	Newport Consulting Group	Yes
	Electric Power Research Institute	No
Advocacy Groups	Rocky Mountain Institute	No
	The Alliance for Solar Choice	Yes
	Hawaii Community Action Program	Yes
	Life of the Land	Yes
	Maui Economic Opportunity	Yes
	Puna Pono Alliance	Yes
	Blue Planet Foundation	No
	Distributed Energy Resource Council	No
	Energy Freedom Coalition of America	No
	Hawaii Solar Energy Association	No
	Hawaii PV Coalition	No
	Renewable Energy Action Coalition	No
Other Utilities	Sunpower Corporation	No
	Ulupono Initiative	No
	Sacramento Municipal Utility District*	Yes
	San Diego Gas and Electric*	Yes
	Kauai Island Utility Cooperative	No

Organization Type	Organization Name	Attended ARDS Workshop in Person?
Other	Apollo Energy Corporation	Yes
	Blue Energy	Yes
	EnerNex	Yes
	Hawai'i Energy	Yes
	Plugged In Strategies	Yes
Hawaiian Electric Company	Electrification of Transportation, Business Development and Strategic Planning	Yes
	Customer Service <ul style="list-style-type: none"> • Demand Response • Distributed Energy Resources • Ombudsman • Revenue Management 	Yes
	Finance	Yes
	Marketing	Yes
	Maui Electric Company	Yes
	Planning and Technology	Yes
	Pricing	Yes
	Regulatory	Yes

* Presenter at the workshop

ARDS Workshop: Breakout Questions and Responses

In the ARDS workshop, in-person participants were divided into five groups. Each group was asked to respond to the same set of questions. A summary of the breakout questions and general responses from the groups follow.

1. Identify the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.

Response	Number of Responses
Equity	5
Lower bills/cost	2
Enable technologies/DER integration	2
Customer choice/focus	1
Load retention	1
Consistency across all tariffs/programs	1
Focus on total system cost	1
Alignment with cost flexibility/public policy	1

2. Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.

Response	Number of Responses
Gradualism, pilot programs	3
Technology and tools	2
Customer choice/options	2
Reduction of costs	2
Time-variance	1
Cost causation	1
Customer segmentation	1
Flexibility	1

3. We have provided some of the different definitions of low income that are currently used by different programs. What definition most appropriately defines the low income population of Hawai'i? This could be one of these definitions or a definition that your group develops.

Response	Number of Responses
LIHEAP (Low Income Home Energy Assistance Program)	2
Federal poverty line (scaled discounts)	1
Depends on objectives (state or federal definitions)	1
Total bill burden	1

4. Should rate design include cross subsidization to support low income groups?

Response	Number of Responses
Yes	2
No	2
Depends on definition of low income	1

5. If so, to what extent?

Response	Number of Responses
Unknown extent, scaled discounts based on federal poverty line	1
Depends on definition of low income, if providing cross-subsidy use a more restrictive definition	1

6. What are the best ways to help Hawai'i's low-income customers with their electric bills?

Response	Number of Responses
Fund with taxes, state government rebates, increased LIHEAP funding	3
Energy efficiency programs	2
Rate discounts, low income rate structures	2
Engagement with public housing or other landlords	2
Low rates	1
Programs	1
Locational investments	1
Community solar	1
Financing	1

7. In your experience, what has been the most effective way of learning about new programs and taking action or changing your behavior?

Response	Number of Responses
Earned (free) media, news	2
Social media	2
Gamification	1
Multi-channel approach	1
Word of mouth	1
Iterative approach	1
Peer profiling	1
Contractors/third parties	1
Bill inserts	1

8. What are the most effective and convenient ways to enable customer enrollment in optional rate plans?

Response	Number of Responses
Online signup/energy marketplace	3
Work with third parties (landlords, churches, social groups, solar industry, stakeholders)	3
Pilots	2
Defaulting customers into plans	1
In-person assistance	1
Leverage employees	1
Talk to customers, focus groups, surveys	1
Data analysis	1

9. What would be the best ways the Companies could make use of advanced metering information in education and outreach of advanced rate designs?

Response	Number of Responses
Have advanced meters in before making decisions	2
Have 12 months of history before making decisions on rates	1
Provide customers access to their data	1
Reach out to customers	1
Evolve programs	1

10. What should be considered in the evaluation of rate design?

Response	Number of Responses
Accomplishing rate objectives	3
Bonbright principles	1
Bill impacts on subsets of the population	1
Benefits realization	1
Achieving policy goals	1
Enrollment goals	1

ARDS Workshop: Post-Workshop Survey

A survey was sent via email to invitees, regardless of attendance. The questions in the survey largely mirrored the questions asked in the breakout sessions to allow invitees the opportunity to expand upon their answers from the breakout sessions or to provide feedback if they did not attend in person. A total of nine survey responses were received that had a response to at least one question (aside from the respondent’s name and organization). A summary of the survey results is below, and the verbatim nine responses are available at the end of this appendix.

1. Identify and rank the top three outcomes that advanced rate designs in Hawai’i can be used to achieve.

Response	Number of Responses
Specific rates	6
Renewable energy goals	5
Customer behavior/load shifting	3
Lower bills	3
System benefit/cost of service	2
Equity	2
Grid stability	1
Integrating technology	1
Customer choice	1

2. Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.

Response	Number of Responses
Simplicity	4
Specific rates and/or concerns with rates (TOU, site infrastructure, demand charges)	4
Change customer behavior, outreach, education	2
Pilots	2
Speed	2
Work with third parties	2
Customer choice	1
Stacked services	1
Load shaping	1

3. What low income definition most appropriately defines the low-income population of Hawai’i, and why?

Response	Number of Responses
ALICE (asset limited, income constrained, employed)	2 (cost of living in Hawai’i)
HUD (Housing and Urban Development)	1 (full and updated data set)

Response	Number of Responses
Federal poverty line	1
Other: Depends on program objective and desired outcomes	1
Other: Not qualified to answer	1
Other: ALICE or something between ALICE and the federal poverty line that includes about 25% of customer base	1

4. Should rate design include cross subsidization to support low income groups?

Response	Number of Responses
Yes	6
No	1

5. If so, to what extent?

Respondents generally advocated for balance. “Such programs, however, should be pursued prudently...”, “Dependent on many variables,” “It should be balanced with priorities and those priorities should be set or established in an open and transparent stakeholder process.” One response advocated that all classes should bear the cross-subsidy of any bill assistance program, not just the residential class.

6. What are the best ways to help Hawai’i’s low-income customers with their electric bill?

Response	Number of Responses
Energy efficiency programs	5
On-bill financing, GEM\$	4
Direct assistance and/or rate subsidy	3
Education	2
Specific programs	2
Partnerships with third parties	1

7. In your experience, what has been the most effective way of learning about new programs and taking action or changing your behavior?

Response	Number of Responses
DER providers encouraging signup	1
Direct marketing via a third party such as Hawai’i Energy	1
Friends and family	1
Investment opportunities	1
Bill inserts	1
Requiring people to opt out	1

8. What are the most effective and convenient ways to enable customer enrollment in optional rate plans?

Response	Number of Responses
Simplicity, simple explanations	3
Work with third parties	3
Targeted marketing	2
Customer choice, offer a suite of programs	2
Bill inserts	1
Focus groups, interviews	1
Limited uptake not necessarily a bad result	1
Outreach campaigns	1
Pilots	1
Bill impacts, shadow billing	1

9. What are the top ways the Companies could inform and educate customers on advanced rate designs?

Response	Number of Responses
TV/Radio/Video	3
Work with energy efficiency and DER contractors, co-marketing with third parties	3
Website	2
Social media	1
Word of mouth	1
Default customers into a rate	1
Pilots	1
Apps	1

10. What should be considered in the evaluation of rate design?

Response	Number of Responses
Bill impact	2
Customer satisfaction	2
Alignment with desired outcomes of the rate design	2
Accuracy in tracking to various costs	2
Customer response to the rate	1
Impact on non-participants	1
Impact on utility load shape	1
Alignment with public policy	1
Equity	1

11. Please provide any final comments.

Response	Number of Responses
Appreciation of forum for feedback and/or opportunity to participate.	2
Would have been nice to have an option for people attending workshop remotely to participate in breakout sessions.	1

Verbatim ARDS Workshop Survey Responses

Name: James Upega

Organization: Honolulu Community Action Program, Inc.

Question	Response
Did you attend the workshop?	Yes, in person
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	Low rate for low-income subscribers
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<i>No response provided</i>
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	<i>No response provided</i>
Should rate design include cross subsidization to support low income groups? If so, to what extent?	<i>No response provided</i>
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<i>No response provided</i>
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<i>No response provided</i>
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	<i>No response provided</i>
What are the top ways the Companies could inform and educate customers on advanced rate designs?	<i>No response provided</i>
What should be considered in the evaluation of rate design?	<i>No response provided</i>
Please provide any final comments.	<i>No response provided</i>

Name: Ted Robinson

Organization: US Army Garrison Hawaii

Question	Response
Did you attend the workshop?	Yes, in person
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Rates which promote optimal investments for overall system benefit • Rates reflect cost of service; reduction in cross-subsidization • Rate offerings which allow customer choice, promote conservation, and are manageable
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Ensure rates incentivize appropriate investments for overall system benefit • Reduce cross-subsidization between rate schedules; improve rate design to more accurately reflect individual cost of service • Ensure rates are not too complex; recognize customer capabilities and constraints with regard to managing usage and load
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	OTHER: Not qualified to answer.
Should rate design include cross subsidization to support low income groups? If so, to what extent?	<i>No response provided</i>
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<i>No response provided</i>
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<i>No response provided</i>
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	<i>No response provided</i>
What are the top ways the Companies could inform and educate customers on advanced rate designs?	<i>No response provided</i>
What should be considered in the evaluation of rate design?	<i>No response provided</i>
Please provide any final comments.	<i>No response provided</i>

Name: Ahmad Faruqui

Organization: The Brattle Group

Question	Response
Did you attend the workshop?	Yes, in person
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Economic efficiency including the promotion of renewable energy goals • Equity between customers • Lower energy bills and enhanced customer happiness
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Customer outreach including focus groups and interviews to test acceptance and understanding of advanced rate designs • Scientifically designed pilots to test customer behavior • Rolling out the advanced rate designs
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	<i>No response provided</i>
Should rate design include cross subsidization to support low income groups? If so, to what extent?	No. Low income groups should get an income subsidy from the state government. They should not get a price subsidy because that leads to wasteful energy consumption.
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Explained in the previous question. • Offer them special energy efficiency programs such as water heater wraps and LED bulbs. • Educate and inform on how to lower their energy bills.
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • Make sure the messaging gets through and is customer-friendly, devoid of jargon. • Test the messaging and improve upon it through focus groups and initial pilots. • Conduct conjoint analysis to identify market segments that will be willing to sign up for advanced rate designs. Target those segments with the messaging identified above. Follow the OG&E and APS examples.
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	See below.
What are the top ways the Companies could inform and educate customers on advanced rate designs?	Social media, word of mouth, advertising on TV and radio.

Question	Response
What should be considered in the evaluation of rate design?	<ul style="list-style-type: none"> • Did customers like the new rate designs? • Did they respond to them by changing their usage? • Did their bills go down? • Were they happy and satisfied when all was said and done.
Please provide any final comments.	<i>No response provided</i>

Name: Robert Harris

Organization: TASC

Question	Response
Did you attend the workshop?	Yes, in person
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Aligning customer behavior and technology with grid needs • Reducing overall grid costs and customer bills • Advancing Hawai'i's clean energy goals
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Customer simplicity: Will they be able to react to pricing and program signals? • Empowering third-party actors: Can they easily and effectively address grid needs? Can they respond to the complex grid needs and "translate" this complexity in a simple fashion to customers? • Speed. Billions of dollars will be spent over the next decade or two in transforming Hawai'i's electrical grid. Moving too slowly can reduce the effectiveness of future rate designs and potentially mismatch these investments to what is in the best interest of customers and the electrical grid.
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	OTHER: This question is too broad. It is probably better addressed in relation to program considerations: What is the goal and outcome being served? For example, some programs might justify a broader definition. Others might choose to address a specific geographical location, building type.
Should rate design include cross subsidization to support low income groups? If so, to what extent?	Yes. Yes, opportunities should be pursued to reverse systemic environmental injustice, and to ensure equity in customer choice. Such programs, however, should be pursued prudently. There are many examples of failed programs that, once established, are difficult to unwind.
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Targeted energy efficiency loans/rebates/ educational programs. • Creation of an on-bill platform, allowing third-party financing to better service rental and low-income properties. • Creation of a wheeling program, and allowing third-party providers to offer access to cheaper/cleaner sources of power.

Question	Response
<p>What are the most effective and convenient ways to enable customer enrollment in optional rate plans?</p>	<p>To some extent, allowing customer choice is a process of creating different options and allowing customers to decide what fits them the best. If customers do not select an option, that's not necessarily a bad result. It simply is the market stating customer preference. Efforts should be made to address customer concerns. That being said, if some choices clearly advance state goals, reduce overall electric rates, etc., it may be better to frame this as a default program versus optional.</p>
<p>In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?</p>	<p>Arizona saw relatively high TOU adoption based on DER adoption: DER providers encouraged customers to sign up for TOU as a part of the DER adoption.</p>
<p>What are the top ways the Companies could inform and educate customers on advanced rate designs?</p>	<p>Working through the existing energy efficiency and DER contractors.</p>
<p>What should be considered in the evaluation of rate design?</p>	<p>Please refer to the top 3 outcomes and considerations.</p>
<p>Please provide any final comments.</p>	<p><i>No response provided</i></p>

Name: Jim Lazar

Organization: Regulatory Assistance Project

Question	Response
Did you attend the workshop?	Yes, call in
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • TOU rates for commercial customers • TOU rates for single-family residential customers • Water heater control and credit program for apartments.
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • The proper time periods for TOU rates. This will change as more solar and storage is installed. • The proper structure of site infrastructure charges for the connection to the grid. • Elimination of demand charges for Schedules J and P
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	ALICE: Based on cost of living in Hawai'i.
Should rate design include cross subsidization to support low income groups? If so, to what extent?	Yes. All classes should bear any income-differentiated rate or bill assistance program, not just the residential class(es).
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Energy efficiency • Controls on water heaters and associated bill credits. • Direct financial assistance on high usage, to address the large multi-generational families for whom energy efficiency alone does not bring their power bills down. Possibly limit that assistance to NOT include air conditioning (which smart meters can detect).
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • Default customers onto their most favorable rate. • Arizona method: Notify all customers annually of any optional rate that will save them money. • Offer a package of TOU rate, load control on major loads, and bill credits for utility control of major loads.
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	Direct contact marketing from Hawai'i Energy or another trusted entity.
What are the top ways the Companies could inform and educate customers on advanced rate designs?	Bill inserts, videos, advertising, and defaulting customers onto rates that will save them money.

Question	Response
What should be considered in the evaluation of rate design?	Customer acceptance, accuracy in helping minimize system costs, accuracy in tracking total service long-run incremental cost, and for critical peak pricing ONLY, accuracy in tracking short-run marginal costs during periods of system stress.
Please provide any final comments.	It would have been nice to participate in the breakouts remotely. Since you serve multiple islands, that should be a part of all Honolulu workshops.

Name: Omar Siddiqui

Organization: EPRI

Question	Response
Did you attend the workshop?	Yes, call in
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Aligning customer rates with HECO load shaping objectives (e.g. peak load shifting) • Market-based rate design for customers with DERs • Rate designs that facilitate electric vehicle adoption and managed charging
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Customer choice and flexibility: providing customers with rate design options and accompanying information to enable them to opt for the most favorable option (e.g. analysis of prior usage to calculate average bills under different options). • Social equity: designing rates such that system costs are not inordinately borne by customers who lack the financial means to acquire DERs (e.g. PV, storage). A rate design with a heavy kWh consumption component favors customers with DERs, who are typically more affluent. A balanced rate design inclusive of fixed charges, energy consumption charges, and demand charges has the potential for greater equity. • Utility load shaping objectives: time-of-use rate design, coupled with enabling tools and feedback for customers, can enable a shift of consumption from on- to off- peak, which can reduce HECO's operational and capital costs while providing financial incentives to customers.
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	OTHER: ALICE or something between ALICE and the FPL. Something about 25% of the customer base.
Should rate design include cross subsidization to support low income groups? If so, to what extent?	Yes. Dependent on many variables.
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Information and programs promoting energy efficiency and peak load reduction • Information and programs promoting peak load reduction • Partial subsidization

Question	Response
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • Outreach campaigns in physical and online communities where customers congregate • Pilots that demonstrate the customer benefits of alternative rates
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	Positive experiences of friends and families with new technologies, rate plans, or utility programs.
What are the top ways the Companies could inform and educate customers on advanced rate designs?	Multi-prong information campaign, including easy-to-use tools on the utility website, an easy-to-use phone app, and pilots in targeted communities.
What should be considered in the evaluation of rate design?	(1) Customer bill impacts (2) Utility load shape impacts
Please provide any final comments.	Thank you for providing such an open forum for feedback!

Name: Steven Rymsha

Organization: Sunrun

Question	Response
Did you attend the workshop?	Yes, call in
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Align customer behavior with needs of the grid with additional programatic options for customers to deliver additional locational or system services. • Ensure customers remain grid connected. • Reduce need for forecasted utility investments and lower costs for all customers.
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Programs must be simple for all with increased complexity for customers providing additional services. • Creation of programmatic offerings for customers to stack services provided to the grid with increased economic benefit versus to simply self consumption to avoid grid energy rates. • Much time is being wasted and need to enable programs at scale ASAP to ensure most economical longterm benefit for customers.
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	<i>No response provided</i>
Should rate design include cross subsidization to support low income groups? If so, to what extent?	Yes
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Energy efficiency • Joint market (utility and DER providers) to identify and attract participation • Transactive energy options
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • Offer a suite of programs including extremes such as interruptable service options for non der customers seeking to have the lowest possible rates. • Possibly programs requiring grid supportive services, so that third parties can be a tool to enable and increase particiaption. • Possibly point of sale program enrollment for EV customers are dealership.
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	Advanced rate design options that create investment opportunies enable third parties to approach customers with savings proposition with rate design participation.

Question	Response
What are the top ways the Companies could inform and educate customers on advanced rate designs?	Targeted comarketing of customers with greatest potential to participate/save/impact the grid based on current behavior.
What should be considered in the evaluation of rate design?	Assesment of impacts of non-participation to ensure appropriate pricing/structure.
Please provide any final comments.	<i>No response provided</i>

Name: Chris DeBone

Organization: DER Council

Question	Response
Did you attend the workshop?	No
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Reduce customer bills. • Integrating technology to assist grid needs. • Reaching 100% renewable goal.
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Keep it simple. • Use Aggregators to bridge the gap between customer resources and grid needs. • Pilots or demonstration projects in the near term to conform effectiveness of new programs.
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	Yes
Should rate design include cross subsidization to support low income groups? If so, to what extent?	<i>No response provided</i>
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Energy efficiency programs (loans / rebates). • GEMS needs to allow energy storage so these customers can participate in the latest solar programs (CGS+, Smart Export, CSS, etc...). • On-Bill-Financing to include energy storage to tap into the rental market.
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • A simple, explainable path to utility bill savings. • Keep programs simple. • Show and estimate on how much they can save, then show how much they did save on a monthly basis.
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	Information mailed along with HECO bills.
What are the top ways the Companies could inform and educate customers on advanced rate designs?	Attach programs to DER tariffs and let the DER industry assist in the education process. There would need to be a net benefit to the customer that the DER vendor is excited to share.
What should be considered in the evaluation of rate design?	Please refer to our top 3 outcomes.
Please provide any final comments.	<i>No response provided</i>

Name: Rocky Mould

Organization: City and County of Honolulu Office of Climate Change, Sustainability and Resiliency

Question	Response
Did you attend the workshop?	No
Identify and rank the top three outcomes that advanced rate designs in Hawai'i can be used to achieve.	<ul style="list-style-type: none"> • Equitable distribution of costs and risks subject to public policy priorities such as affordability, cost control, and energy efficiency • Alignment with renewable energy, sustainability, and resilience goals through time-of-use and other rate structures • Internalization of externalities such as the cost of carbon.
Given those outcomes, identify the top three considerations that should go into the implementation of future rate designs.	<ul style="list-style-type: none"> • Appropriate balance between fixed and volumetric charges • Incorporation of public policy adders for sustainability and resilience. • Time-of-use to align incentives for EOT and renewables penetration.
Which low income definition most appropriately defines the low-income population of Hawai'i, and why? Please select all that apply.	ALICE: Accounts for cost of living
Should rate design include cross subsidization to support low income groups? If so, to what extent?	Yes. It should be balanced with priorities and those priorities should be set or established in an open and transparent stakeholder process.
What are the best ways to help Hawai'i's low-income customers with their electric bills? Prioritize your top three approaches and explain your reasoning.	<ul style="list-style-type: none"> • Direct transfer payments to support overall income out of central budgeting or refundable EITC • LiHEAP and other federally-leveraged sources • Community-Based Renewable Energy attributed to customers through On-Bill Financing.
What are the most effective and convenient ways to enable customer enrollment in optional rate plans?	<ul style="list-style-type: none"> • Targeted direct marketing and inserts in electricity bills • Use a third-party such as Hawai'i Energy and Public Benefits Fund • PSAs
In your experience, what has been the most effective way of learning about new programs and taking action/changing your behavior?	Automatically opted in; must opt-out of programs. e.g., pension and 401k plans
What are the top ways the Companies could inform and educate customers on advanced rate designs?	PSAs and inserts or on-line ads.
What should be considered in the evaluation of rate design?	Alignment with public policy and maintaining utility as a solvent, going-entity.

Question	Response
Please provide any final comments.	I am sorry I was unable to attend the workshop but look forward to participating in the conversation about advanced rates in this and other proceedings. Rate design is a critical way to align public policy priorities with utility operations and incentives

Appendix D Customer Survey Results

Advanced Rate Design Strategy Customer Survey Results

Prepared by the **Market Research Department**
August 2019



Overview of Surveys

◆ Residential Customers

- Online panel survey conducted with randomly selected Hawaiian Electric, Maui Electric, and Hawai'i Electric Light customers.
- Survey fielding: **July 22 – August 4, 2019**
- **1,530 responses** out of 4,051 panelists
38 percent participation rate

Hawaiian Electric	718
Maui Electric	345
Hawai'i Electric Light	467
- Data was weighted by **ages** within **genders** across each **utility's service area**.

◆ Small to Mid-size Business Customers

- Online survey distributed to available contacts of Hawaiian Electric, Maui Electric, and Hawai'i Electric Light business customers.
- Survey fielding: **August 5 – 13, 2019**
- **148 responses** out of 7,606 unduplicated emails
2 percent participation rate

Hawaiian Electric	76
Maui Electric	30
Hawai'i Electric Light	42
- Data was weighted by the proportion of **business partners** (account holder) across each **utility's service area**.

The objective of the research was gauge interest in various pricing options and community support for low income customers as well as assess advanced meter awareness, installation interest, methods of enrollment, and preferred portal features along with anticipated energy monitoring.



Time-of-Use Participation: July 2019

TOU-RI: 2,294

0.56% of total customer base

TOU-EV: 354 (closed)
TOU-R: 33 (closed)

TOU-G

(small commercial): no current participants
TOU-J (commercial): 8
TOU-P (large commercial): no current participants



Influence to Participate in TOU-RI

"My wife and I are retired so we would be able to use more electricity, such as cooking, clothes washing and drying and water heater use, during midday times."

"Opportunity to save on my electricity bill, as I am retired and can take advantage of the low rate period."

"I compared usage rates from prior months to both plans and TOU was actually a tiny bit cheaper. Then I changed my laundry time to mid day on my teleworking days to take advantage of the lower rates ultimately lowering my monthly electric bill."

Experience with TOU-RI

"Money savings is small. We use high-electrical-use appliances and tools from 9am to 5pm if at all possible."

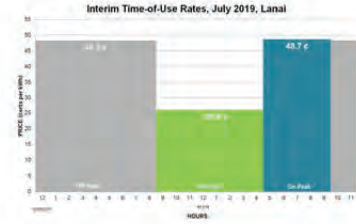
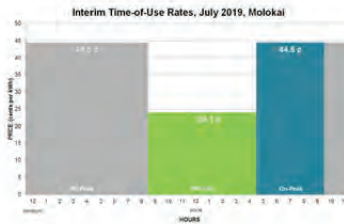
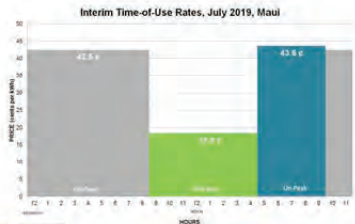
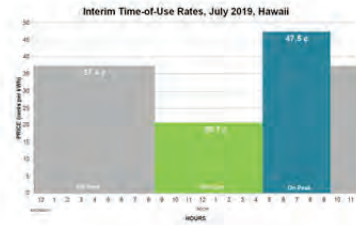
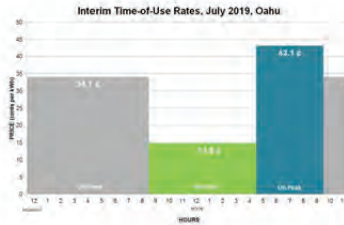
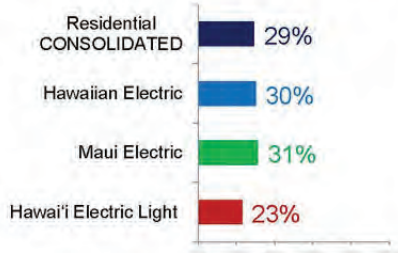
"It has been harder than we thought to shift most usage to the day, remembering when to start the dryer being the hardest. However we have seen cost decreases, and we don't feel as bad running the AC now..."

"Would like to see amount saved each month. That info seemed to stop after the first few months."

"I like it. Can't wait for smart meter to better refine my usage."

3

Time-of-Use Rate Awareness



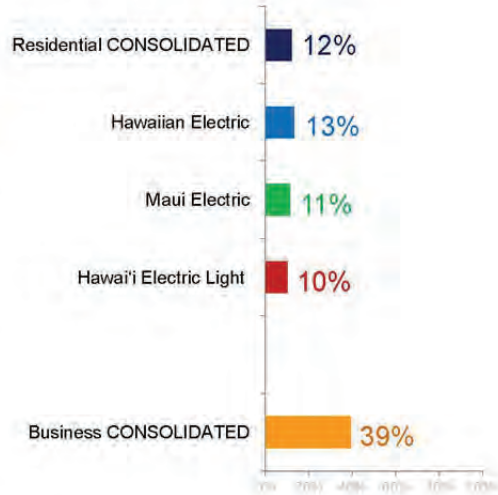
4

Time-of-Use Rate Savings Review

Would you make use of the advanced meter online portal to see if you would save money by switching to a Time-of-Use Rate? (TOU-RI and TOU-G hourly cents per kWh displayed for specific utility)

In other research*, 40 percent of residential customers and 48 percent of business customers are interested in Time-of-Use Rates. (no hourly kWh costs provided or graphs displayed)

In October 2016 focus groups in which TOU-RI Pilot Rates were shared with residential customers, interest was minimal with recognition that the program would work better for retirees, stay-at-home parents, or evening shift workers.



*Customer Engagement Surveys for the Hawaiian Electric Companies (2014-2019): Residential and Business

5

Time-of-Use Rate Savings Review: Why?

Yes, would review

Residential Customers

"Specifically, the Mid-Day rate would impact on when we utilize our larger electric appliances- i.e., the clothes washer and dryer and the dishwasher, so actually switching to the Time-of-Use rate might be more economical. This possible switching should be monitored first. Also, even scheduling the recharging of batteries may impact the cost. We could monitor these various electricity usage activities as well as other electricity use in determining whether to switch or not."

"Our daily usage is pretty constant, so if changing our habits without giving up our comfort (i.e. a/c usage), then it would make sense to us to adapt as long as it fit with our daily schedules."

"I don't think it would be beneficial, but if the data shows it would be, I'd like to know before making a decision."

"I would like to use this -- but a smart meter would help me understand if I would save money."

No or Not Sure

"We would pay more since we're not home when the lowest rates apply."

"I use central air all day & night - whenever I am at home - so higher rates for peak hours would not work - we looked into it & our rates would go up a lot."

"We tried TOU and did not find it made material difference in usage."

"With my current PV system I pay only the minimum bill each month. It's my understanding that switching time of use rate would not reduce my bill one cent."



6

Time-of-Use Rate Savings Review: Why?

Business Customers

Yes, would review

- "Anything to save on electricity costs would be evaluated."
- "Try using heavy draw equipment during off peak time."
- "We can shift our usage if we know how it will benefit us."
- "We are a greenhouse operation, and we need a way to first monitor time of day usage by our fans and pump and then secondly, perhaps devise a way to time fan usage to take advantage of off peak rates."
- "Not sure if I understand this correctly -- are we only on TOU rates when we request it? Or does it always apply? If the latter, I would probably use the portal to see when spikes were and if they could be moved to another time."

No or Not Sure

- "On most days, we start work between 8am and 9am, and finish working between 8pm and 9pm so our evening work ours would be during the On-Peak hours."
- "Our business hosts multiple tenants (17 agencies) it would be difficult to manage everyone's time. Also there is a cafeteria, a therapy pool, pharmacy, gym and meeting facilities is too many schedules to deal with."
- "Nope! What am I supposed to do... close my business? Are you serious? You could charge me twice as much and I'd just raise my fees to my clients to cover it. I'm not going to provide professional services in the middle of the night to save a buck. Ludicrous!!!"



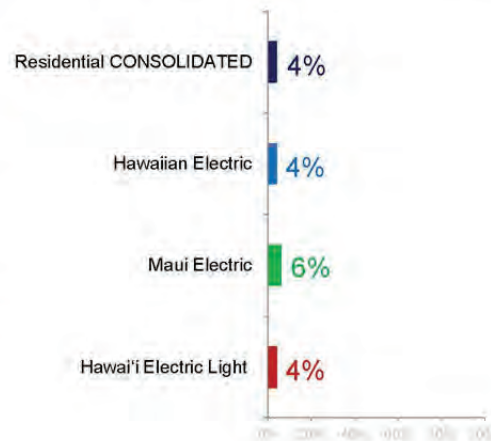
7

Prepay Program Interest

Prepaid electricity: This program encourages customers to better manage their electricity usage by paying for their electricity before it is used. With this pay-as-you-go billing option, you will not receive a monthly bill, and you are able to pay as much as you can and as often as you would like. You can receive automated reminders when your balance is running low.

To stay on this plan, you must maintain a minimum balance. If your account drops below the minimum balance, your electric service would be disconnected after a grace period of five days.

Would you participate in a prepaid electricity program?



2015 Prepay Program Enrollment: 15
out of 5,184 Residential Smart Meter Pilot Customers (0.29%)

8

Prepay Program Interest: Why?

Residential Customers

Yes, interested

- "Prepaid electricity forces you to be more mindful of your electricity usage."
- "It's another option to budget planning."
- "Pay as I go."
- "Might be better suited to my income."
- "Always broke."

No or Not Sure

- "This looks like it will require too much engagement, especially if you get busy or distracted and forget to update the account. The risk of having your service cut off is too high."
- "This is something that is used in other countries for people who are living off of a limited budget which don't get me wrong I am not rich at all but I find it harder to keep track and easier to run out because it is prepaid and not on-demand like it is now."
- "Sounds like another great option for those who might like the flexibility and have irregular incomes, but I would prefer to still pay as we use."

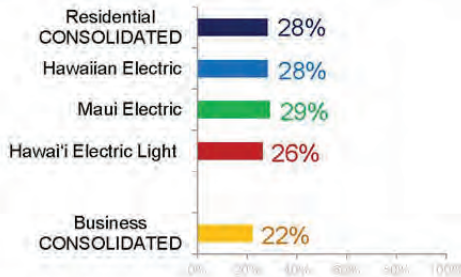


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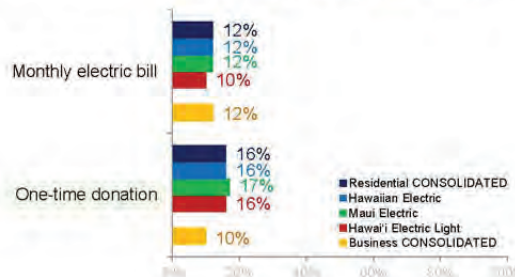
Low-Income Support

Hawai'i's transition to 100% renewable energy will take all of us working together, and as a community, we do not want to leave anyone behind.

If you had the option to contribute an amount (not tax deductible) of your choosing to help qualified low-income customers reduce their electric bills through clean energy programs, would you?



How would you prefer to contribute?



Average Donation

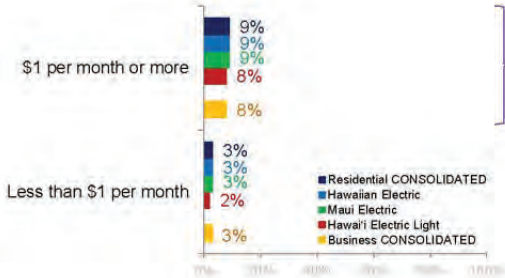
Residential CONSOLIDATED:	\$63.10
Hawaiian Electric:	\$63.92
Maui Electric:	\$60.69
Hawai'i Electric Light:	\$54.38
Business CONSOLIDATED:	\$118.75

Follow up question calculated to the total customer base.

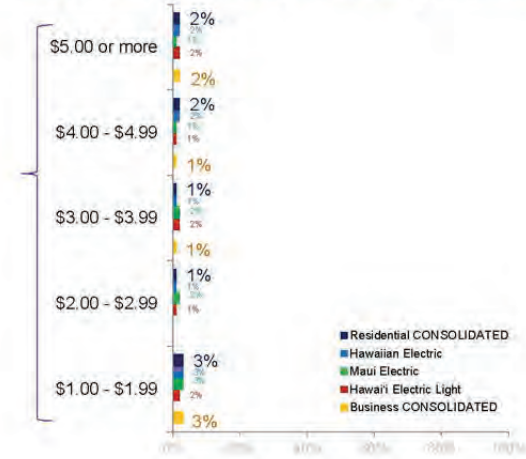
10

Low-Income Support: Monthly Electric Bill Contribution

How much would you be willing to contribute (not tax deductible) on your monthly electric bill to support access to clean energy programs for low income customers?



What's the maximum amount you'd be willing to contribute?



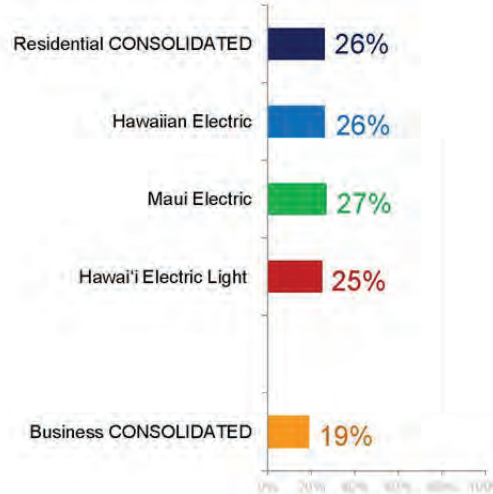
Follow up questions calculated to the total customer base.

11

Low-Income Support: Rounding up Monthly Electric Bill

All respondents willing to contribute (one time donation or monthly electric bill):

Would you be willing to round up your monthly electric bill to the next dollar and contribute (not a tax deductible) that additional amount to support access to clean energy programs for low-income customers?



Follow up question calculated to the total customer base.

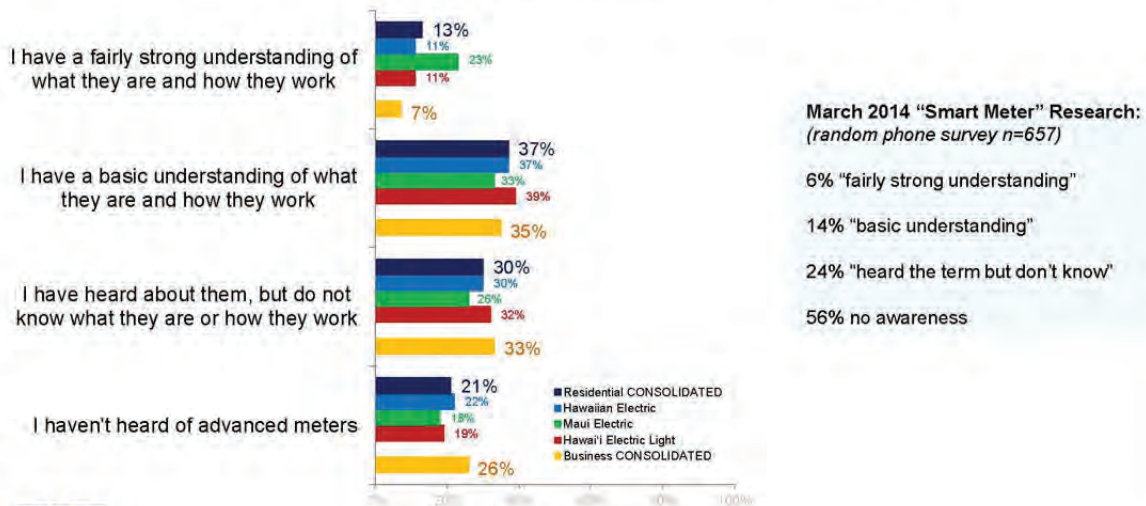
12

Advanced Meter and Portal



13

Advanced Meter Knowledge



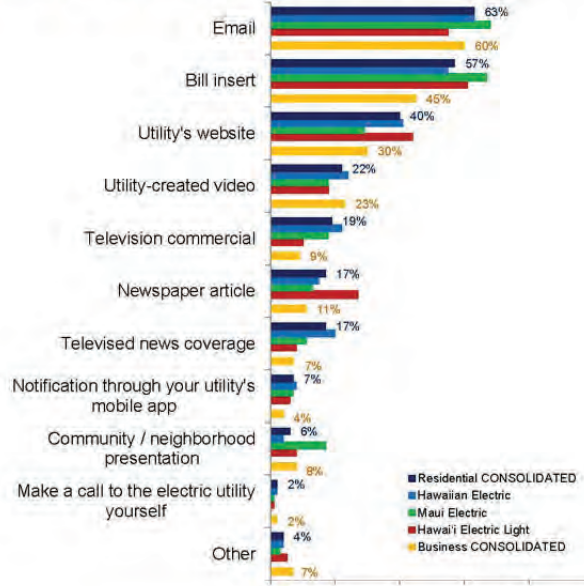
14

Learning About Advanced Meters

Advanced meters are digital electricity meters that can provide a number of potential benefits to electricity customers. When they become available, advanced meters will be installed at no charge.

- Advanced meters eliminate the need for a meter reader to come on to your property. Instead, usage information is sent directly to the utility for timely, accurate billing.
- Advanced meters provide real-time information about electricity use so you can see how much electricity you are using at a given time. As you become informed about your usage, you can save money by managing your electricity use more actively and efficiently. You will be able to access your real-time household energy usage data through a secure website portal.

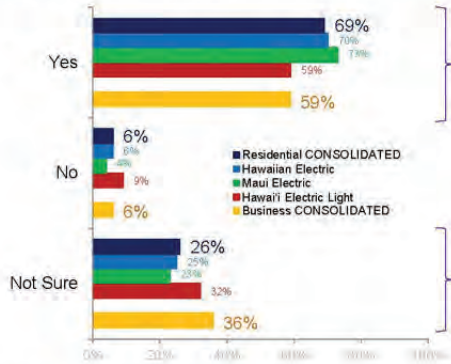
How would you prefer to learn more about advanced meters and the utility's rate offerings and programs? Please select up to three options.



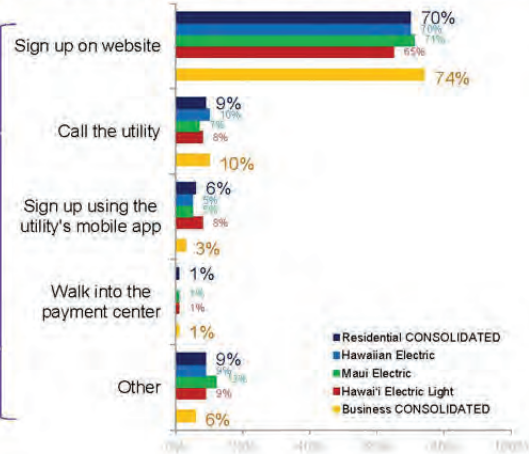
15

Advanced Meter Installation

Once an advanced meter is made available to you at no additional cost, would you be interested in having one installed?



How would you prefer to sign up for advanced meter installation?



Follow up question calculated to the total customer base.

16

Advanced Meter Installation: Why?

Residential Customers

Yes, install

"I would love to be able to know how much energy I am using at any given time, and therefore know how to be more efficient with my energy usage during different times of the day."

"I believe in understanding where our power usage can be made more efficient and how we can work with MECO on making the grid more stable."

"Doing away with a meter reader would reduce HECO costs and perhaps reduce mine."

Not Sure

"Are they available in condos?"

"I rent my townhouse that is in a large housing development. Don't know if it is possible."

"We are planning to put in solar panels within the next few months, which will provide us with electricity usage information. Not sure if an advanced meter will be needed in addition to the solar monitor(s)."

No

"I am already on NEM with my PV system."

"Because RF radiation is a possible carcinogen, and smart meters give off RF radiation, it is possible that smart meters could increase cancer risk."

"Way too many horror stories of people's electric bill sky rocketing after having one of those things put in."



17

Advanced Meter Installation: Why?

Business Customers

Yes, install

"Would help me monitor usage and make adjustments to help keep my costs down."

"Economy of operation on your end might possibly lead to less cost on my end."

"To understand my usage so I wouldn't be surprised how much I should pay."

Not Sure

"Would want to fully understand how it works before agreeing to it. Thanks!"

"Without knowing enough of the pros and cons, and the impact to the business, I am unsure if we would be interested. We would definitely lean towards it, but need to do a deeper review."

"Our location is actually a church, and I would have to run it past the board of directors before making a decision. It sounds like a good idea and I believe would approve it, but I don't want to say till I know for sure."

No

"Smart meters, other common technologies, which utilize electromagnetic radiation (EMR) are being found to have long-term (potentially harmful, even carcinogenic) effects on health. Until further studies can prove that these technologies are indeed benign, I believe they should be used cautiously and sparingly despite their obvious benefits (convenience, accuracy, etc.). Please lookup EMF safety and smart meters for further info."

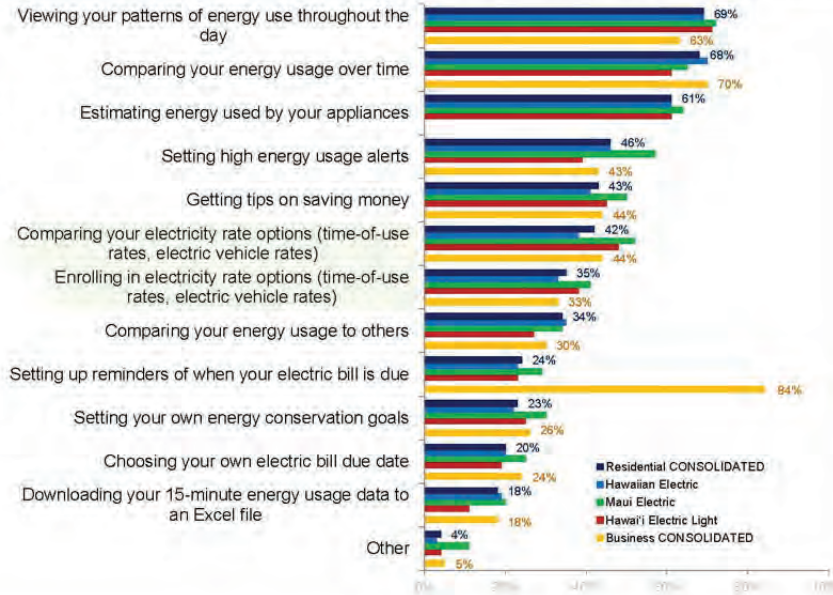
"I am not a fan of them and would find no additional benefit from them. It's not 'at no additional cost'. The cost is just hidden somewhere. There's nothing wrong with the meters we have now. They do their job just fine."



18

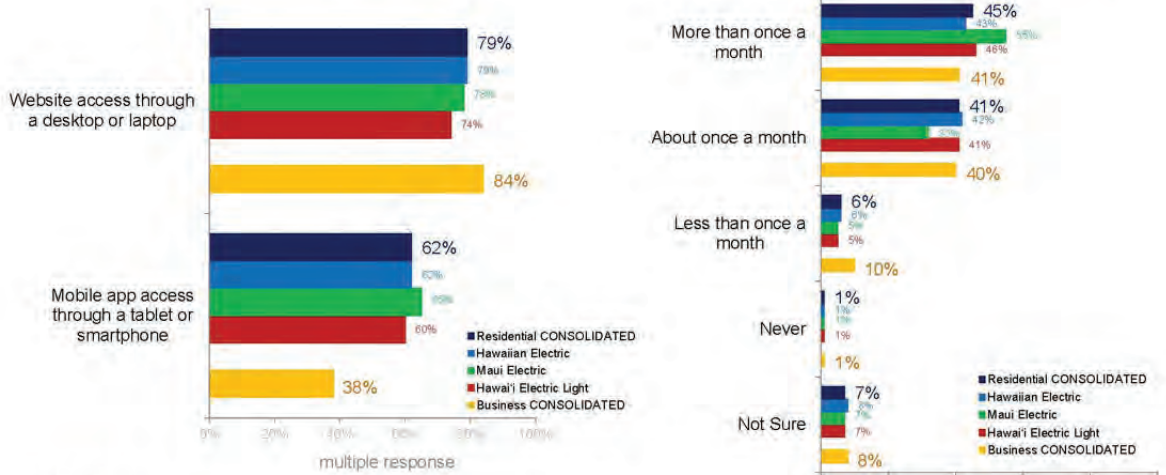
Advanced Meter's Portal Features of Interest

The advanced meter's secure internet portal may also include a number of helpful features. Please select the features you would be most interested in using.



19

Advanced Meter's Portal Access and Frequency



20

Appendix E Advanced Rate Design Strategy Illustrative Roadmap

Table 25 reflects an illustrative roadmap of when the Companies may propose certain rate designs. This illustration is not meant to be all-inclusive or definitive. The Companies expect the timing and nature of proposals in the future to be different from what is indicated below due to market conditions, the rollout of advanced meters, stakeholder and customer feedback, and changing system and customer needs. However, this illustration may serve as a basis for additional discussion.

Table 25: ARDS Illustrative Roadmap

Year(s)	Related to Advanced Meters	Retail Rates	Demand Response	Distributed Energy Resources
2019	<ul style="list-style-type: none"> • Mesh deployment (smart grid pilots) • Over-the-air programming (with cellular/mesh, if deployed) • Reading, billing: manual until MDMS 	<ul style="list-style-type: none"> • E-BUS-J and E-BUS-p⁸³ • A revision to the commercial TOU rate to incentivize day time usage 		

⁸³ These rates, approved for O’ahu, Maui, and Hawai’i Island, pairs a second meter with a host meter to measure baseline on-peak electric bus demand. If on-peak demand exceeds host meter demand, excess kW will be billed at the host meter demand rate. Energy rate is tailored to electric bus operations and aligned with the Companies’ grid needs.

Year(s)	Related to Advanced Meters	Retail Rates	Demand Response	Distributed Energy Resources
2020	<ul style="list-style-type: none"> About 40,000 advanced meters Maui Electric class-load studies (by mid-year) 	<ul style="list-style-type: none"> Increased temporal granularity of TOU rates⁸⁴ Business developmental rates to encourage new loads⁸⁵ Pilot EV rates (EV-U, EV-F) to make permanent EV-MAUI tariff (pending Commission approval) TOU EV rate expires – smooth transition to alternative rates Residential and small commercial pilot for multi-part time-variant rate Budget bill 	<ul style="list-style-type: none"> Determination of critical peak incentive Level-of-service rates⁸⁶ (i.e., interruptible rates) 	<ul style="list-style-type: none"> A standard DER tariff (residential, small commercial) Customer Interconnection Tool application fee (all companies)⁸⁷ CBRE Phase 2⁸⁸
2021	<ul style="list-style-type: none"> About 100,000 advanced meters MDMS functional 	<ul style="list-style-type: none"> Residential multi-family TOU rate pilot 	<ul style="list-style-type: none"> Critical peak incentive per CPI determination 	<ul style="list-style-type: none"> Standby charges, departed load/exit fees

⁸⁴ Opt-in rates may include shoulder periods; seasonal, day of week, and holiday pricing; and tiered rates.

⁸⁵ Special rates to encourage new loads for new technologies (e.g., E-BUS) or as mandated by public policy (e.g., protected agriculture).

⁸⁶ These rates may provide customers with a lower rate for a lower level of reliability.

⁸⁷ One-time application fee for PV or battery DER. May include CBRE.

⁸⁸ Includes a 50% LMI participation requirement for utility projects.

Year(s)	Related to Advanced Meters	Retail Rates	Demand Response	Distributed Energy Resources
2022	<ul style="list-style-type: none"> About 140,000 advanced meters 	<ul style="list-style-type: none"> Revised TOU rates: Opt-in for existing customers, default for new customers Opt-in multi-part time-variant rate (residential, small commercial), default for standard DER tariff customers 		<ul style="list-style-type: none"> Interim programs⁸⁹ may migrate to a standard DER tariff
2023	<ul style="list-style-type: none"> Grid Mod Phase 1 complete About 175,000 advanced meters 			
2024+	<ul style="list-style-type: none"> Further deployment of advanced meters Prepay 	<ul style="list-style-type: none"> Opt-out TOU pilot Default TOU (residential, commercial) Subscription plan 	<ul style="list-style-type: none"> Dynamic pricing pilot (e.g., hourly day-ahead, real-time pricing) 	

⁸⁹ Includes CGS, CSS, CGS Plus, and Smart Export.

Appendix F Presentations from the ARDS Workshop

The presentations from the ARDS Workshop held on July 15, 2019 that were summarized in Appendix C are included in this appendix. The presentations given at the ARDS workshop may not necessarily be reflective of the viewpoints of the presenter's organization.

Presenter	Presentation
Ahmad Faruqui, Principal	<ul style="list-style-type: none"> The Brattle Group: Advanced Rate Designs, The Eight FAQs
Jim Lazar, Senior Advisor	<ul style="list-style-type: none"> Regulatory Assistance Project (RAP): Advanced Rate Design for Hawaiian Electric Company
Travis Kavulla, Director, Energy & Environmental Policy	<ul style="list-style-type: none"> R Street Institute: Rate Design in a 100% Clean-Energy Transition
Chris Yunker, Energy Systems & Planning Branch Manager	<ul style="list-style-type: none"> Hawai'i State Energy Office: Rate Design: Pricing in Consideration of State Energy Policy
Jennifer Davidson, Chief Financial Officer	<ul style="list-style-type: none"> Sacramento Municipal Utility District (SMUD): Hawaiian Electric Advanced Rate Design Workshop
Cyndee Fang, Manager of Energy Research & Analysis	<ul style="list-style-type: none"> San Diego Gas & Electric (SDGE): Advanced Rate Design Workshop
Ren Orans, Managing Partner	<ul style="list-style-type: none"> Energy and Environmental Economics, Inc. (E3): Advanced Rate Design Workshop

Advanced Rate Design Strategy

The slide features a dark blue background with a white diagonal line separating a photograph of a modern building with blue glass panels from the text area. The text is white and centered on the dark blue background.

Advanced Rate Designs
The Eight FAQs

PRESENTED BY
Ahmad Faruqui, Ph.D.
Principal

Honolulu, Hawaii

July 15, 2019

THE **Brattle** GROUP

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Digital technologies are changing the way customers interact with electric utilities

Smart homes: Smart appliances, smart thermostats, and smart phones are becoming ubiquitous

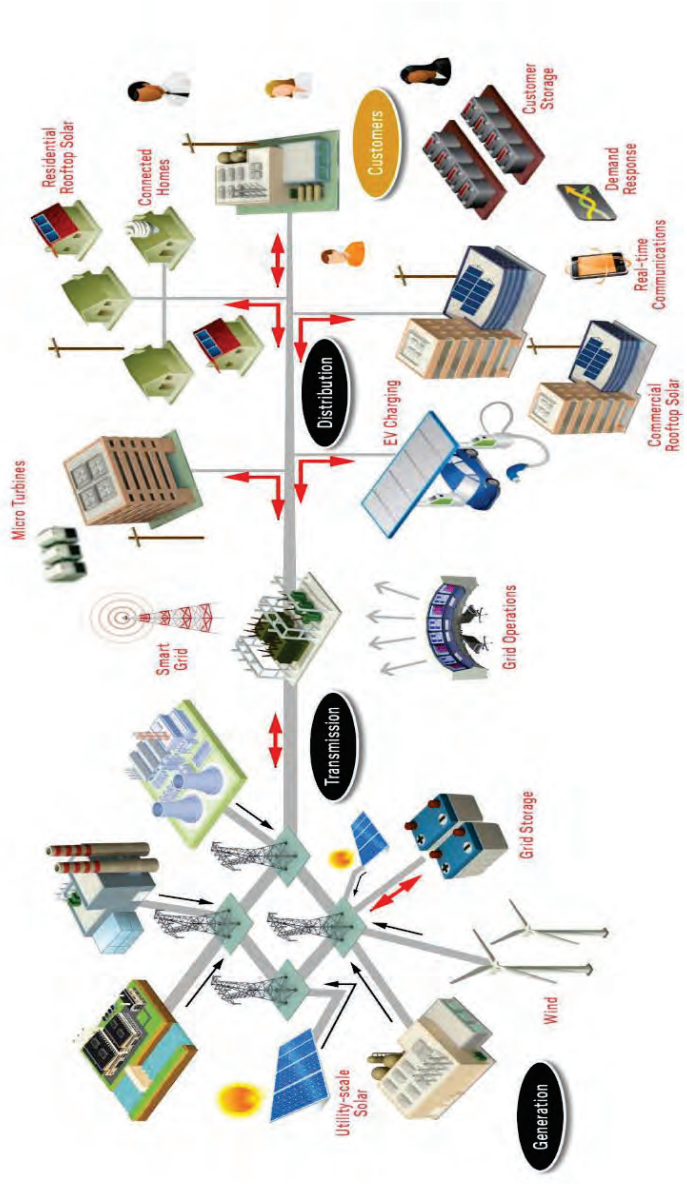
Electric vehicles: Some car manufacturers have said they will stop making gasoline-powered cars in the next decade

Distributed generation: Customers are increasingly turning into prosumers, by installing rooftop solar panels, battery storage, and fuel cells; this requires the grid to be modified to accommodate two-way energy flows

Smart metering: Advanced metering infrastructure (AMI) now covers half of the United States

Advanced Rate Design Strategy

To deal with these challenges, the integrated grid is beginning to take shape



Source: EPRI

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Today's rate designs hearken back to an era when the Treaty of Versailles was signed

They consist of a tiny fixed charge and a flat energy charge



The infographic features a background image of the ornate interior of the Palace of Versailles. At the top, the title "Treaty of Versailles" is displayed in a large, bold, black font. Below the title is a bulleted list of five key facts. At the bottom of the infographic, there is a horizontal row of six national flags: the United Kingdom, France, the United States, Belgium, Italy, and Sweden.

Treaty of Versailles

- Treaty of Versailles was one of the peace treaties at the end of WWI
- Ended the state of war between Germany and the Allied Powers
- Signed on 28 June 1919
- Other Central Powers were dealt with in separate treaties
- Although the armistice, signed on 11 November 1918, ended the actual fighting, it took six months of negotiations at the Paris Peace Conference to conclude the peace treaty

In 1938, rate design was called “an unflinching annoyance”

“There has never been any lack of interest in the subject of electricity tariffs. Like all charges upon the consumer, they are an unflinching source of annoyance to those who pay, and of argument in those who levy them. There is general agreement that appropriate tariffs are essential to any rapid development of electricity supply, and there is complete disagreement as to what constitutes an appropriate tariff.”

-D.J. Bolton, Costs and Tariffs in Electricity Supply, London, 1938

Advanced Rate Design Strategy

In 1951, originality in rate design was questioned

“The vast literature on electricity tariffs shows so many different views that it would be difficult to be original in proposing tariff changes.”

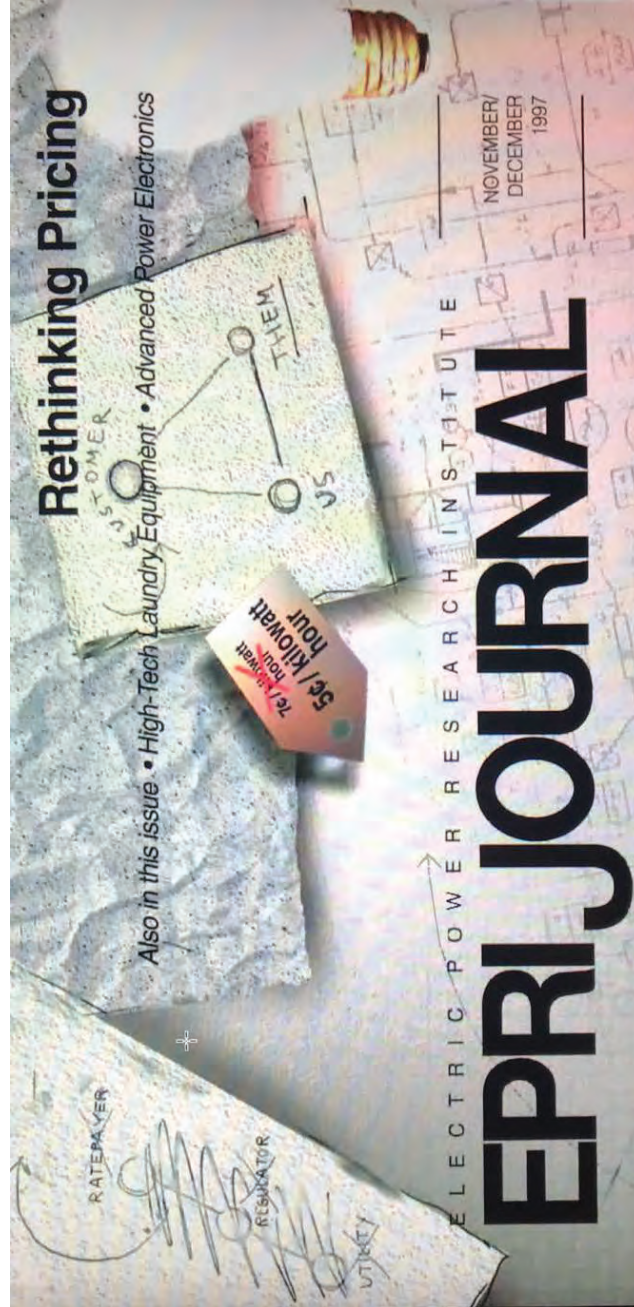
-Hendrik Houthakker, 1951



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Advanced Rate Design Strategy

In 1997, EPRI published an essay on the need to modernize rate design



Advanced Rate Design Strategy

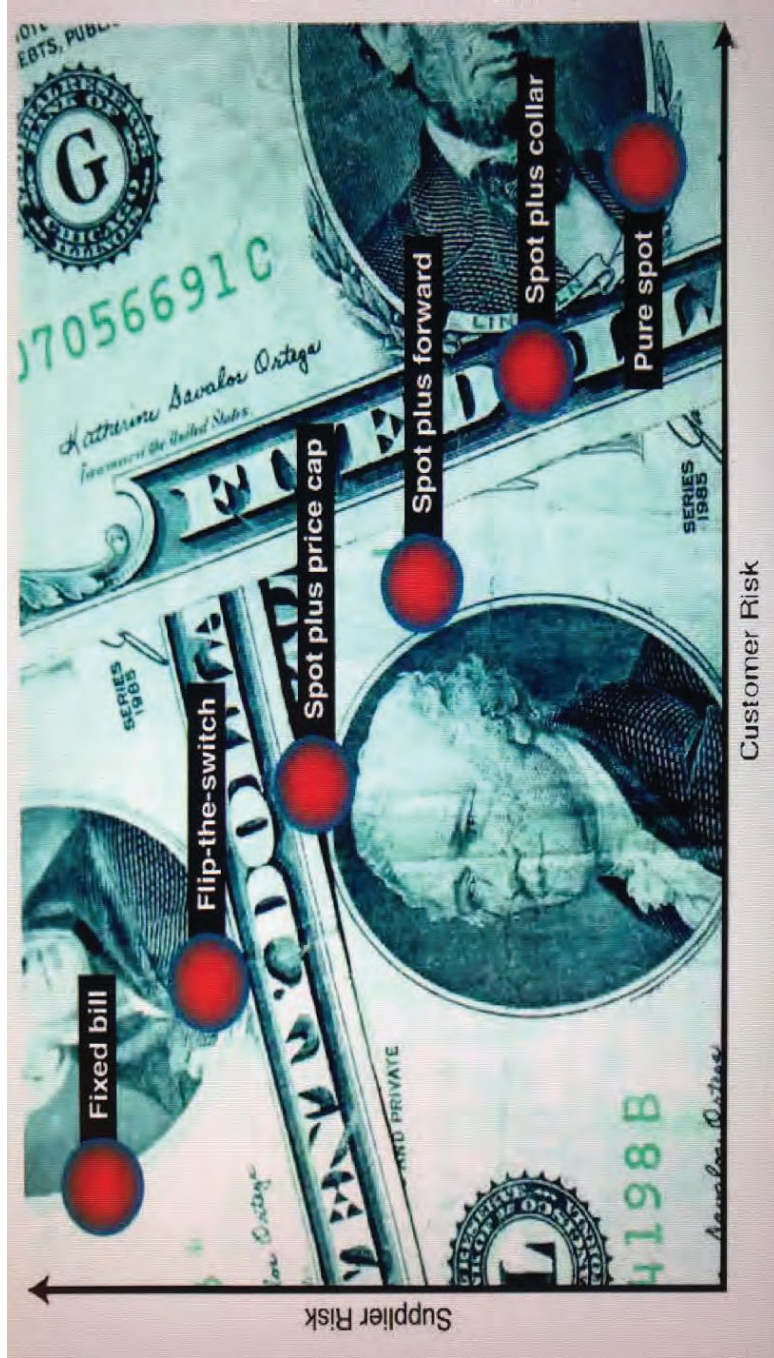
In the late 1990s, inspired by UK's Professor Littlechild, deregulation arrived on the shores of the US

It was going to be the proverbial "Brave New World" where utilities would face competition like never before



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The choices would trade-off supplier risk against consumer risk



Advanced Rate Design Strategy

In 2019, what was modern in 1950 is no longer modern



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Advanced Rate Design Strategy

Current rate designs do not mirror the cost structure of generating and delivering electricity



Note: Illustrative example for an electric utility.

FAQ 1. What do advanced rate designs look like?

- They reflect the cost structure of electricity and thereby promote economic efficiency and equity
- They allow customers to control their electricity use and bill
- They incentivize energy efficiency and demand response and facilitate the development of clean energy resources
- Advanced rate design provide choices to customers

FAQ 2. What are the trade-offs in rate design?

The Bonbright Principles are predicated on **cost-causation**, and allow the following objectives to be achieved

- Equity/minimization of cross-subsidies
- Reduced long-run costs due to more efficient use of the network
- Efficient siting of distributed energy resources (DERs)

Customer considerations will require that strictly cost-reflective tariff designs be modified

- Simplicity / understandability
- Customer acceptance / appeal / perceived fairness
- Mitigating large bill changes / volatility
- Protecting vulnerable customer segments

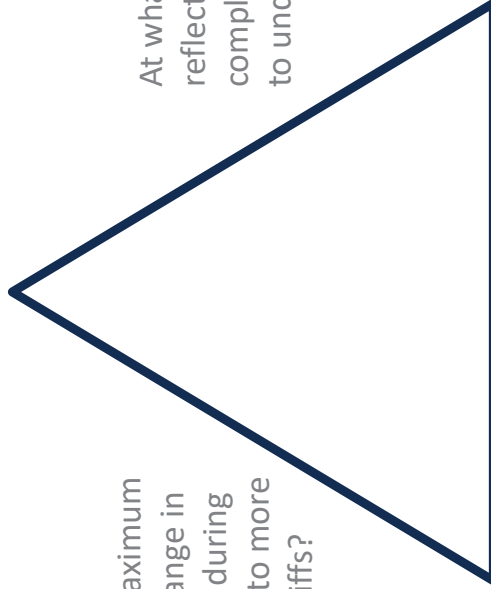
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Thus, rate design involves making trade-offs against three competing goals

Cost Reflective

What is the maximum acceptable change in customer bills during the transition to more cost based tariffs?

At what point is a cost reflective tariff too complex for customers to understand?



Bill Impact

Do simple tariffs lead to significant over/under-payment by certain customer segments?

**Simplicity/
Acceptability**

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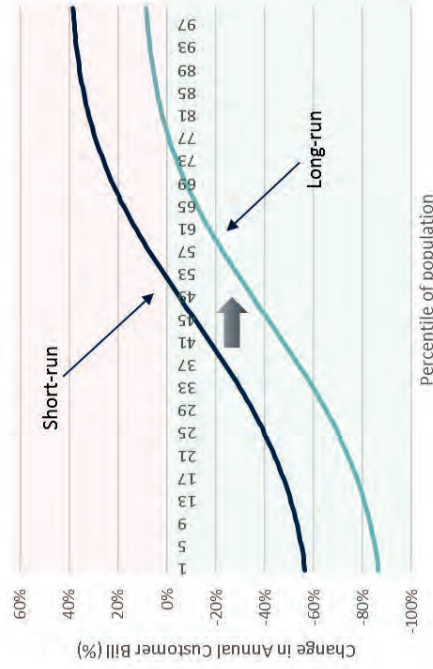
Rate design reform requires buy-in from stakeholders and, most importantly, from customers

Some of the benefits of the tariff transition, such as network cost reductions, will occur in the long-run, while impacts will be felt by customers immediately

Commonly cited stakeholder concerns about tariff changes

- Higher bills for (some) customers
- Changes to status quo are perceived to be “unfair”
- Bills for some vulnerable customers may increase, or they may be unable to respond to new price signals

Illustration of Bill Impacts due to Tariff Transition



It is important to ensure that customers understand why the transition is occurring and are aware of any opportunities to save on their bill

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FAQ 3. What are some examples of advanced rate design?

Rate Design	Definition
Fixed bill	Customers pay a fixed monthly bill accompanied with tools for lowering the bill (such as incentives for lowering peak usage)
Seasonal Rates	The year is divided into different seasons, commonly winter and summer, each of which have distinct rates. Prices are higher in peak seasons to reflect seasonal variation in the cost of supplying energy.
Demand Charges	Customers are charged based on peak electricity consumption, typically over a span of 15, 30, or 60 minutes.
Time-of-Use (TOU)	The day is divided into peak and off-peak time periods. Prices are higher during the peak period hours to reflect the higher cost of supplying energy during that period.
Critical Peak Pricing (CPP)	Customers pay higher prices during critical events when system costs are highest or when the power grid is severely stressed.
Peak Time Rebates (PTR)	Customers are paid for load reductions on critical days, estimated relative to a forecast of what the customer would have otherwise consumed (their “baseline”)
Variable Peak Pricing (VPP)	During alternative peak days, customers pay a rate that varies by day to reflect dynamic variations in the cost of electricity.
Demand Subscription Service (DSS)	Customers subscribe to a kW demand level based on the size of their connected load. If they exceed their subscribed level, they must reduce their demand to restore electrical service.
Transactive Energy (TE)	Customers subscribe to a “baseline” load shape based on their typical usage patterns, and then buy or sell deviations from their baseline.
Real-Time Pricing (RTP)	Customers pay prices that vary by the hour to reflect the actual cost of electricity

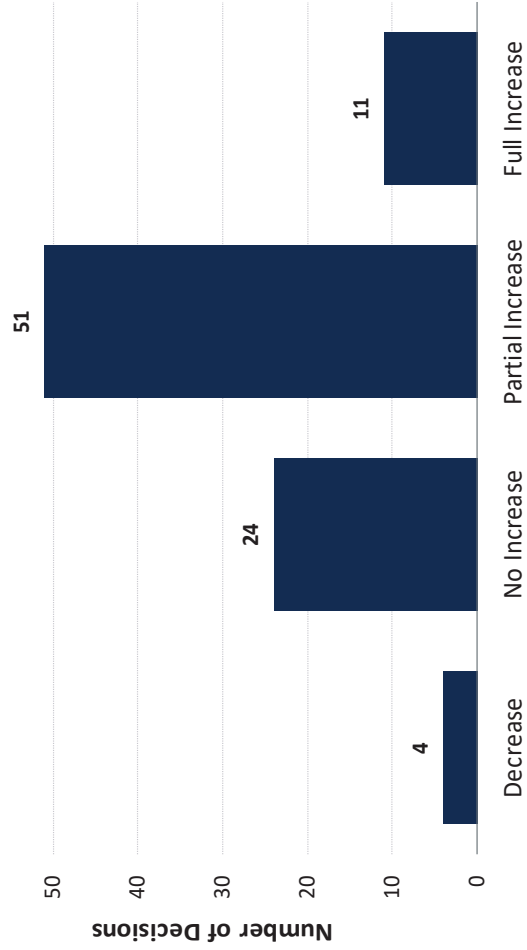
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In the industry, utilities are seeking to move fixed charges closer to fixed costs

Many utilities have proposed to increase the fixed charge, with varying degrees of success

2017-18 Fixed Charge Decisions



Source: NC Clean Energy, "The 50 States of Solar," 2017 and 2018 Year in Reviews. Average partial increase was 26% of utility's request in 2017, and 40% in 2018.

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There is also a trend toward residential demand charges

Capacity charges based on the size of the connection are mandatory for residential customers in France, Italy, and Spain

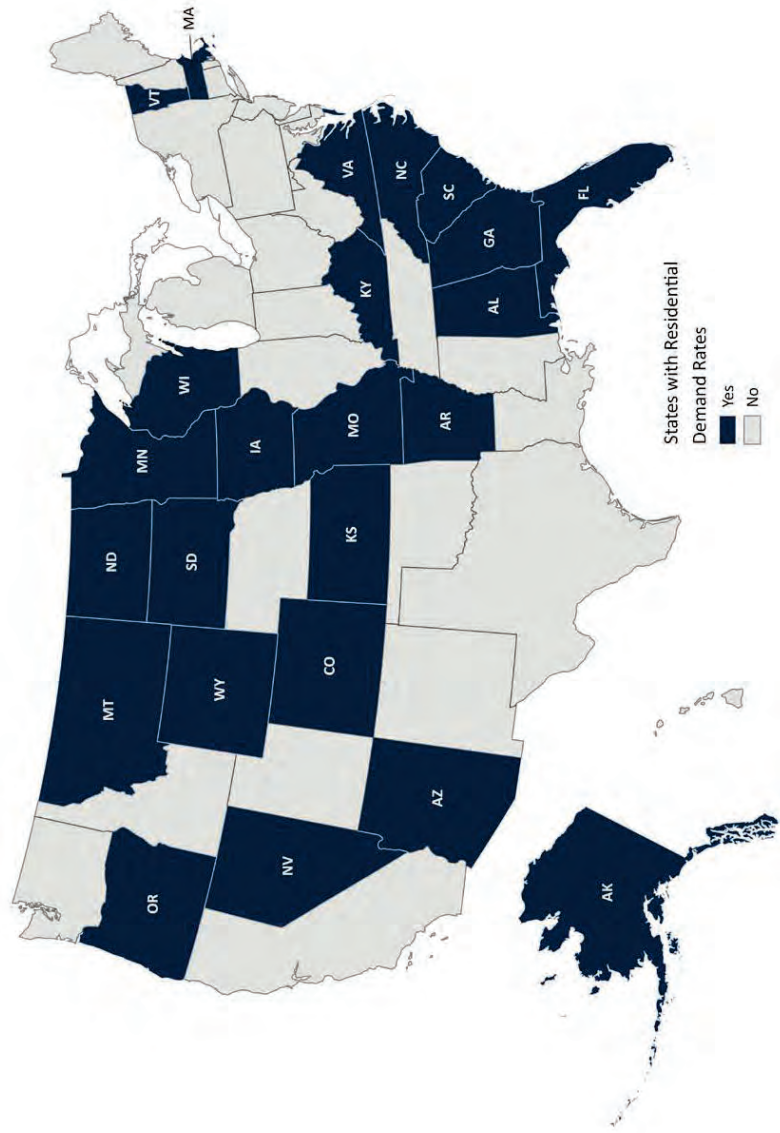
Demand charges are being offered by more than 50 utilities across 24 states in the United States

Utilities such as Arizona Public Service, NV Energy, and Westar Energy have filed applications to make them a mandatory tariff for customers with PVs on their roof

- Salt River Project in Arizona, a municipally owned system, has instituted such a tariff for DG customers
- The Kansas Corporation Commission has ordered that DG customers be considered a separate class and be offered three-part rates, among other options

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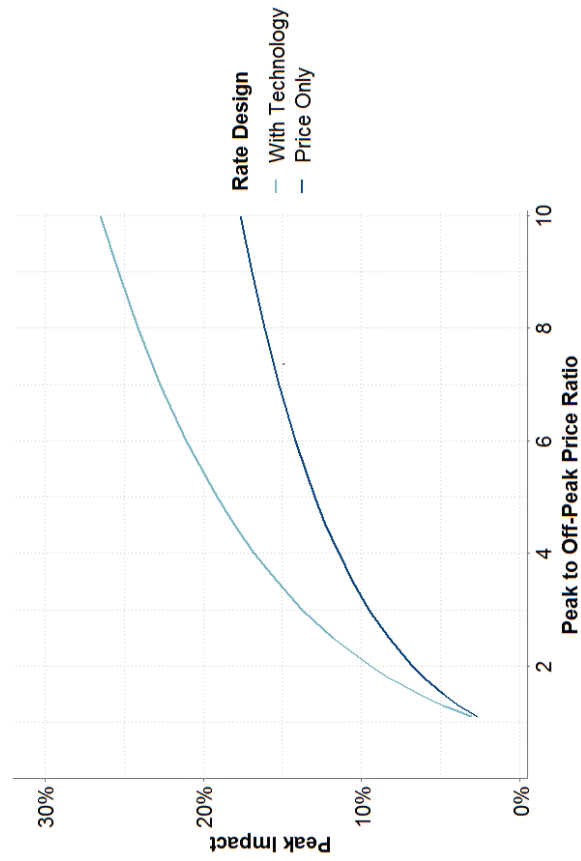
More than 60 demand charges are deployed today to residential customers



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FAQ 4. Do time-varying rate designs significantly change customer load shapes?

A meta-analysis of 349 deployments worldwide shows that when customers face a strong price signal (a higher on-peak price), they reduce peak electricity usage. And if the price signal is accompanied by enabling technology, they reduce their peak electricity usage even more.



Source: Arcturus Data Base, The Brattle Group.

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FAQ 5. Where are advanced rate designs being offered?

	Mandatory	Opt-in	Opt-out
Flat bill		Georgia Power, Oklahoma Gas & Electric	
Peak-time rebates			Maryland, California, Illinois
Demand charges		Arizona Public Service, Black Hills, Salt River Project,	
Time-of-use (TOU) volumetric rates	Fort Collins (Colorado)	Texas	SMUD (California)
Dynamic volumetric rates (CPP, PTR, and RTP)		Oklahoma, Illinois	California

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FAQ 6. Have customers accepted advanced rate designs?

Utility or Location	Type of Rate	Applicability	Participating Customers
Oklahoma Gas & Electric	Variable Peak Pricing (VPP)	Opt-in	20% (130,000)
Maryland (BGE, Pepco, Delmarva)	Dynamic Peak Time Rebate (PTR)	Default	80%
Ontario, Canada	Time-of-Use (TOU)	Default	90% (3.6 million)
Great Britain	Time-of-Use (TOU)	Opt-in	13% (3.5 million)
Hong Kong (CLP Power Limited)	Dynamic Peak Time Rebate (PTR)	Opt-in	27,000
Arizona (APS, SRP)	Time-of-Use (TOU)	Opt-in	57% of APS' residential customers (20% of which are also on a demand charge), 36% of SRP's
California (PG&E, SCE, SDG&E)	Time-of-Use (TOU)	Default (2019)	TBD – 75-90%*
California (SMUD)	Time-of-Use (TOU)	Default	75-90%*
Colorado (Fort Collins)	Time-of-Use (TOU)	Mandatory (for residential)	100%
Illinois (ComEd, Ameren Illinois)	Real Time Pricing (RTP)	Opt-in	50,000
France	Time-of-Use (TOU)	Opt-in	50%
Spain	Real Time Pricing (RTP)	Default	50%
Italy	Time-of-Use (TOU)	Default	75-90%*

*Estimated participation based on historical trends

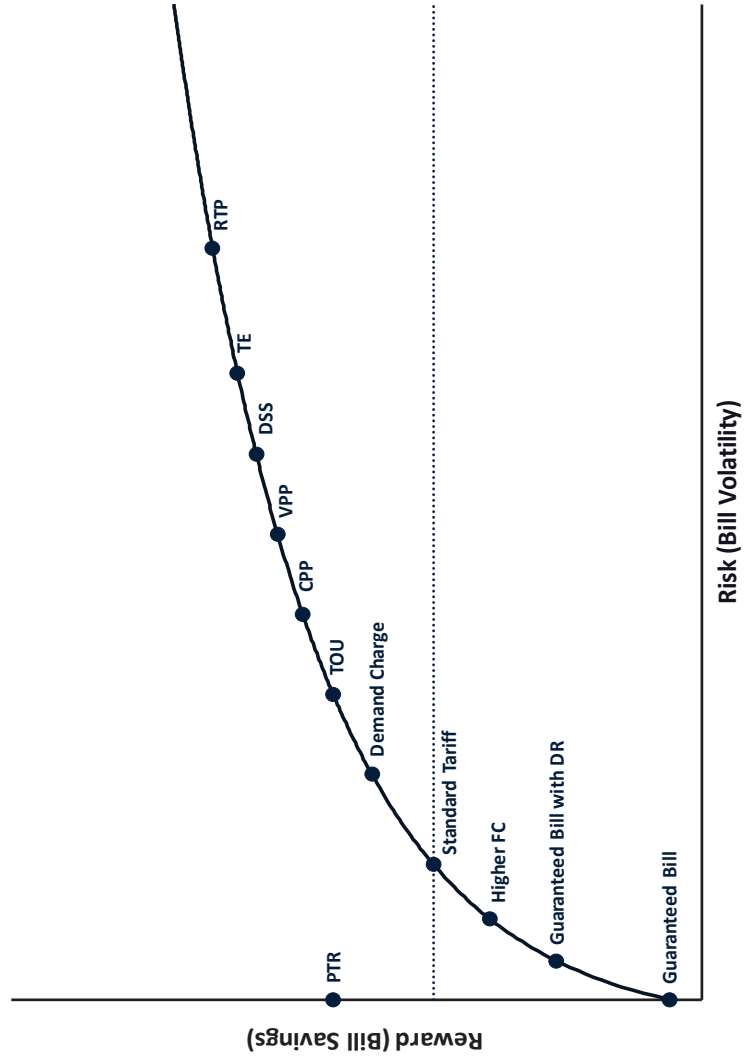
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FAQ 7. What advanced rate design choices are being offered by utilities?

- A Guaranteed bill (GB)
- B GB with discounts for demand response (DR)
- C Increased fixed charge (FC)
- D Standard tariff
- E Demand charge
- F Time-of-Use (TOU)
- G Critical peak pricing (CPP)
- H Peak time rebates (PTR)
- I Variable peak pricing (VPP)
- J Demand subscription service (DSS)
- K Transactive energy (TE)
- L Real-time pricing (RTP)

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Customers can pick their landing point along the “efficient pricing frontier”



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Example 1: Rate design choices being offered today by Arizona Public Service

Residential Plan Comparison*

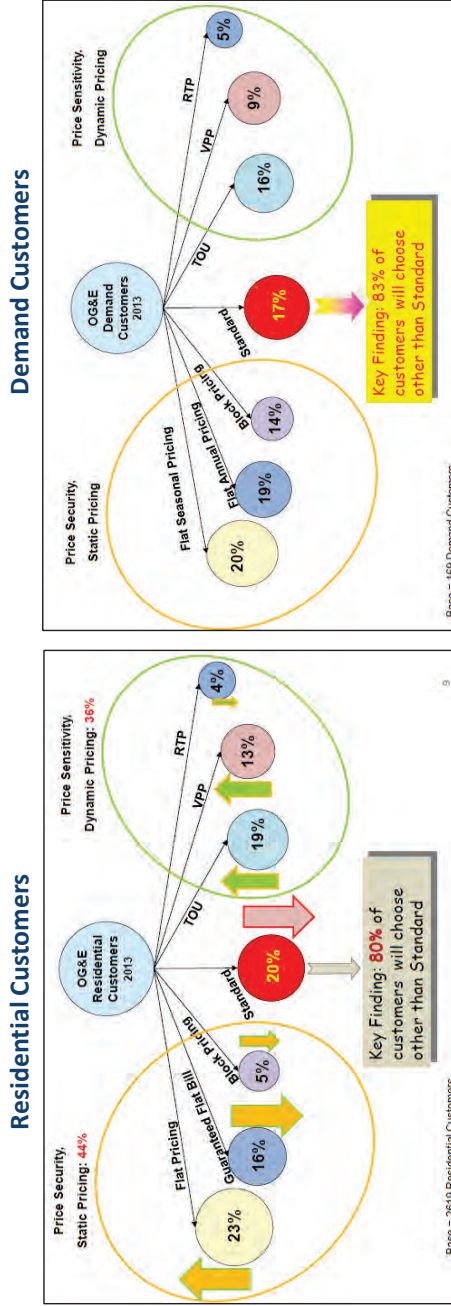
PLANS	BASIC SERVICE CHARGE (PER DAY)	ENERGY USE (PER kWh)	OFF-PEAK PRICING	SAVER WINTER PRICING	DN-PEAK PRICING	ON-PEAK PRICING	ON-PEAK PEAK USAGE (DEMAND) PER kW	ON-PEAK PEAK USAGE (DEMAND) PER kW	OFF-PEAK HOURS	SAVER WINTER HOURS	ON-PEAK HOURS	ENERGY USE RESTRICTIONS (24-MONTH AVERAGE)	RENEWABLE COMPATIBLE
Saver Choice	42.7¢	-	10.873¢	3.200¢	24.314¢	23.068¢	-	-	8 p.m.–3 p.m. weekdays, all weekend +10 holidays	10 a.m.–3 p.m. weekdays	3 p.m.–8 p.m. weekdays	-	Yes (with grid access charge)
Saver Choice Plus	42.7¢	-	7.798¢	-	13.160¢	11.077¢	\$8.40	\$8.40	8 p.m.–3 p.m. weekdays, all weekend +10 holidays	-	3 p.m.–8 p.m. weekdays	-	Yes
Saver Choice Max	42.7¢	-	5.230¢	-	8.683¢	6.376¢	\$17.44	\$12.24	8 p.m.–3 p.m. weekdays, all weekend +10 holidays	-	3 p.m.–8 p.m. weekdays	-	Yes
Lite Choice	32.9¢	11.672¢	-	-	-	-	-	-	-	-	-	Linear 600 kWh per month	No
THE FOLLOWING PLANS IS AVAILABLE TO ELIGIBLE CUSTOMERS AT TERA TRAIL OF 90 DAYS ON ONE OF THE SAVER CHOICE PLANS.													
Premier Choice	49.3¢	12.393¢	-	-	-	-	-	-	-	-	-	601-999 kWh per month	No

Source: Arizona Public Service, Residential Plan Comparison, <https://www.aps.com/library/rates/PlanComparison.pdf>, accessed March 2019.

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Example 2: OG&E picked its rate design choices through "design thinking"

Customer Choices Among Pricing Plans (2013)



Source: Direct Testimony of Bryan J. Scott on behalf of Oklahoma Gas and Electric Company, Before the Arkansas Public Service Commission, Docket No. 16-052-J, August 26, 2016. Survey responses include both Oklahoma and Arkansas customers. Arrows next to the residential customer results represent changes from an earlier survey conducted in 2010.

FAQ 8. What are the different ways for transitioning to advanced rate designs?

Roll out the rate designs on a gradual basis

Pilot the new rate designs

Offer the advanced rate designs on an opt-in basis, with the clear understanding that one of them will eventually become the default rate design

Make one of them the default rate design with bill protection that's gradually phased out

Supplement the rate designs with enabling technologies

Structure the rate design around a reference load shape (a good example is Georgia Power's real time pricing rate tariff)

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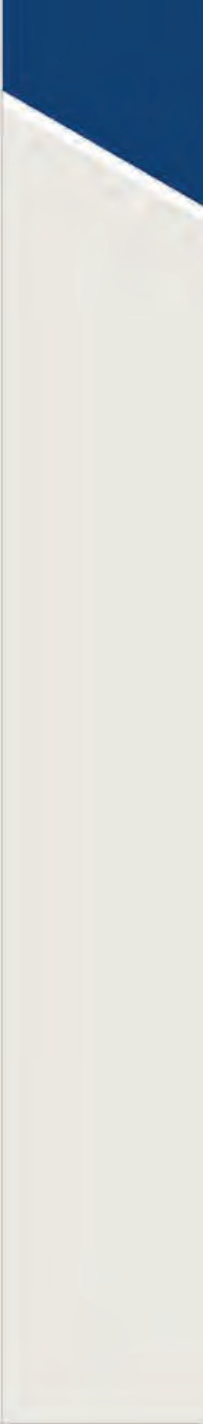
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Appendix A Residential Demand Charges

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#	Utility	Utility Ownership	State	Residential Customers Served	Fixed charge (\$/month)	Demand Charge (\$/kW-month)		Timing of demand measurement	Demand interval	Combined with Energy TOU?	Applicable Residential Customer Segment	Mandatory or Voluntary
						Summer	Winter					
[1]	Alabama Power	Investor Owned	AL	1,268,271	14.50	1.50	1.50	Any time	15 min	Yes	All	Voluntary
[2]	Alaska Electric Light and Power	Investor Owned	AK	14,579	11.13	6.51	10.76	Any time	Unknown	No	All	Voluntary
[3]	Albemarle Electric Membership Corp	Cooperative	NC	11,679	27.00	13.50	13.50	Peak Coincident	15 min	Yes	All	Voluntary
[4]	Alliant Energy (IPL)	Investor Owned	IA	403,160	11.50	17.40	11.62	Peak Coincident	60 min	Yes	All	Voluntary
[5]	Alliant Energy (WPL)	Investor Owned	WI	410,620	15.04	3.00	3.00	Peak Coincident	60 min	Yes	All	Voluntary
[6]	Arizona Public Service	Investor Owned	AZ	1,080,665	13.02	8.40	8.40	Peak Coincident	60 min	Yes	All	Voluntary
[7]	Arizona Public Service	Investor Owned	AZ	1,080,665	13.02	17.44	12.24	Peak Coincident	60 min	Yes	All	Voluntary
[8]	Black Hills Power	Investor Owned	SD	56,430	13.00	8.10	8.10	Any time	15 min	No	All	Voluntary
[9]	Black Hills Power	Investor Owned	WY	2,031	15.50	8.25	8.25	Any time	15 min	No	All	Voluntary
[10]	Butler Rural Electric Cooperative	Cooperative	KS	6,662	31.00	5.10	5.10	Peak Coincident	60 min	No	All	Mandatory
[11]	Butte Electric Cooperative	Cooperative	SD	5,082	45.00	9.50	9.50	Unknown	Unknown	No	All	Voluntary
[12]	Carteret-Craven Electric Cooperative	Cooperative	NC	36,124	30.00	11.95	9.95	Peak Coincident	15 min	No	All	Voluntary
[13]	Central Electric Membership Corp	Cooperative	NC	20,299	34.00	8.55	7.50	Peak Coincident	15 min	Yes	All	Voluntary
[14]	City of Fort Collins Utilities	Municipal	CO	63,760	6.16	2.60	2.60	Any time	Unknown	No	All	Voluntary
[15]	City of Glasgow	Municipal	KY	5,522	24.16	11.86	10.87	Peak Coincident	30 min	Yes	All	Voluntary
[16]	City of Kingston	Municipal	NC	9,694	14.95	9.35	9.35	Peak Coincident	15 min	No	All	Voluntary
[17]	City of Longmont	Municipal	CO	36,392	16.60	5.75	5.75	Any time	15 min	No	All	Voluntary
[18]	City of Templeton	Municipal	MA	0	3.00	8.00	8.00	Any time	15 min	No	All*	Mandatory
[19]	Cobb Electric Membership Corporation	Cooperative	GA	184,095	28.00	5.55	5.55	Peak Coincident	60 min	No	All	Voluntary
[20]	Dakota Electric Association	Cooperative	MN	98,048	12.00	14.70	11.10	Any time	15 min	No	All	Voluntary
[21]	Dominion Energy	Investor Owned	NC	102,429	16.39	9.76	5.66	Peak Coincident	30 min	Yes	All	Voluntary
[22]	Dominion Energy	Investor Owned	VA	2,196,466	11.53	5.46	3.79	Peak Coincident	30 min	Yes	All	Voluntary
[23]	Duke Energy Carolinas, LLC	Investor Owned	NC	1,693,953	14.00	7.83	3.92	Peak Coincident	30 min	Yes	All	Voluntary
[24]	Duke Energy Carolinas, LLC	Investor Owned	SC	487,693	9.93	8.15	4.00	Peak Coincident	30 min	Yes	All	Voluntary
[25]	Edgecombe-Martin County EMC	Cooperative	NC	10,199	31.00	8.75	8.00	Peak Coincident	Unknown	No	All	Voluntary
[26]	Flathead Electric Cooperative	Cooperative	MT	54,511	23.71	0.26	0.26	Peak Coincident	60 min	No	All	Mandatory
[27]	Fort Morgan	Municipal	CO	4,988	8.17	10.22	10.22	Unknown	Unknown	No	All	Voluntary
[28]	Georgia Power	Investor Owned	GA	2,173,557	10.00	6.64	6.64	Any time	30 min	Yes	All	Voluntary
[29]	Kentucky Utilities Company	Investor Owned	KY	429,407	12.25	7.87	7.87	Peak Coincident	15 min	No	All	Voluntary
[30]	Lakeland Electric	Municipal	FL	107,703	9.50	5.60	5.60	Peak Coincident	30 min	No	All	Voluntary
[31]	Lincoln Electric Cooperative	Cooperative	MT	5,133	39.39	0.75	0.75	Any time	15 min	No	All	Voluntary

Sources: Utility tariffs as of September 2018, and EIA Form 861 from 2017 (for Utility ownership and Residential Customers Served columns).

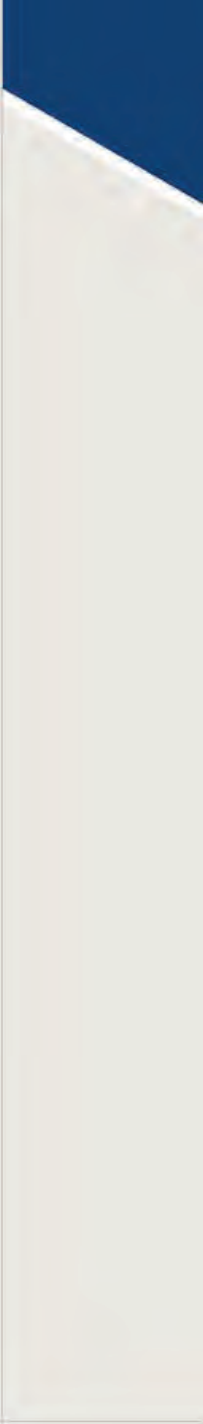
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Listing of demand charges
(concluded)

#	Utility	Utility Ownership	State	Residential Customers Served	Fixed charge (\$/month)	Demand Charge (\$/kW-month)		Timing of demand measurement	Demand interval	Combined with Energy TOU?	Applicable Residential Customer Segment	Mandatory or Voluntary
						Summer	Winter					
[32]	Louisville Gas and Electric	Investor Owned	KY	359,658	12.25	7.68	7.68	Peak Coincident	15 min	No	All	Voluntary
[33]	Loveland Electric	Municipal	CO	31,915	23.50	9.80	7.35	Any time	15 min	No	All	Voluntary
[34]	Mid-Carolina Electric Cooperative	Cooperative	SC	50,451	24.00	12.00	12.00	Peak Coincident	60 min	No	All	Mandatory
[35]	Midwest Energy Inc	Cooperative	KS	29,738	22.00	6.40	6.40	Any time	15 min	No	All	Voluntary
[36]	NV Energy (SPP)	Investor Owned	NV	294,966	10.25	0.35 (daily)	0.35 (daily)	Peak Coincident	15 min	No	All	Voluntary
[37]	NV Energy (SPP)	Investor Owned	NV	294,966	15.25	0.26 (daily)	0.93 (daily)	Peak Coincident	15 min	Yes	All	Voluntary
[38]	Oklahoma Gas and Electric Company	Investor Owned	AR	55,622	9.75	1.00	1.00	Any time	15 min	No	All	Voluntary
[39]	Other Tail Power Company	Investor Owned	MN	48,477	11.00	8.00	8.00	Any time	60 min	No	All	Voluntary
[40]	Other Tail Power Company	Investor Owned	ND	45,688	18.38	6.52	2.63	Any time	60 min	No	All	Voluntary
[41]	Other Tail Power Company	Investor Owned	SD	8,736	13.00	7.05	5.93	Any time	60 min	No	All	Voluntary
[42]	PacificCorp	Investor Owned	OR	503,632	13.30	2.20	2.20	Unknown	Unknown	No	All	Voluntary
[43]	Pee Dee Electric Membership Cooperative	Cooperative	SC	28,735	34.40	8.50	7.00	Peak Coincident	Unknown	Yes	All	Voluntary
[44]	Platte-Clay Electric Cooperative	Cooperative	MO	21,336	25.38	2.50	2.50	Peak Coincident	60 min	No	All	Mandatory
[45]	Progress Energy Carolinas	Investor Owned	NC	1,183,832	16.85	4.88	3.90	Peak Coincident	15 min	Yes	All	Voluntary
[46]	Progress Energy Carolinas	Investor Owned	SC	136,342	11.91	5.38	4.14	Peak Coincident	15 min	Yes	All	Voluntary
[47]	Salt River Project	Political Subdivision	AZ	942,690	32.44	11.13	4.54	Peak Coincident	30 min	Yes	NEM Only	Voluntary
[48]	Salt River Project	Political Subdivision	AZ	942,690	32.44	21.94	8.13	Peak Coincident	30 min*	Yes	NEM Only	Voluntary
[49]	Santase Cooper Electric Cooperative	Cooperative	SC	33,105	50.00	6.00	6.00	Peak Coincident	30 min	Yes	NEM only	Mandatory
[50]	Smithfield	Municipal	NC	3,390	17.00	5.93	5.93	Peak Coincident	15 min	Yes	All	Voluntary
[51]	South Carolina Electric & Gas Company	Investor Owned	SC	615,096	14.00	12.04	8.60	Peak Coincident	15 min	Yes	All	Voluntary
[52]	Sun River Electric Cooperative	Cooperative	MT	4,473	32.00	4.00	4.00	Unknown	Unknown	No	All	Mandatory
[53]	Swanton Village Electric Department	Municipal	VT	3,263	11.33	9.17	9.17	Any time	15 min	No	All*	Mandatory
[54]	Tideland Electric Member Corp	Cooperative	NC	20,153	31.00	10.35	9.40	Peak Coincident	15 min	No	All	Voluntary
[55]	Tri-County Electric Cooperative	Cooperative	FL	16,391	23.00	7.00	7.00	Any time	15 min	No	All	Voluntary
[56]	Traverse Electric Cooperative, Inc.	Cooperative	MN	1,873	76.00	18.65	18.65	Peak Coincident	Unknown	No	All	Voluntary
[57]	Tucson Electric Power	Investor Owned	AZ	381,556	10.00	8.85	8.85	Peak Coincident	60 min	Yes	All	Voluntary
[58]	Tucson Electric Power	Investor Owned	AZ	381,556	10.00	8.85	8.85	Peak Coincident	60 min	No	All	Voluntary
[59]	Vigilante Electric Cooperative	Cooperative	MT	8,406	26.00	0.50 per kVA	0.50 per kVA	Any time	Unknown	No	All*	Mandatory
[60]	Westar Energy	Investor Owned	KS	329,457	16.50	6.91	2.13	Any time	30 min	No	All	Voluntary
[61]	Xcel Energy (PSCo)	Investor Owned	CO	1,244,432	19.31	10.08	7.76	Any time	15 min	No	All	Voluntary
[62]	Xcel Energy (PSCo)	Investor Owned	CO	1,244,432	6.54	13.38	10.46	Peak Coincident	60 min	No	All	Voluntary

Sources: Utility tariffs as of September 2018, and EIA Form 861 from 2017 (for Utility ownership and Residential Customers Served columns).

Advanced Rate Design Strategy



Appendix B
A Pocket History of Rate
Design

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A pocket history of rate design

Year	Author	Contribution
1882	Thomas Edison	<ul style="list-style-type: none"> Electric light was priced to match the competitive price from gas light and not based on the cost of generating electricity
1892	John Hopkinson	<ul style="list-style-type: none"> Suggested a two-part tariff with the first part based on usage and the second part based on connected kW demand
1894	Arthur Wright	<ul style="list-style-type: none"> Modified Hopkinson’s proposal so that the second part would be based on actual maximum demand
1897	Williams S. Barstow	<ul style="list-style-type: none"> Proposed time-of-day pricing at the 1898 meeting of the AEIC, where his ideas were rejected in favor of the Wright system
1946	Ronald Coase	<ul style="list-style-type: none"> Proposed a two-part tariff, where the first part was designed to recover fixed costs and the second part was designed to recover fuel and other costs that vary with the amount of kWh sold
1951	Hendrik S. Houthakker	<ul style="list-style-type: none"> Argued that implementing a two-period TOU rate is better than a maximum demand tariff because the latter ignores the demand that is coincident with system peak
1961	James C. Bonbright	<ul style="list-style-type: none"> Published “Principles of Public Utility Rates” which would become a canon in the decades to come

Advanced Rate Design Strategy

A pocket history of rate design
(concluded)

Year	Author	Contribution
1971	William Vickrey	<ul style="list-style-type: none"> Proffered the concept of real-time-pricing (RTP) in <i>Responsive Pricing of Public Utility Services</i>
1976	California Legislature	<ul style="list-style-type: none"> Added a baseline law to the Public Utilities Code in the <i>Warren-Miller Energy Lifeline Act</i>, creating a two-tiered inclining rate
1978	U.S. Congress	<ul style="list-style-type: none"> Passed the <i>Public Utility Regulatory Act (PURPA)</i>, which called on all states to assess the cost-effectiveness of TOU rates
1981	Fred Schweppe	<ul style="list-style-type: none"> Described a technology-enabled RTP future in <i>Homeostatic Control</i>
2001	California Legislature	<ul style="list-style-type: none"> Introduced <i>AB 1X</i>, which created the five-tier inclining block rate where the heights of the tiers bore no relationship to costs. By freezing the first two tiers, it ensured that the upper tiers would spiral out of control
2001	California PUC	<ul style="list-style-type: none"> Began rapid deployment of California Alternative Rates for Energy (CARE) to assist low-income customers during the energy crisis
2005	U.S. Congress	<ul style="list-style-type: none"> Passed the <i>Energy Policy Act of 2005</i>, which requires all electric utilities to offer net metering upon request

Advanced Rate Design Strategy

Presenter Information



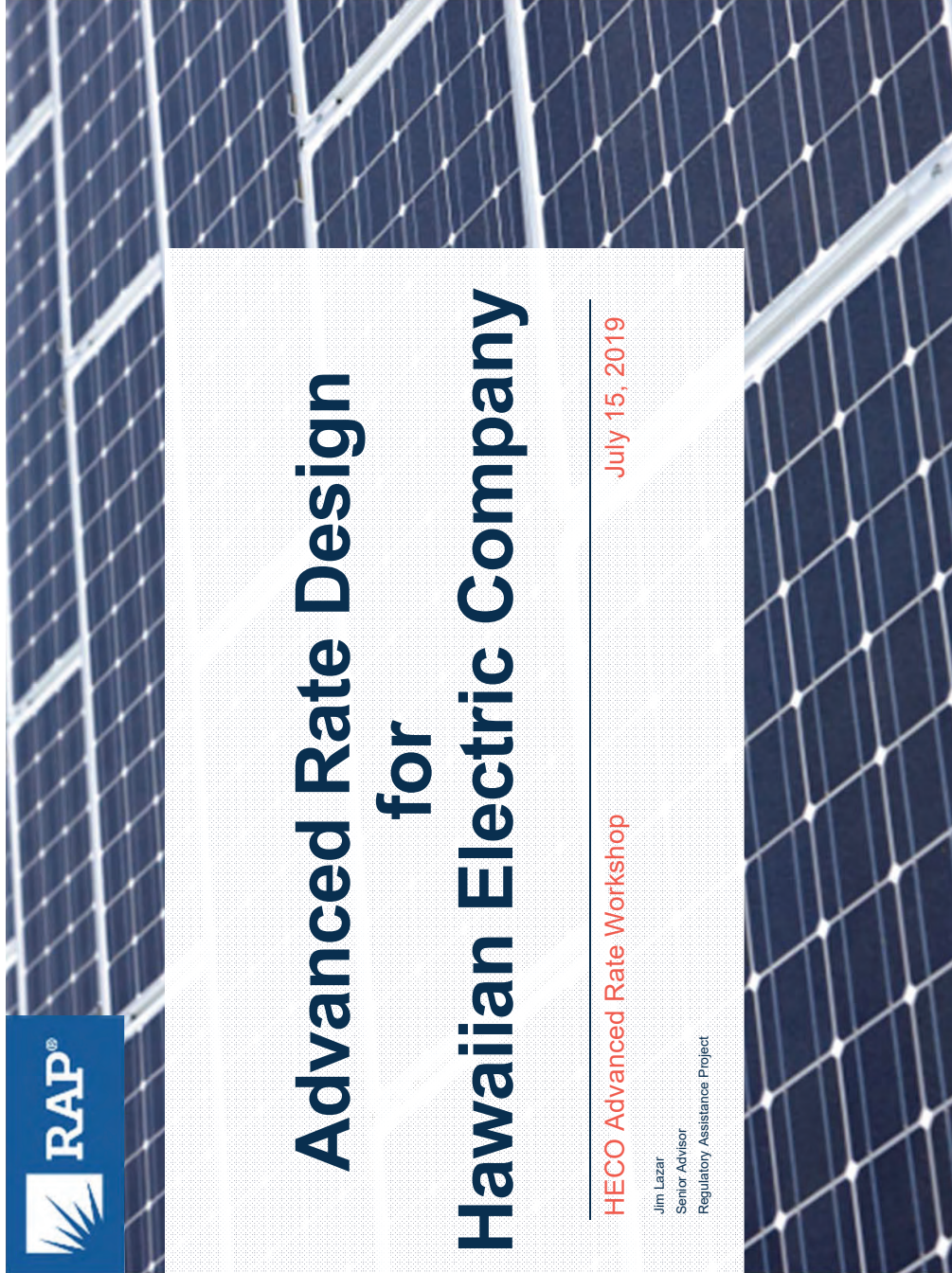
AHMAD FARUQI, PH.D.
Principal | San Francisco, CA
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Ahmad Faruqi is an internationally recognized authority on the design, evaluation and benchmarking of tariffs. He has analyzed the efficacy of tariffs featuring fixed charges, demand charges, time-varying rates, inclining block structures, and guaranteed bills. He has also designed experiments to model the impact of these tariffs and organized focus groups to study customer acceptance. Besides tariffs, his areas of expertise include demand response, energy efficiency, distributed energy resources, advanced metering infrastructure, plug-in electric vehicles, energy storage, inter-fuel substitution, combined heat and power, microgrids, and demand forecasting. He has worked for nearly 150 clients on 5 continents, including electric and gas utilities, state and federal commissions, governments, independent system operators, trade associations, research institutes, and manufacturers.

Ahmad has testified or appeared before commissions in Alberta (Canada), Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, FERC, Illinois, Indiana, Kansas, Maryland, Minnesota, Nevada, Ohio, Oklahoma, Ontario (Canada), Pennsylvania, Saudi Arabia, and Texas. He has presented to governments in Australia, Egypt, Ireland, the Philippines, Thailand, New Zealand and the United Kingdom and given seminars on all 6 continents. He has also given lectures at Carnegie Mellon University, Harvard, Northwestern, Stanford, University of California at Berkeley, and University of California at Davis and taught economics at San Jose State, the University of California at Davis, and the University of Karachi.

His research been cited in Business Week, The Economist, Forbes, National Geographic, The New York Times, San Francisco Chronicle, San Jose Mercury News, Wall Street Journal and USA Today. He has appeared on Fox Business News, National Public Radio and Voice of America. He is the author, co-author or editor of 4 books and more than 150 articles, papers and reports on energy matters. He has published in peer-reviewed journals such as Energy Economics, Energy Journal, Energy Efficiency, Energy Policy, Journal of Regulatory Economics and Utilities Policy and trade journals such as The Electricity Journal and the Public Utilities Fortnightly. He is a member of the editorial board of The Electricity Journal. He holds BA and MA degrees from the University of Karachi, both with the highest honors, and an MA in agricultural economics and a PhD in economics from The University of California at Davis, where he was a research fellow.

The views expressed in this presentation are strictly those of the presenter(s) and do not necessarily state or reflect the views of The Brattle Group.



 **Advanced Rate Design
for
Hawaiian Electric Company**

HECO Advanced Rate Workshop
July 15, 2019

Jim Lazar
Senior Advisor
Regulatory Assistance Project

About Jim Lazar

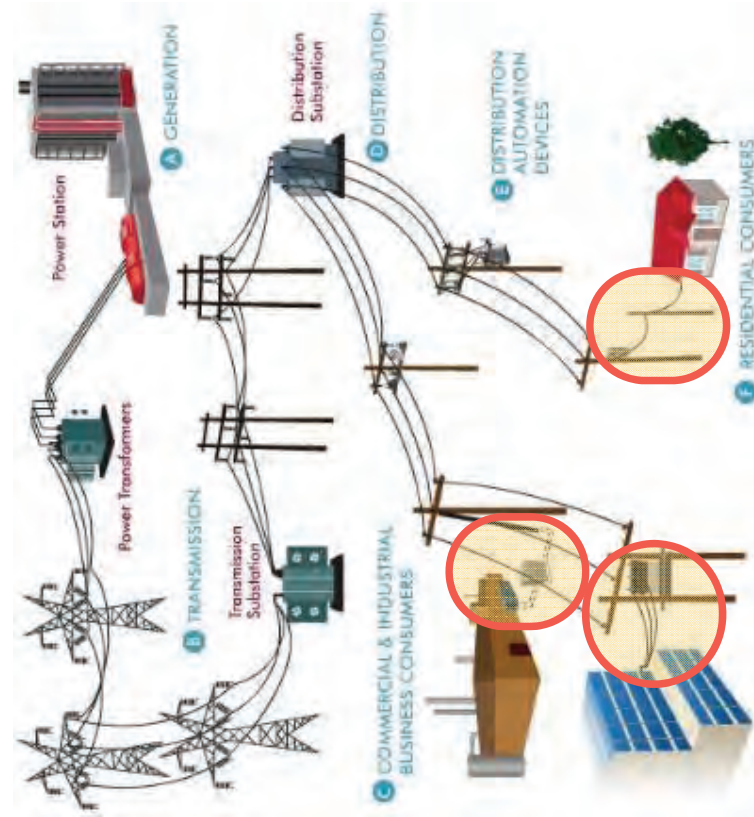


- Economist
- Based in Olympia, Washington
- RAP senior advisor since 1998
- Consultant to Consumer Advocate and other Hawaii parties beginning in 1990.
- RAP engaged by Hawaii PUC on decoupling, PBR, and other issues.

Overview of Presentation

- Principles of Smart Rate Design
- Customer Class Changes
- Residential Rate Design
- Commercial Rate Design
- Electric Vehicles





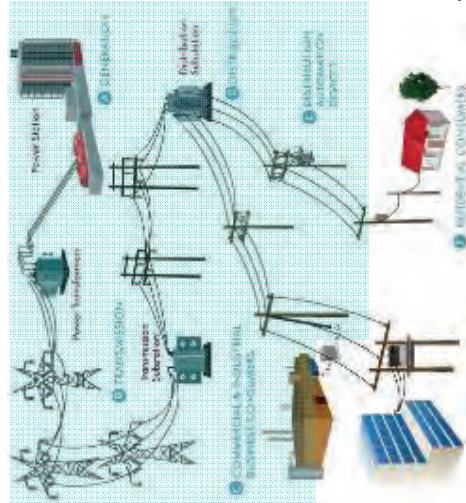
Principle #1

- A customer should be allowed to connect to the grid for no more than the cost of connecting to the grid.



Principle #2

Customers should pay for power supply and grid services in proportion to how much they use, and when they use it.



Regulatory Assistance Project (RAP)®



Principle #2

Customers should pay for power supply and grid services in proportion to how much they use, and when they use it.



Principle #3

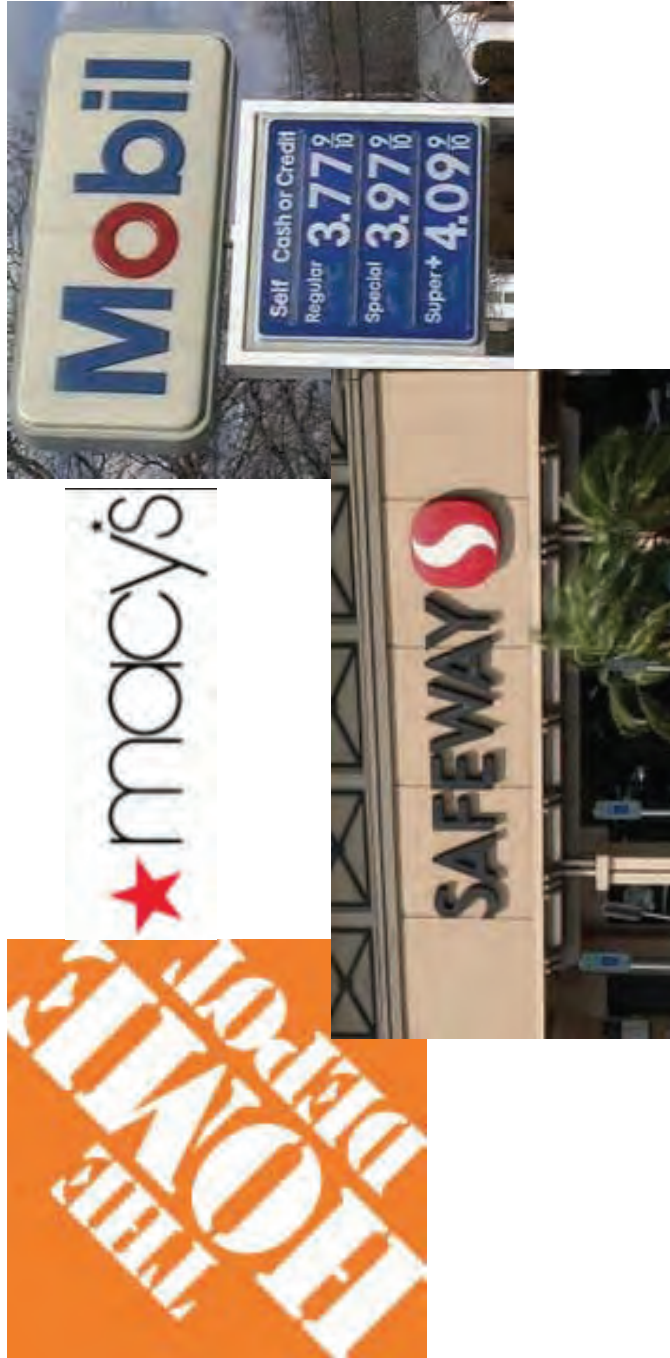
Customers delivering power to the grid should receive full and fair value—no more and no less.



How Do Other Industries Recover Fixed Costs?



We Pay For Other “Grids” In Volumetric Prices



And They Are Happy To Have Our Business



Regulatory Assistance Project (RAP)[®]

**Variable Costs are Disappearing –
But costs are still driven by volume**



An Example of a Smart Rate EdF Critical Peak Pricing (Tempo)

Typical Dwelling Units	Contract power-rating (KVA)	Subscription Including Tax \$/month	Non-Summer Days On-Peak \$ Off-Peak \$	Summer Days On-Peak \$ Off-Peak \$	Critical Days On-Peak \$ Off-Peak \$
Small SF Home	9	\$ 11.25	\$.115 \$.097	\$.16 \$.135	\$.632 \$.243
	12	\$ 18.03			
	15	\$ 20.88			
Large SF Home	18	\$ 22.91			
	30	\$ 57.32			
	36	\$ 70.33			

One Illustrative Smart Rate Burbank Whole House EV (Optional)

- Customer Charge: \$8.61/month
- Service Size Charge:
 - Small (multi-family) \$1.36/month
 - Medium (most single-family) \$2.73/month
 - Large (400 Amp +) \$8.19/month

Energy Charge

Off-Peak	\$.0812
Mid-Peak	\$.1624
On-Peak (4-7 PM Summer)	\$.2437



Customer Classes

- **Recommendation #1: Divide the residential class**
- **Single-family and multi-family customers are fundamentally different.**
- **Multi-family:**
 - Very low distribution costs borne by HECO
 - Low usage per customer
 - Higher incidence of electric water heat



- **Single-family:**

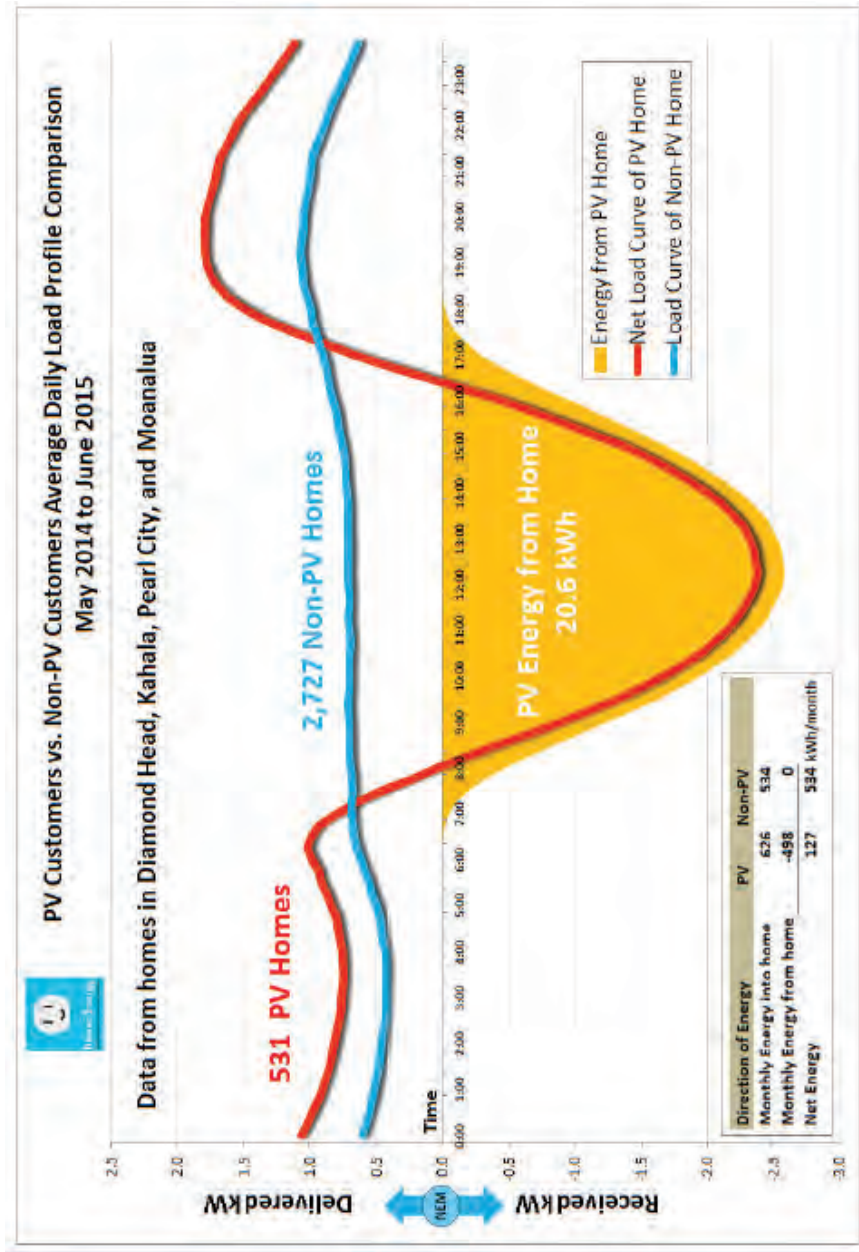
- Higher distribution costs per customer and per kWh
- More PV opportunity
- More air conditioning
- More peak-oriented usage



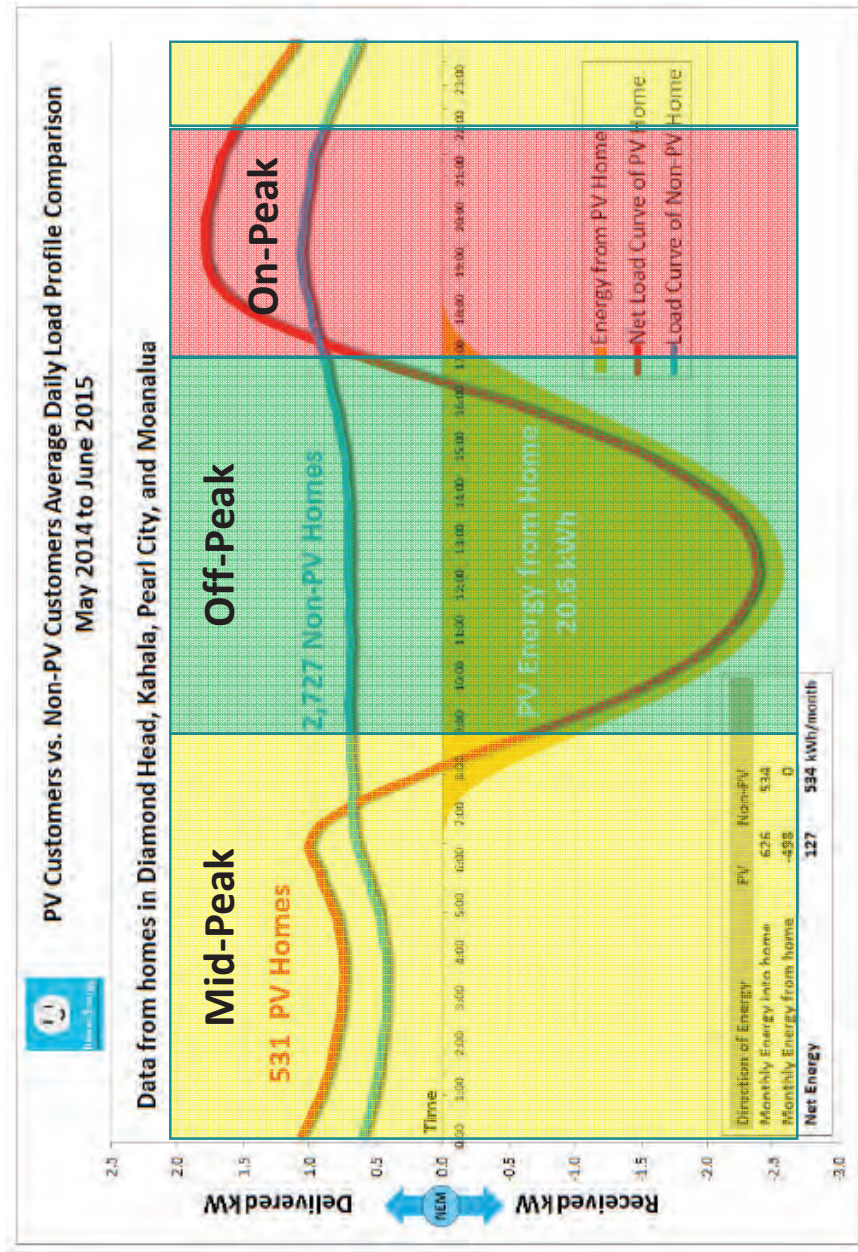
Future Rates for SF and MF Customers

Multi-Family	Single-Family
Customer Charge: \$ 5.00	Customer Charge: \$ 5.00
Site Infrastructure: \$2.50/kW x 2 \$ 5.00	Site Infrastructure: \$2.50/kW x 6 \$ 15.00
Energy Charge: \$.30/kWh	Energy Charge:
	Off-Peak \$.15
	Mid-Peak \$.30
	On-Peak \$.45
Controlled water heater monthly bill credit: (\$10.00)	Critical Peak \$1.00

Effect of this rate on Solar Customers



Effect of this rate on Solar Customers



Impact: Solar customer with 0 kWh NEM

Rate Element	Amount	Unit	Period	Usage kWh	PV kWh	Net kWh
Customer	\$ 11.50	Month		1		
Off-Peak	\$ 0.153	kWh	9 AM - 5 PM	195.3	477	(281.70)
Mid-Peak	\$ 0.345	kWh	All Other	198.6	42	156.60
On-Peak	\$ 0.436	kWh	5-10 PM	140.1	15	125.10
				534	534	0.00

Impact: Solar customer with 0 kWh NEM

Rate Element	Amount	Unit	Period	Usage kWh	PV kWh	Net kWh	Billed Amount
Customer	\$ 11.50	Month		1			\$ 11.50
Off-Peak	\$ 0.153	kWh	9 AM - 5 PM	195.3	477	(281.70)	\$ (43.10)
Mid-Peak	\$ 0.345	kWh	All Other	198.6	42	156.60	\$ 54.03
On-Peak	\$ 0.436	kWh	5-10 PM	140.1	15	125.10	\$ 54.54
				534	534	0.00	\$ 76.97



Non-Residential Rates

Current HECO Schedule J Rate

Charge	Amount	Unit
Customer	\$666.00	Month
Demand	\$13.00	kW (NCP)
Energy	\$.2381	kWh

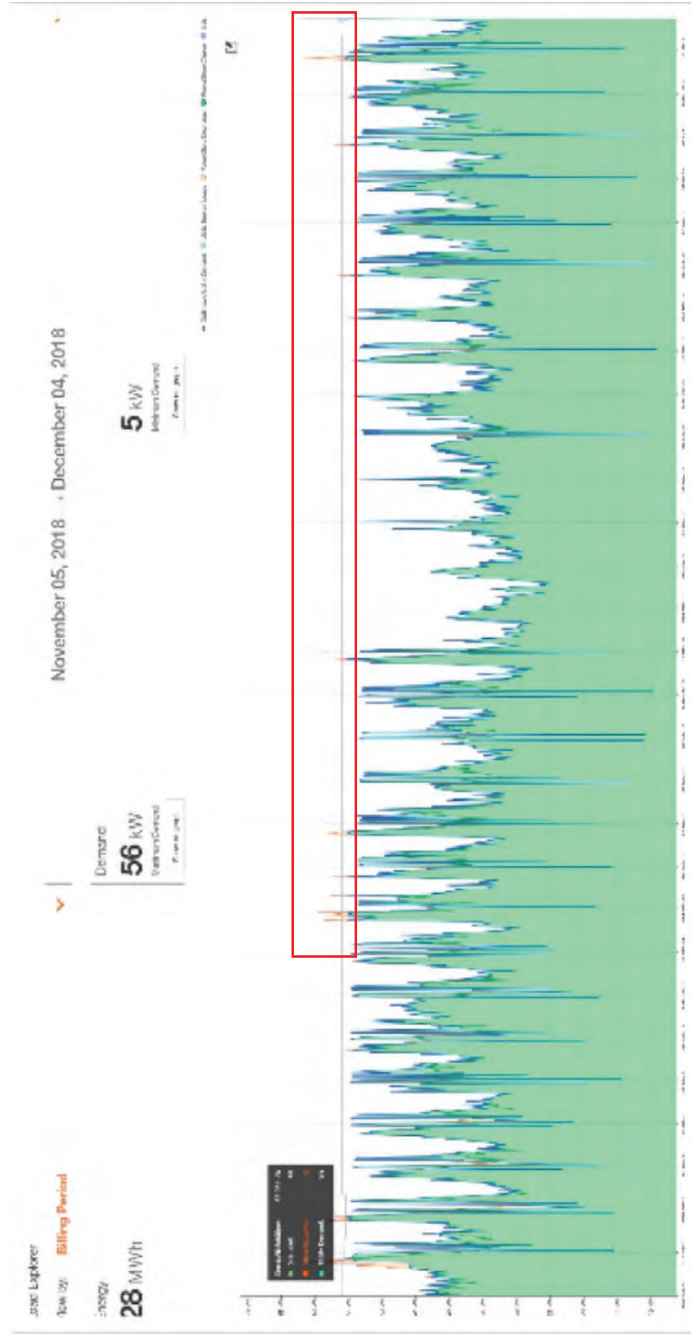
Problems with HECO Schedule J

- **Demand Charge:** Applies to NCP demand; irrelevant for system planning or system costs, except for site infrastructure at customer premises.
- **Energy Charge:** Not differentiated by time of use.
- **Invites battery installation** to shave demand charge – even at non-peak system hours.

Getting Around Demand Charges



STEM: 12 kW Savings Off 68 kW Peak



Rate design should make the choices the customer makes to minimize their **own bill** consistent with the choices they would make to minimize **system costs**.

Solution: Smart Rates

- **Demand Charge:**
 - Limit to site infrastructure **only**
- **Energy Charge**
 - Use same TOU principles as for residential rate

**Example Smart Commercial Rate
SMUD GUS-M Rate (500 kW – 999 kW)**

Charge	Amount	Unit
Customer	\$109.05	Month
Site Infrastructure	\$ 2.88	kW (NCP)
Super-Peak Demand	\$ 7.05	Summer kW 2 – 8 PM only
Energy Charge	Summer \$/kWh	Non-Summer \$/kWh
Super-Peak	\$0.1969	
On-Peak	\$0.1356	\$0.1039
Off-Peak	\$0.1044	\$0.0822

Concept Rate for HECO Schedule J

Charge	Amount	Unit
Customer	\$666.00	Month
Site Infrastructure	\$2.00	kW (NCP)
Off-Peak	\$.15	kWh
Mid-Peak	\$.30	kWh
On-Peak	\$.45	kWh
Critical	\$1.00	kWh

Electric Vehicles

- **Key Issues**
 - TOU Rates Work VERY Well
 - Residential: Need to avoid distribution upgrades
 - Workplace: Need to avoid high demand charges; concentrate charging in solar hours
 - Smart Charging works well.
- **Southern California Edison solution:**
 - 5-year “Demand Charge Holiday”
- **Pacific Gas and Electric solution:**
 - Small site infrastructure charge + TOU Energy Rate
- **Xcel Minnesota:** TOU and smart chargers = 96% off-peak.

Illustrative Rates Work Well for EVs

Single-Family	
Customer Charge:	\$ 5.00
Site Infrastructure:	
\$2.50/kW x 6	\$ 15.00
Energy Charge:	
Off-Peak	\$.15
Mid-Peak	\$.30
On-Peak	\$.45
Critical Peak	\$1.00

Concept Rate for HECO Schedule J

Charge	Amount	Unit
Customer	\$66.00	Month
Site Infrastructure	\$2.00	kW (NCP)
Off-Peak	\$.15	kWh
Mid-Peak	\$.30	kWh
On-Peak	\$.45	kWh
Critical	\$1.00	kWh

Summary

- **Residential:**
 - Divide class single-family vs. multi-family
 - Provide water heater curtailment credit to multi-family
 - Move single-family to TOU / CPP soon.
- **Non-Residential**
 - Limit demand charges to site infrastructure
 - Recover all other system costs in TOU/CPP rates
- **Electric Vehicles**
 - Site infrastructure Charge + TOU/CPP works well



About RAP

The Regulatory Assistance Project (RAP)[®] is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

Rate Design in a 100% Clean-Energy Transition

Travis Kavulla
Director, Energy & Environmental Policy
R Street Institute

Advanced Rate Design Workshop
Honolulu, Hawaii

July 15, 2019



Free markets. Real solutions.

Consider the Source

- ▶ Director, Energy & Environmental Policy, R Street Institute
- ▶ Governing Body Member, Western Energy Imbalance Market
- ▶ Formerly “The Honorable Travis Kavulla”: utility commissioner (State of Montana) and past president, National Association of Regulatory Utility Commissioners (NARUC)
- ▶ The views expressed here are mine alone.

Rate Design: *Why should regulators care?*

- ▶ Bad rate design leads to individuals taking actions that may be privately profitable— but which may raise the cost to society to provide a reliable, clean supply of energy
 - ▶ Example #1: Demand charges that lead batteries to be deployed for a siloed use (keeping individual consumer's demand below a certain threshold), rather than for system purposes
 - ▶ Example #2: Supply rates that overstate marginal cost of energy, and lead to uneconomic entry of distributed energy resources
- ▶ Good rate design can allow demand to play an essential role in integrating a system dominated by renewable energy

Cost structure in a jurisdiction moving toward '100%'

- ▶ Hawaii is not going green overnight, but it will happen relatively fast. The 25-year trajectory implies a few things are likely to happen:
 - ▶ Fuel costs (variable costs) will diminish.
 - ▶ Overall capital investment (fixed costs), whether HECO-led or customer-led, will increase.
 - ▶ There will be more periods where the system will be oversupplied, and (unless overbuilt) there will also be more periods where energy is scarce.

<u>Year</u>	<u>RPS Requirement</u>
2010	10%
2015	15%
2020	30%
2030	40%
2040	70%
2045	100%

Rate Design at a '100%' renewable end state?

- ▶ If short-run variable costs were zero, customers' electricity should probably be paid for like the smartphone than the gas station fill-up
- ▶ It'd probably also look like the cell company in terms of system congestion management (e.g. "throttling")

Pick your new plan size.

Don't get limited by an unlimited plan. Our new Verizon Plan has a simple size for everyone, each with more data and Unlimited Talk & Text. Find your fit below.

Limited time only

S	2 GB	\$35/mo.
M	4 GB	\$50/mo.
L	8 GB + 2 GB/line	\$70/mo.
12	12 GB + 2 GB/line	\$80/mo.
XL	16 GB + 2 GB/line	\$90/mo.
XXL	24 GB + 2 GB/line	\$110/mo.

**But moving
to '100%'
poses
tricky
questions
on rate
design**

Do we want rate design to send price signals intended to accomplish investment (i.e., do we expect rate design to accomplish IRP/IGP-like objectives)?

As renewables are added, how to reflect the value of energy during the (frequent) periods of vast oversupply and other (hopefully less frequent) periods of scarcity?

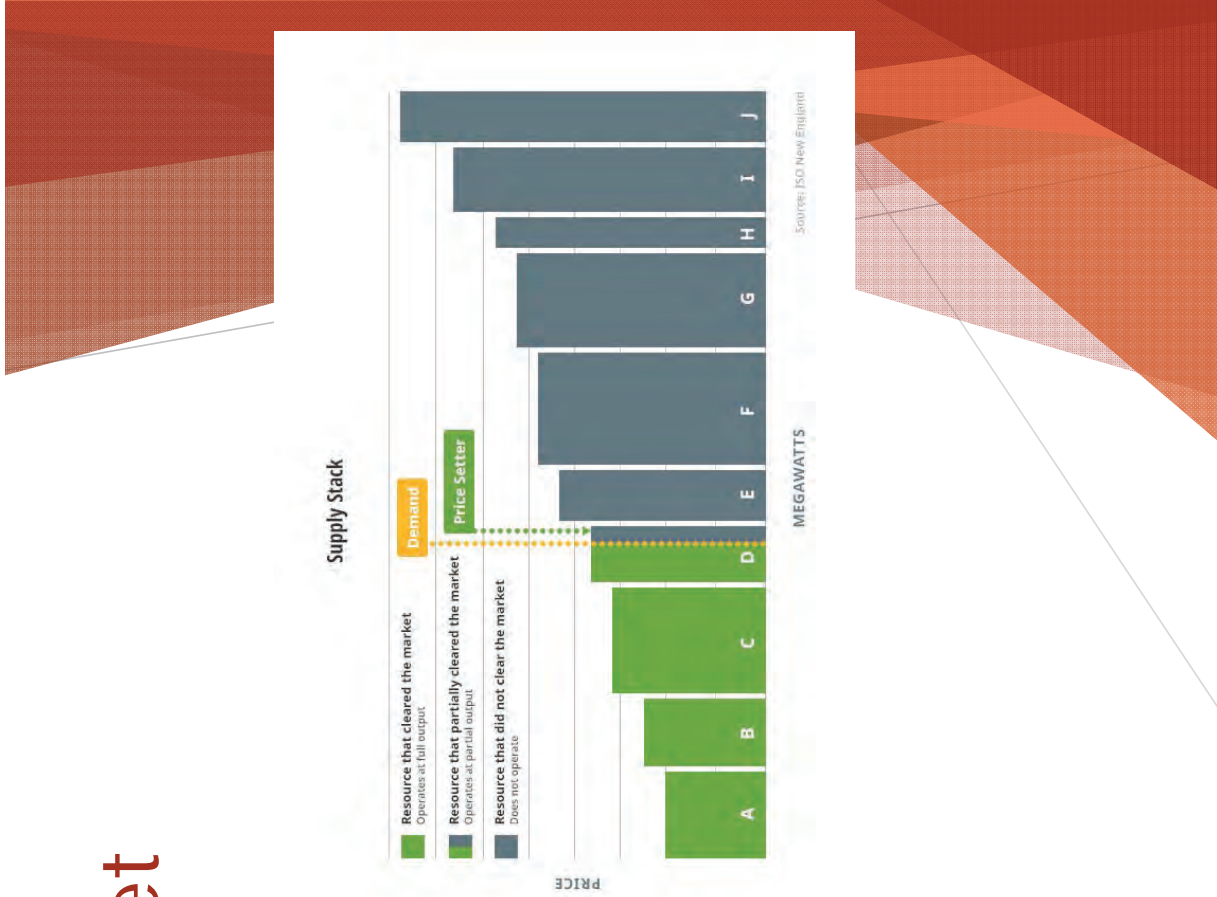
Supply Pricing in a Retail-Monopoly Marketplace

- ▶ If HI had many sellers & buyers → Bid-based wholesale market + security-constrained network → Locational Marginal Prices → inform procurements/sales in a competitive retail environment. This structure gives rise to appropriate supply pricing in larger markets.
- ▶ Hawaii is not that.
 - ▶ Its grids are not large and liquid enough to have a workable bid-based wholesale market.
 - ▶ Many procurements made through a “planning”/RFP process - although LMP-like prices should inform those procurements
- ▶ A second-best option to obtain accurate, useful supply prices is a “cost-based” market. (Wolak, 2018)*

*Frank Wolak, Stanford University
“How should the Public Utilities Commission regulate the Hawaiian Electric Company for better integration of renewable energy?”

Cost-Based Market

- ▶ The cost of generator units to HECO is known and approved by regulator, allowing a "supply stack" to be created (periodically modified by outages, fuel price increases, etc.)
- ▶ A day-ahead market model can estimate consumer load in order to create a day-ahead schedule of supply resources, and a measurement of the locational marginal cost of grid-delivered energy



Why a 'Market' if HECO is a Monopoly?

- ▶ Uses a system model to project both a Day-Ahead system (not locational) marginal cost, or λ , for each hour of next day.
- ▶ Customers "buy" a baseline of usage based on existing rates. They may use more than or less than their baseline usage by paying/being credited λ .



Pro tip: call it a 'rate design tool' if you don't like the word 'market'

As a formula....

$$\text{RTP-DA Bill Mo.} = \text{Standard Bill Mo.} + \sum \text{Price Hr.} \times [\text{Load Hr.} - \text{CBL Hr.}]$$

Where:

- RTP-DA Bill Mo. = Customer's bill for service under this tariff in a specific month
- Standard Bill Mo. = Customer's bill for a specific month based on usage as defined by the CBL and billed under the standard firm tariff
- \sum = Sum over all hours of the monthly billing period
- Price Hr. = Hourly RTP-DA price based on marginal costs
- Load Hr. = Customer's actual load in an hour
- CBL Hr. = Customer Baseline Load shape on an hourly basis

Getting the Baseline Right

- ▶ The “Customer Baseline Load” (CBL) is important because it is the billing determinant for fixed-cost recovery
- ▶ Existing Customers
 - ▶ CBL developed either actual historical metered half-hourly interval data for a customer’s specific location, or
 - ▶ from a template scaled to the actual historical monthly energy and monthly peak demands
- ▶ New Customers
 - ▶ 100% of commercial projected load; 60% or greater of industrial customer’s projected load
 - ▶ Requirement to “demonstrate” actual peak load to avoid gaming

Uses of a 'Cost-Based Market'

- ▶ A price within rate design to encourage demand participation: Georgia Power has 2,400 customers on this or its HA dynamic tariff (2/3 commercial; 1/3 industrial)
 - ▶ Conceivable to have retail aggregators certified and responding to this price signal on behalf of residential customers
- ▶ Provides DERs a price signal for the economic substitution of offered generation from Day Ahead
- ▶ The market's two-part settlement (Day Ahead to Real Time) encourages forward hedging and reliability of supply, because (depending on design of IPP contracts & DER payment schemes) it is an economic resolution to generation & demand imbalances.

Some Possible Objections to this Approach

- ▶ It's a 100% renewable system, so it won't have any marginal costs
 - ▶ Response: This is a system that is going to have huge excursions of oversupply and scarcity unless & until load is covered in each hour by 100% zero-marginal-cost resources. Is that really going to happen?
 - ▶ Indeed, it may always have these characteristics (vacillating oversupply and scarcity) if the last increment of supply in scarcer times is price-responsive demand. Which, in a market where the value of lost load < marginal of storage storage, is quite likely.
 - ▶ A postcard from the future: Imagine a Hawaii marketplace which is more a "reverse curtailment auction" than a "supply the last unit of demand auction"

Objections, Part Deux

- ▶ The prices won't rise high enough to get DER built
 - ▶ Response: Not sure about that!
 - ▶ In any case, using rate design to organically achieve significant sources of long-term supply in a monopoly market is odd, given that they are "competing" with a central procurer with a tendency to overbuild. Probably better that DER aggregators should sign contracts for energy/capacity obligations to HECO, like IPPs, and be responsible for imbalance in cost-based market's real-time settlement. (Again, using the "market" as a rate design tool.)
 - ▶ If you want to "test drive" organic behavioral reactions, then relax the reserve margin in order to drive part of the portfolio to come from voluntary load curtailment/"merchant" DER.

Finally: A Plea for Regulatory Flexibility

- ▶ Does every rate need to be spelled out precisely?
- ▶ In order to get significant DER/DR into a more predictable regime of procurement, there probably needs to be some contractual latitude on the part of HECO to achieve deals that match a customer's peculiar situation, or which relieve problematic points of congestion on network.
- ▶ Examples exist of customer protections in a more deregulated regime of rate design (special rates for poor or rural telecommunications customers)



Mahalo...

Questions?



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Advanced Rate Design Strategy

Rate Design: Pricing in Consideration of State Energy Policy

Chris Yunker

Energy Systems & Planning Branch Manager
Hawaii State Energy Office

July 15th, 2019



Advanced Rate Design Strategy

Considerations for Rate Design in Hawaii

- What are Hawaii's energy policy goals?
- What does Hawaii look like if successful in achieving those goals?
- How can rate design support that vision of Hawaii?
- What, if any, implications are there for rate design principals and will any need to be adjusted to develop rates that support Hawaii's vision?

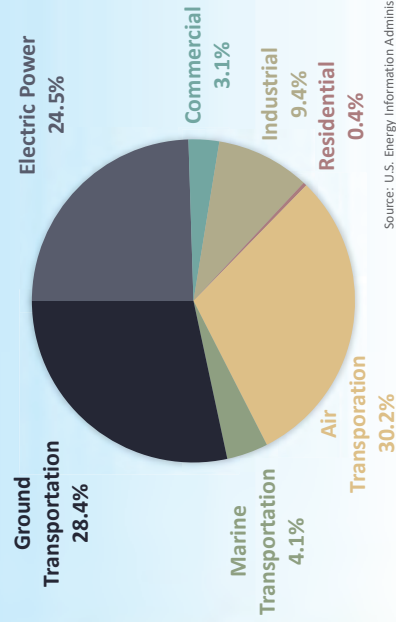


Advanced Rate Design Strategy

State Energy Policies

- In 2015 the Hawaii State Legislature set a statutory provision for a 100 percent Renewable Portfolio Standard (RPS) by 2045
- Hawaii also has a Statewide Energy Efficiency Portfolio Standard (EEPS) goal of 4,300 gigawatt-hours of electricity savings by 2030
- In 2018 Governor Ige signed into law a goal for statewide carbon neutrality by 2045
- The mayors of Hawaii's four main counties have also jointly pledged to eliminate fossil fuel use from ground transportation by 2045

HAWAII'S PETROLEUM USE BY SECTOR 2017



Energy Independence means breaking our addiction on imported fossil fuels

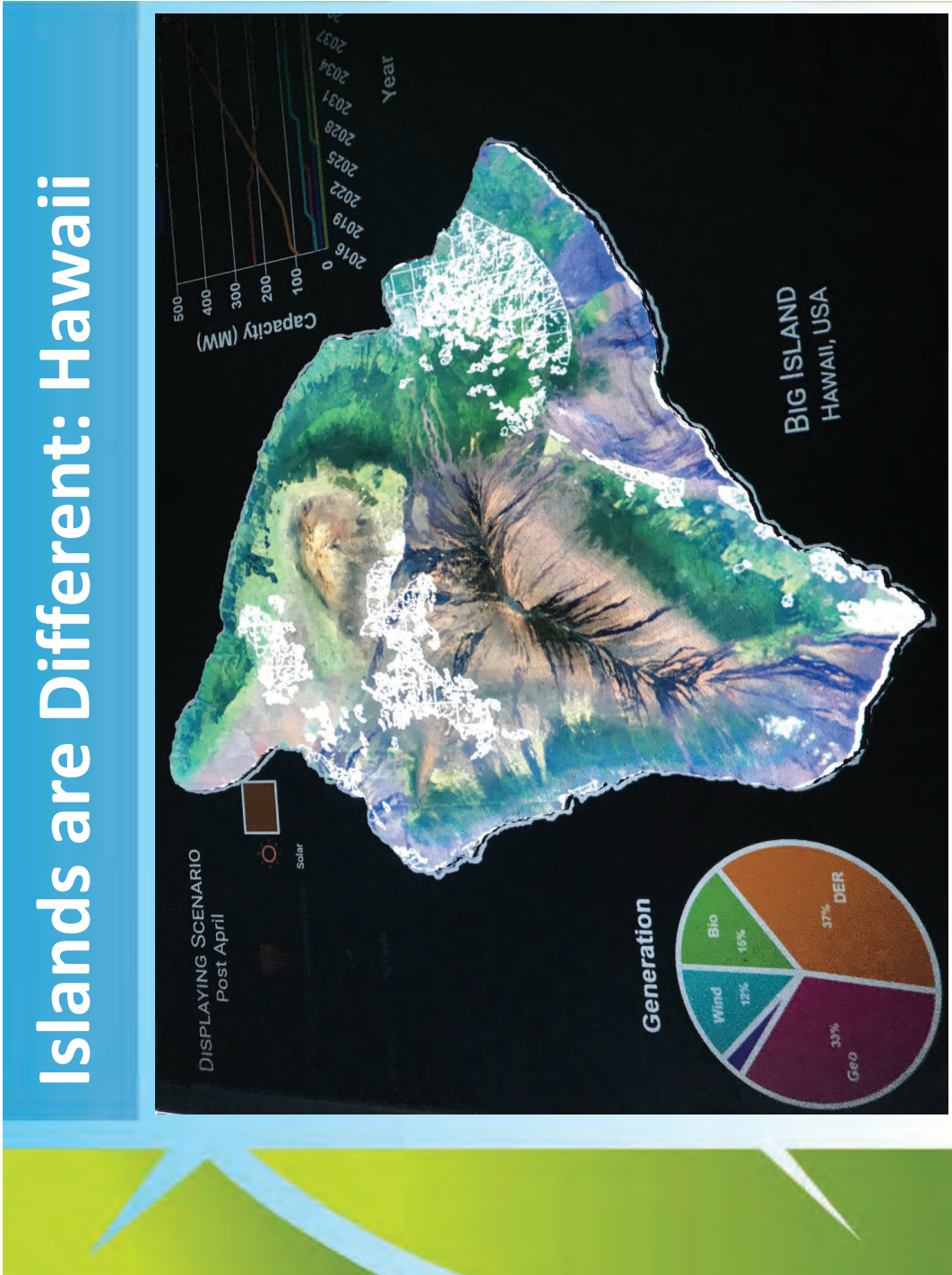


Source: U.S. Energy Information Administration, State Energy

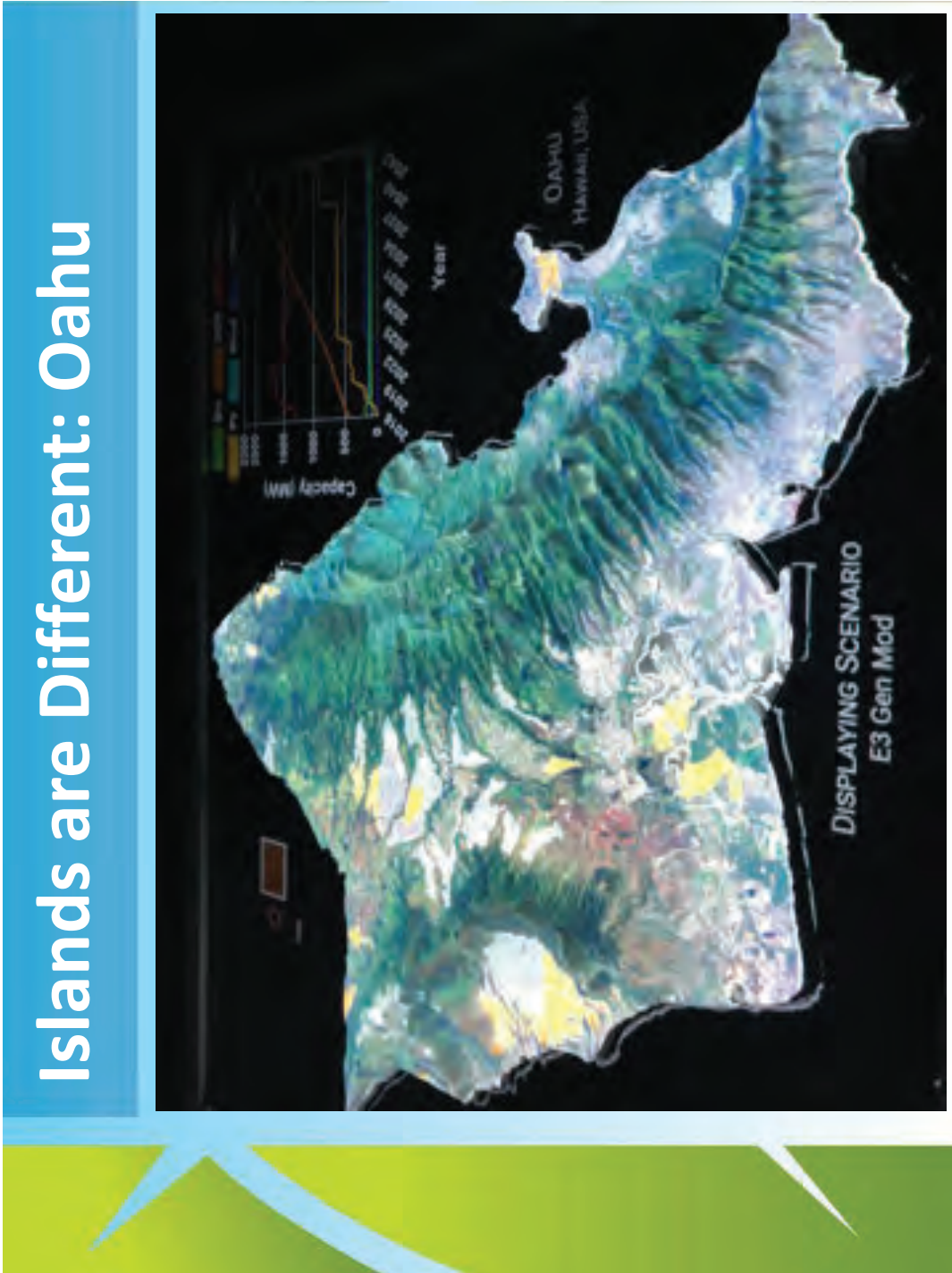
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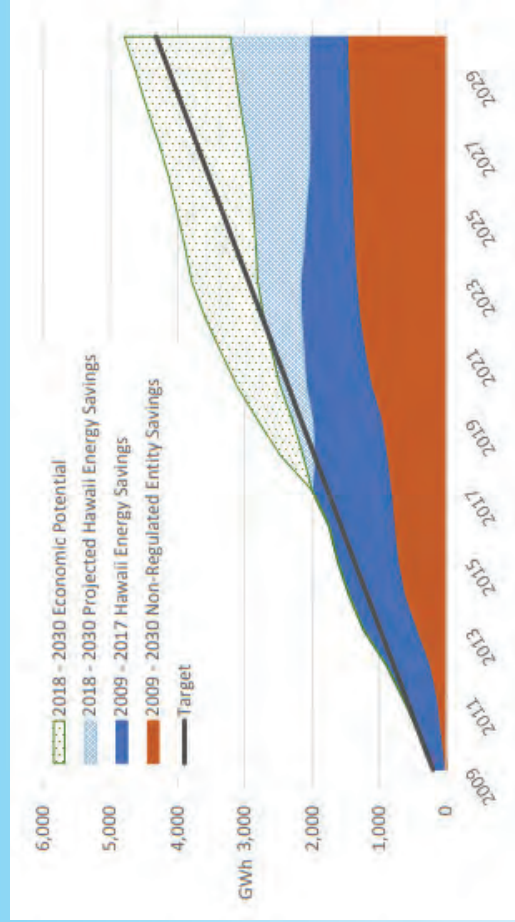
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Islands are Different: Oahu

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Statewide Energy Efficiency Portfolio Standard



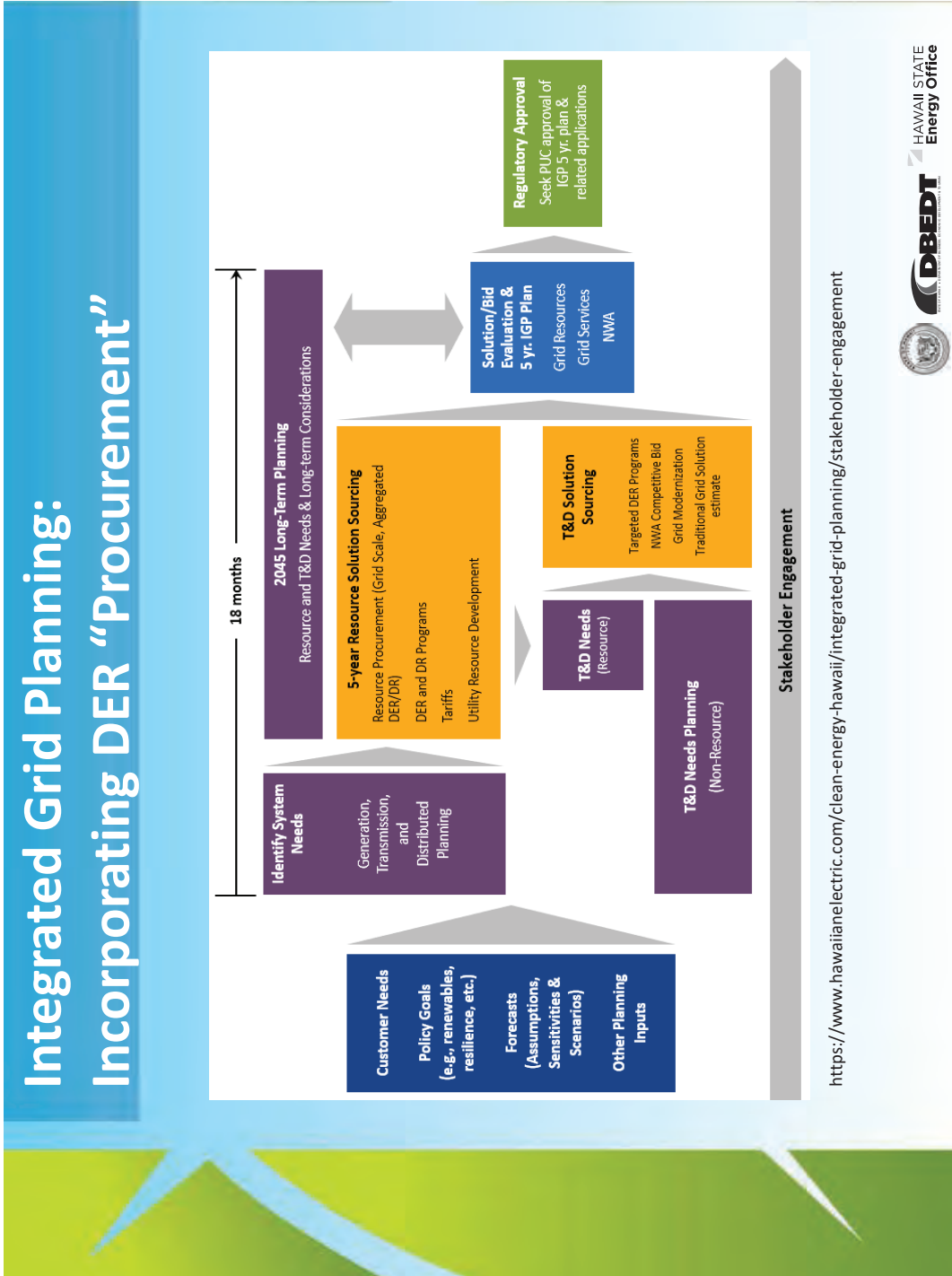
- Statewide Energy Efficiency Portfolio Standard (EES) goal is 4,300 gigawatt-hours of electricity savings by 2030.
- Energy efficiency remains a lower cost resource than most other energy options, while providing many other important benefits to Hawaii's electric utilities and ratepayers.



Advanced Rate Design Strategy



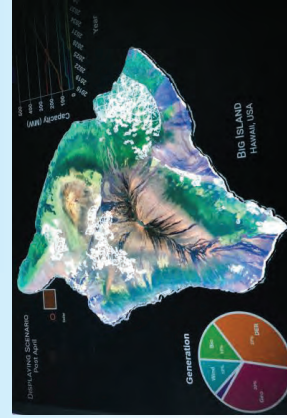
Advanced Rate Design Strategy



Advanced Rate Design Strategy

Resource Optimization, Land Utilization and DER Adoption

- Land is a finite resource in Hawaii which creates a technical limit on the potential for utility scale resources
- To achieve state energy policy DER deployment is not simply a question of economic efficiency but a necessary resource given constraints
- Rates can play a significant role in a customers decision to adopt DER
- What, if any, adjustment to rates and cost allocation are needed to achieve adoption equivalent to 40% or more of system energy procured from behind the meter?
 - How does any adjustment account for consumer equity?
 - If resource potential and planning targets are different by island how should rate design account for this if at all?



Advanced Rate Design Strategy

Cost Efficient Rate Design to Maximize Customer Connectivity

Keeping DER customers connected to the grid helps maximize the benefits of DER for all customers and helps minimize grid costs per customer

- This is especially true if the potential DER customer market represents 40% or more of system energy

If DER costs fall below the cost of individual customers utility bills then those customers could disconnect from the grid resulting in a “death spiral”

However what happens if the cost a customer would face if they disconnected from the grid

- Is less than the fully allocated cost to serve a DER customer?
- But is more than short run avoided costs to serve that DER customer?

If there is a balance to be struck and if so, how could rate design and cost allocation accommodate it?



Advanced Rate Design Strategy

Mahalo

*Clean Energy Innovation & Deployment
for a Better Hawaii!*

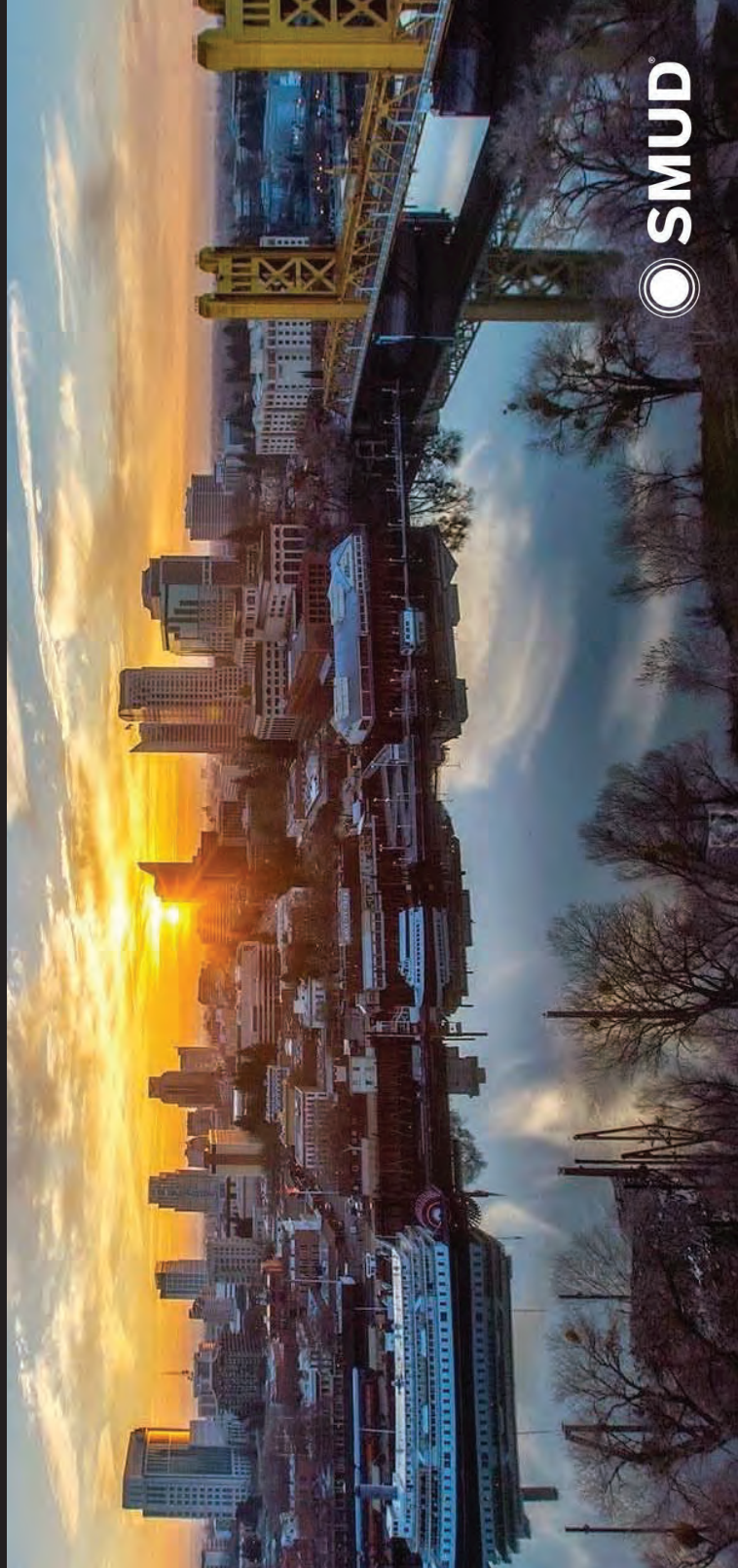
**HAWAII STATE
Energy Office**
energy.hawaii.gov

DBEDT
HAWAII STATE
Energy Office

Hawaiian Electric Advanced Rate Design Workshop

Jennifer Davidson
SMUD Chief Financial Officer

July 15, 2019



SMUD Overview



70+ years community owned, not for profit



Safe, reliable electricity at affordable rates



Elected 7-member Board of Directors
628,000 accounts serving 1.5 million



Taking steps to reduce reliance on carbon-based fuels



900 Square foot district in Northern California serving the state's Capitol



SMUD Board of Directors Sets Strategic Directions

The SMUD Board of Directors created 18 Strategic Directions to guide decisions we make about SMUD policies and operations.

PURPOSE STATEMENT

- Our purpose is to enhance the quality of life for our customers and community through creative energy solutions.

VISION STATEMENT

- SMUD's vision is to be the trusted partner with our customers and community, providing innovative solutions to
 - ensure energy affordability and reliability
 - improve the environment
 - reduce our region's carbon footprint
 - enhance the vitality of our community

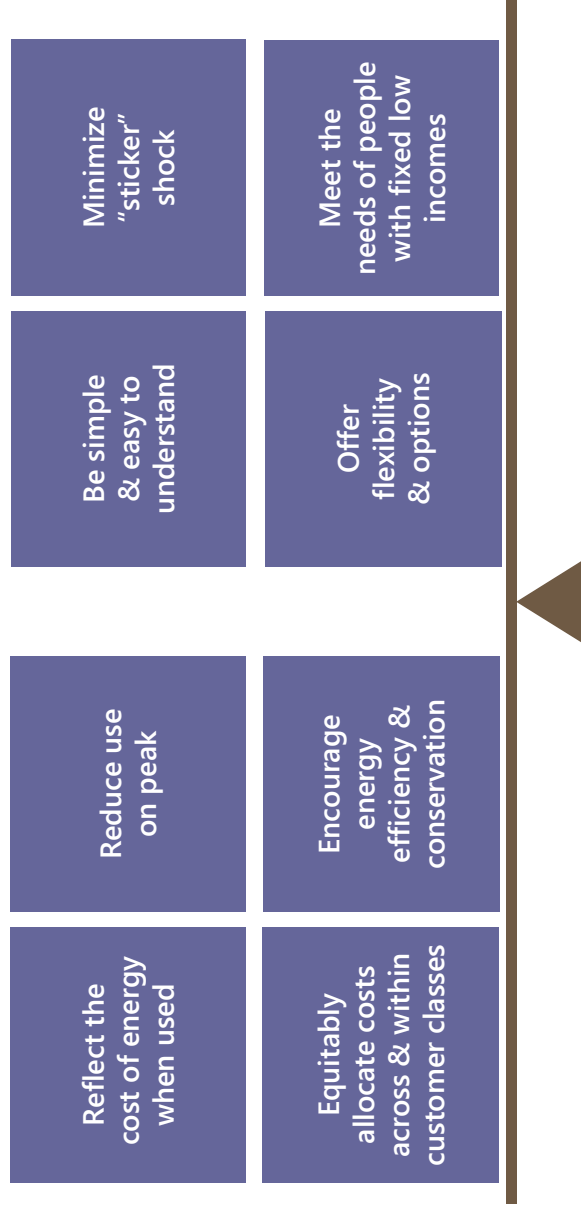
17 additional SDs- aspiration with natural friction between SDs

- Example: Reliability, Customer Relations, Environmental Leadership, Innovation, Enterprise Risk Management, and Economic Development



Strategic Direction 2: Competitive Rates

Maintaining competitive rates is a core value of SMUD. In addition, SMUD rates shall be designed to balance and achieve the following goals:

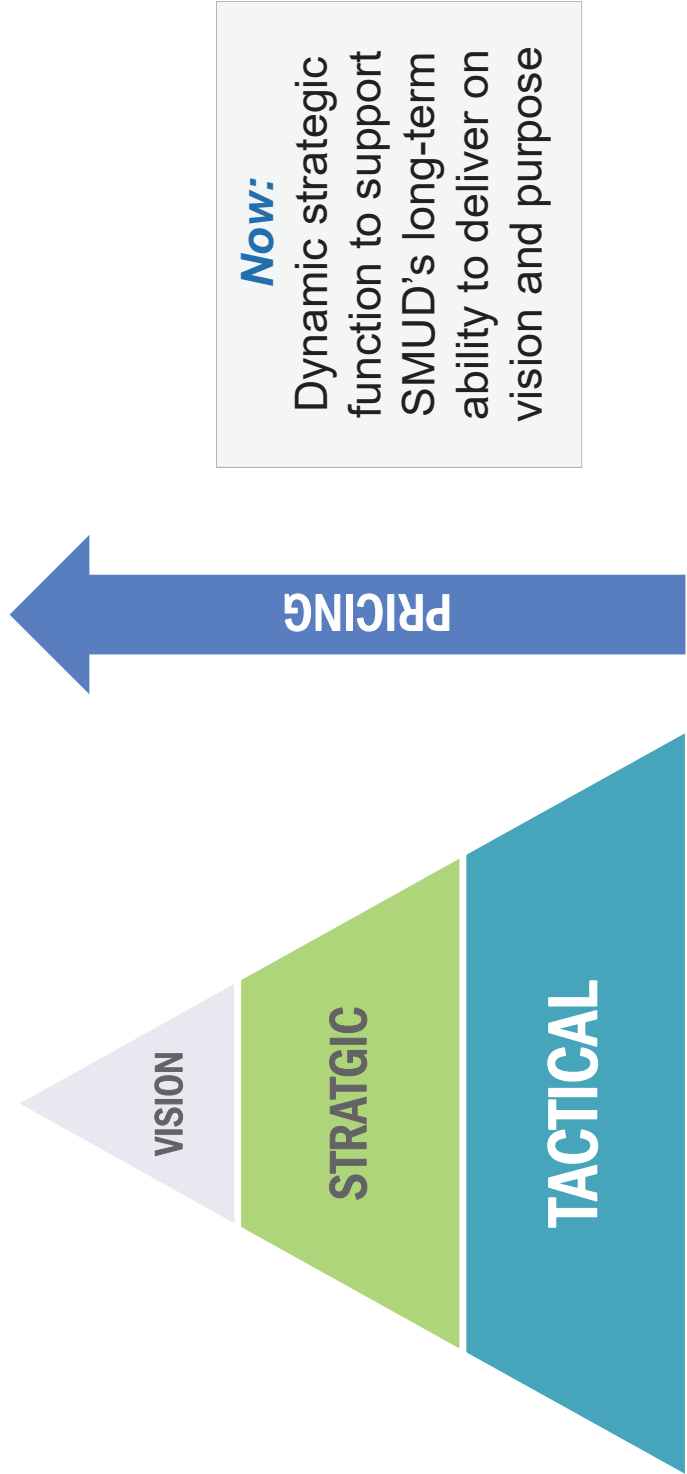


As the business evolves and markets change, these principles guide SMUD's pricing changes



Pricing As a Strategic Function

Pricing is the primary means to interact with majority of our customers.
Previously: Pricing was a back office function to ensure rates covered costs



Adopting Longer Term Outlook with a Rates Roadmap

- **Rate structure needs to evolve** with business and market changes
 - Urgency because gap currently exists between cost causation and revenue collection, and is quickly widening
 - Urgency because customers adopting DERs and non-adopters may have competing interests
- **Recognizing that pricing changes** can take multiple years for a utility to update, within two response time cadences:
 - behavioral based responses - take longer to enact but are lasting
 - technology based - can be enacted and responded to almost immediately
- **Rates need to be evolving** now with both a short and long-term vision and with an identified path to avoid more significant rate impacts and exacerbate cost shifting between parties



SMUD's Rates Journey

HISTORICAL ACTION

- **SmartPricing Options Pilot (SPO)** Residential pricing study with 12,000 participants to inform design of future tariff
 - 95% of participants reported they were satisfied with the new pricing plans
- **Flattening of Tiered Rates** from 3-tiered structure to flat rate before TOD
 - Results: pure TOD price signals
- **Increased residential monthly charge** from \$7.50 to \$20 per month
 - Results: increased recovery of fixed costs

NOW

- **Overhauling low income rate** (Energy Assistance Program Rate or EAPR) to provide the greatest discount on a sliding scale based on Federal Poverty Level (FPL)
 - Results: greatest benefit to those most in need
- **TOD implemented** as a standard for residential customers
- **New commercial restructure**
- **Rate increase** in support of low carbon plan, wildfire mitigation, and technology



A Deeper Dive

Direct Linkage Between Pricing & Achievement of SMUD's Strategies

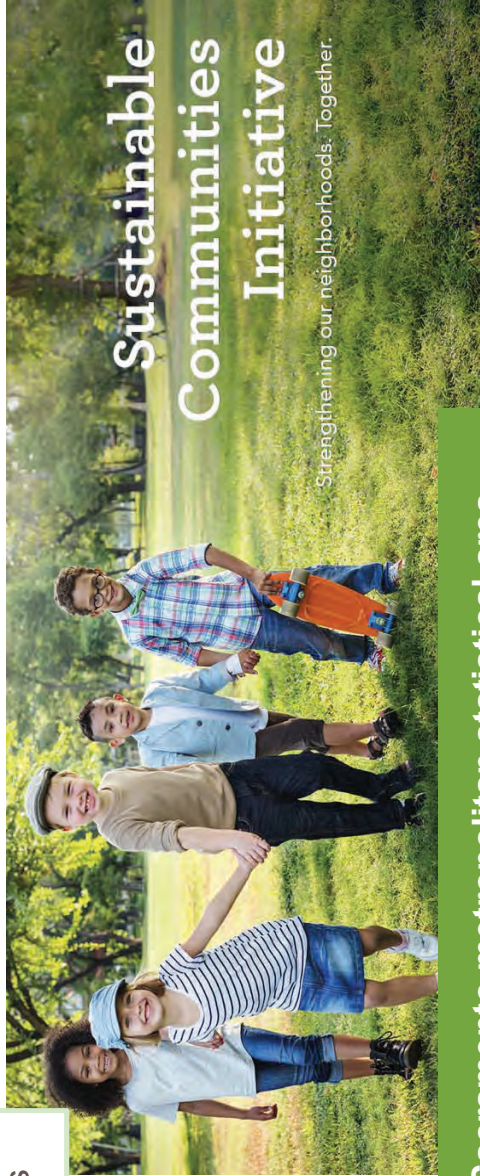


Strategy: Building Sustainable Communities

Sustainable Communities Initiative

Enhancing Quality of Life for All Through Innovative Solutions

“Addressing energy affordability can help break the cycle of poverty and improve economic development, educational achievement and public health.” ACEEE, April 2016



“ 2006 – 2016: The Sacramento metropolitan statistical area ranks in the bottom-third of the 100 largest metro areas in composite rankings measuring improvements in growth, prosperity, and inclusion, 3 critical elements of regional economies that work for everybody. ”



Pricing Strategies – Sustainable Communities

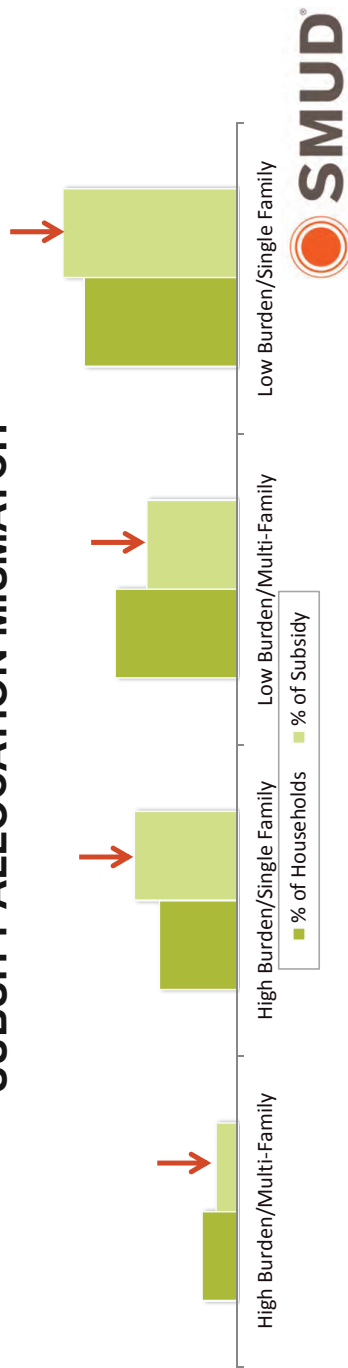
- Economic Development Rate in 2018
- Higher discount applied to businesses that locate in disadvantaged communities
- Extended discount to business which add to a communities' place making
 - Education, art, entertainment, recreation, accommodations, food service, government and retail
- Greater Sacramento Economic Council (GSEC)



Low Income Assistance Rate (EAPR) – Problem Statement

- The cost of EAPR subsidies has risen **324%**, while enrollments have only increased **131%** over the last 10 years
- 10% of EAPR customers continue to have unaffordable electric bill burdens, especially those in the lowest of poverty levels
- Providing the subsidy alone doesn't address the underlying issues of energy consumption
- TOU could potentially worsen electric bill burdens for low income customers, unless we provide targeted information, education and energy efficiency programs.

SUBSIDY ALLOCATION MISMATCH



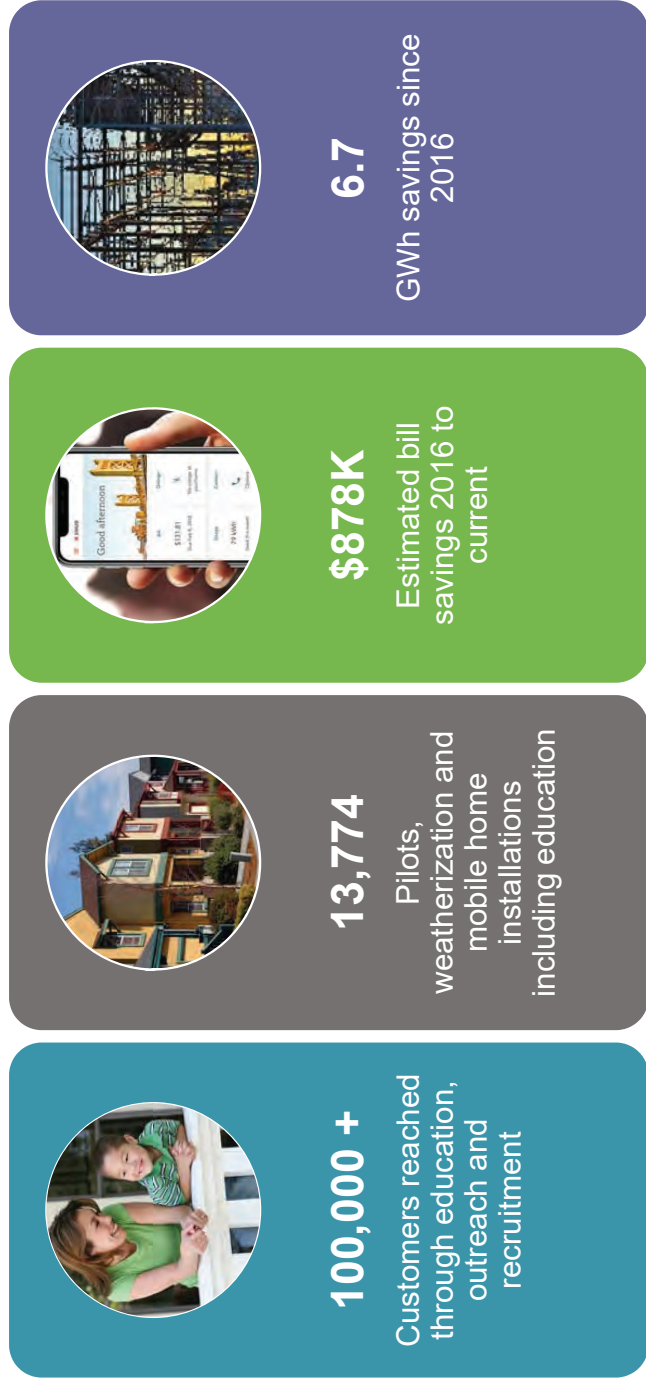
Low Income Assistance EAPR Rate Restructured

- EAPR customers on TOD rate
- Energy bill discounts on a **sliding scale of need** using the Federal Poverty Level (FPL)
- 2016 – 2019: education and investment in energy efficiency
- **Feedback** response to **TOD** rates has been **most positive** from low income communities due to increased feeling of control of energy bill
- Energy Efficiency investments to **address root cause**, permanently reducing energy bill to offset reduction in subsidy

Monthly Maximum EAPR Discount			
FPL	2019	2020	2021
0 – 100%	\$50	\$60	\$70
100 – 150%	\$30	\$25	\$20
150% - 200%	\$30	\$20	\$10

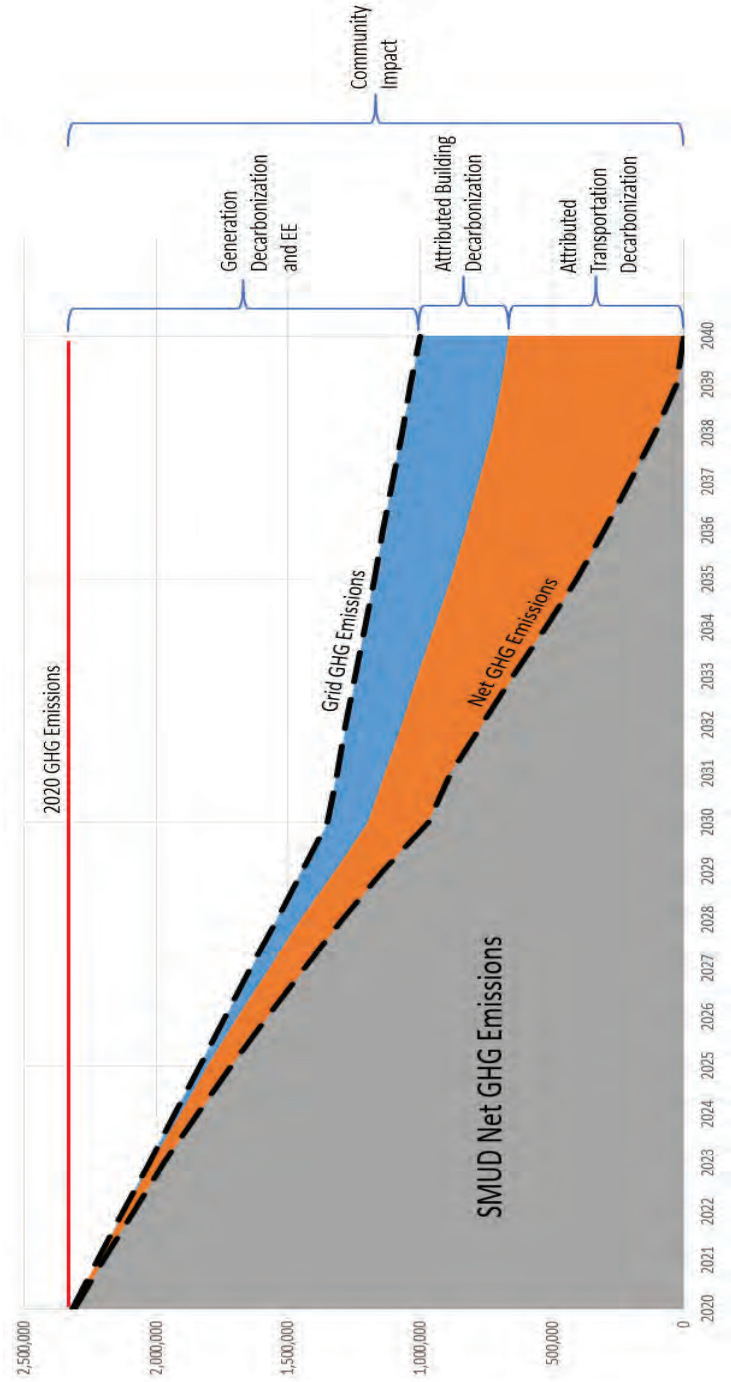


Sustainable Community Strategy Results



Strategy: Net Zero Carbon Future

SMUD Board adopted aggressive Integrated Resource Plan with the strategic objective to establish long-term GHG reduction goals while balancing environmental leadership, cost and customer impacts, reliability and local benefits



Pricing Strategies – Net Zero Carbon Goal

Residential Customers

- Peak reduction and to reduce reliance on higher carbon emitting plants and higher commodity costs
- Transportation electrification and charging for optimized load shape
- Equitable costs sharing and fixed cost recovery
- NET Energy Metering Compensation
 - TOD pricing balancing complexity and appropriate compensation for over generation
 - Shifting of peak from 4-7pm to 5-8pm better reflect the value of solar in our price signals; 1 hour shift reduced value of solar by 2¢/kWh



Energy Rate Restructured for Residential Customers

Residential Time of Day (TOD)

- Default Standard Rate
- Alternate fixed rate priced higher to reflect indifference to price signal
- 99% adoption of TOD rate
- EV customers have additional 1.5¢ whole house discount from midnight to 6 am



Pricing Strategies – Net Zero Carbon Goal

Commercial Customers

- Commercial customers have larger energy bills so are more responsive to price signals and are more apt to be motivated by more complex rate designs
- Fairness between customers and customer classes; more reliably collect for fixed costs
- Price signals that distinguish between service level demand and coincident demand
- Staking middle ground as storage is still infancy and during transition, is easier to adjust in the future
- Not create price signal that drives behavior that favors the individual over the system
- Moving energy costs closer to generation costs to make electrification attractive
- Energy charges that target load shapes; targeted energy efficiency
- Optimize investments by SMUD and our customers



Energy Rate Restructured for Commercial Customers

- 1. Increase the fixed charges and decrease energy charges** to be revenue neutral
- 2. Adjusted the time period** to reflect price of energy, encourage electrification, especially when generation source is low-cost renewables
 - Created new day-time off peak super saver rate for 8 non-summer months
- 3. Created consistency** across 10 commercial classes
 - Adjust Demand Charges (5 classes had increases; 2 classes had decreases; 3 classes had no change)
 - Added a Summer Peak Demand Charge to all but the smallest commercial customers
 - Reduced the energy charge
- 4. Created multi-year transition plan** to avoid rate shock



One Last Note About the Importance of Programs

- Customer Programs and Rates are two biggest tools we have to drive market transformation
- Pilots to test tariffs
- Bridge to new program design to mitigate impact of pricing channels
 - EAPR restructure
 - Commercial restructure
- More responsive than tariff to rapid change to DERs and technology
- Facilitate small wins that over time become additive and compliment Pricing in achieving our strategies



Rates Roadmap Next Steps



NEM successor
rate and Fixed
Cost Recovery

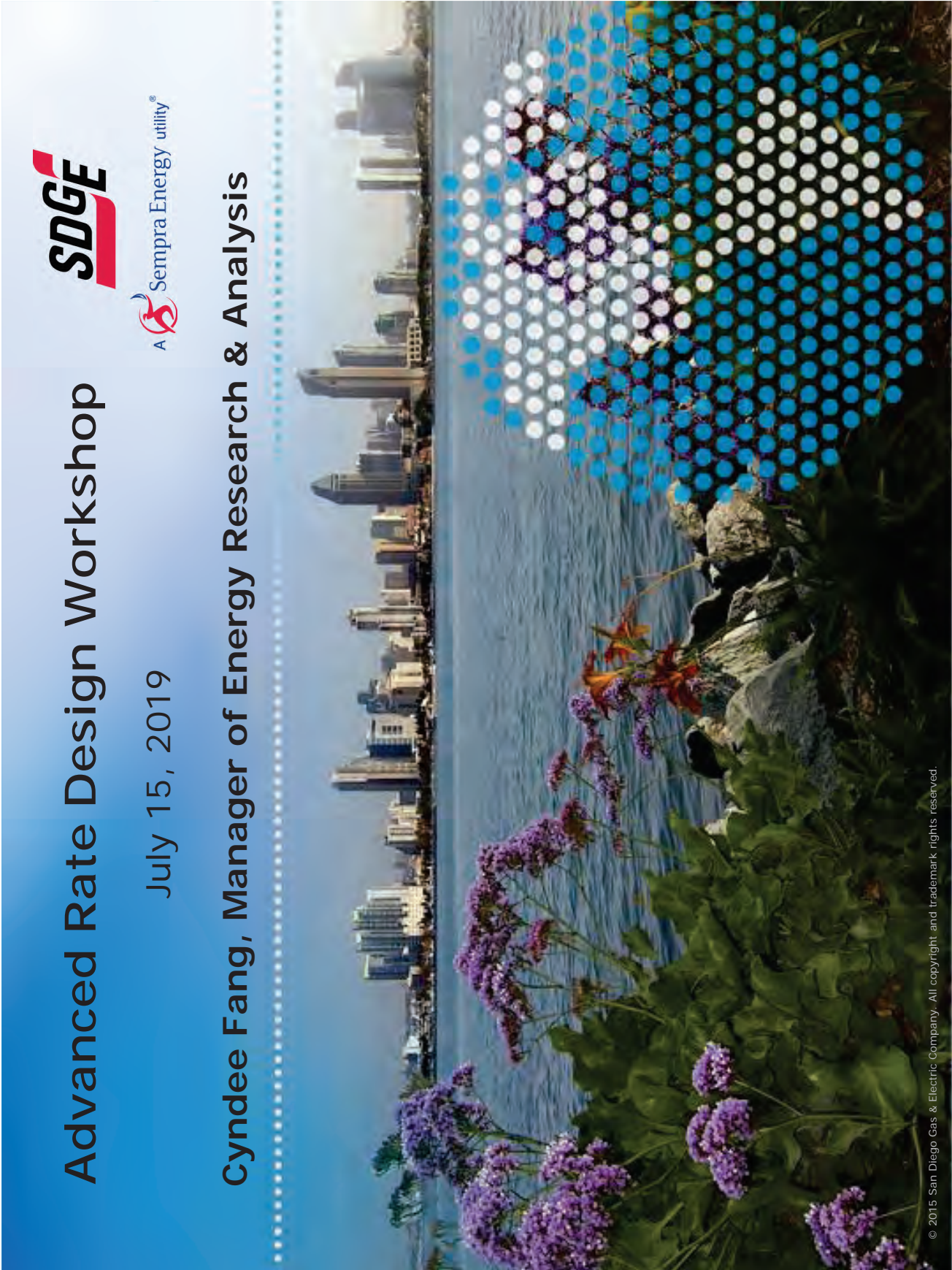
- SMUD desires least cost solution; though neutral on specific solutions
- Valuing the community over the individual
- Least total cost for the system



Pricing Challenges and Opportunities

- **Provide visibility of price signals** so customers can understand the long term value proposition before making the investment to avoid misalignment between DER adopters and non-adopters
- **Embedded costs** (historical investments) greater than current marginal cost (cost to add 1 more customer)
- **Balance** between tangible, immediate benefits vs. intangible longer-term benefits
- **Maintaining SMUD's financial health** so we can harness the benefits of the energy revolution for all of our customers





Advanced Rate Design Workshop

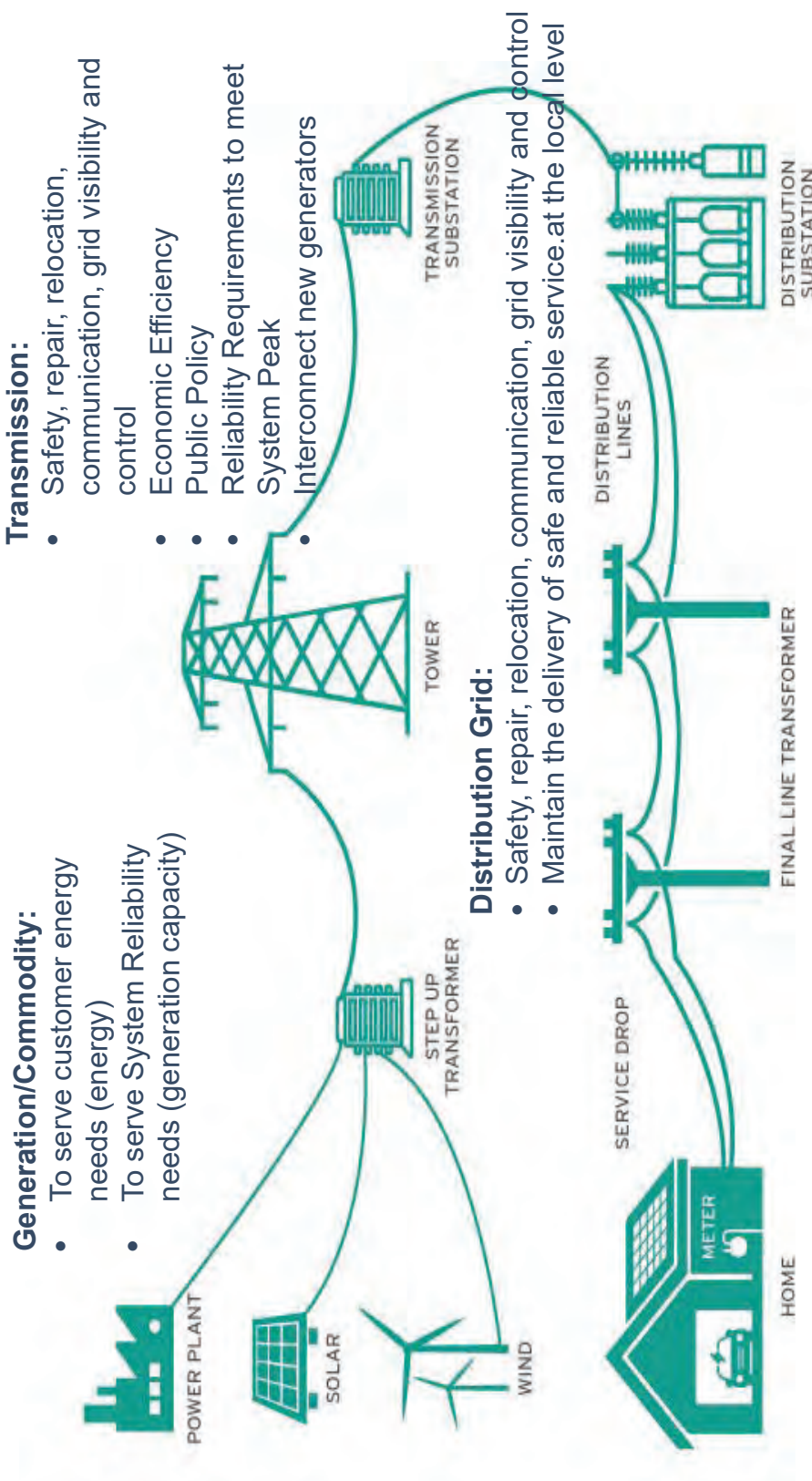
July 15, 2019

Cyndee Fang, Manager of Energy Research & Analysis

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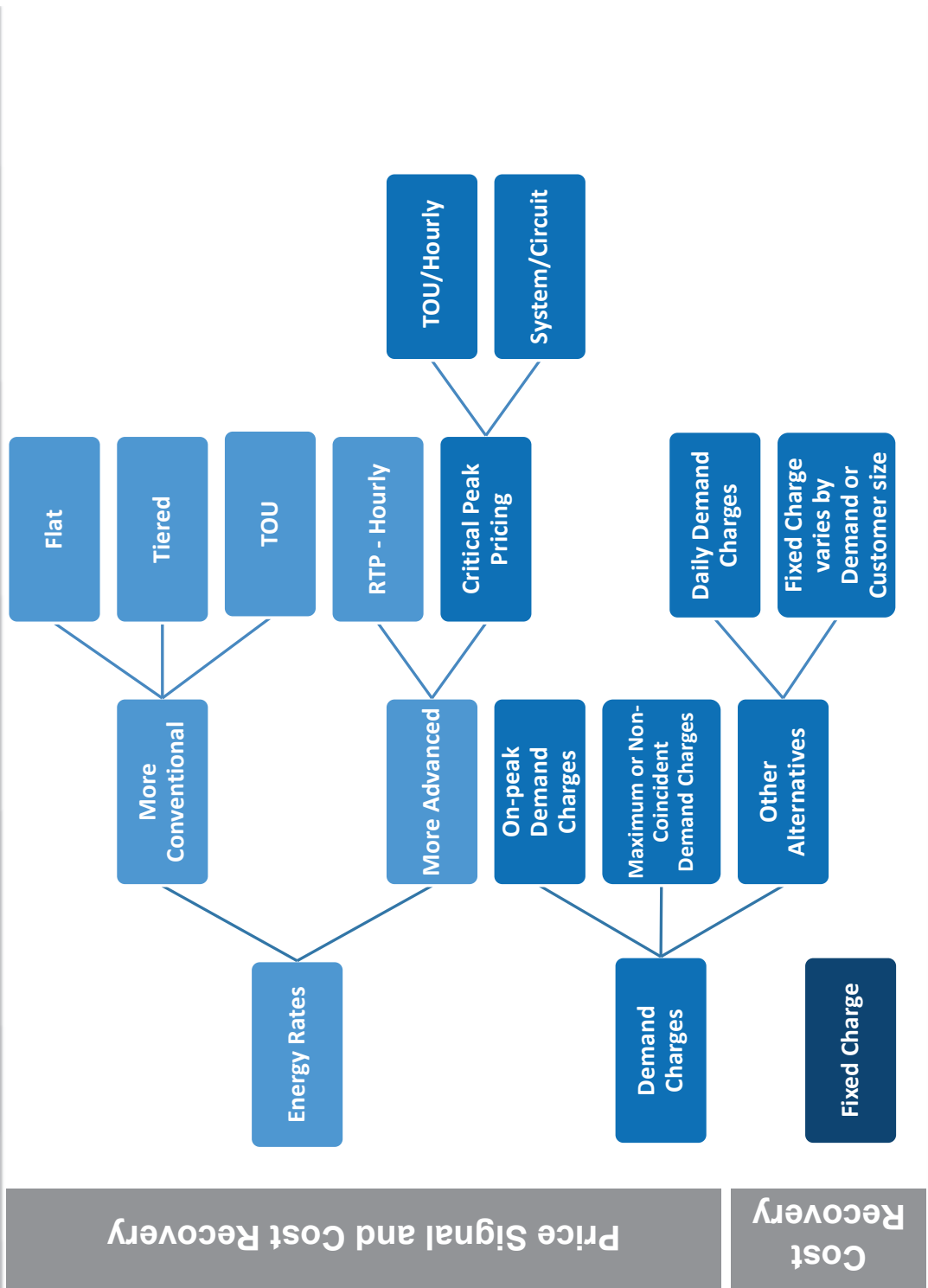
The Utility System



- Customer Set-up:**
- To ensure customers are ready to receive energy services



Rate Design Tools



Price Signal and Cost Recovery

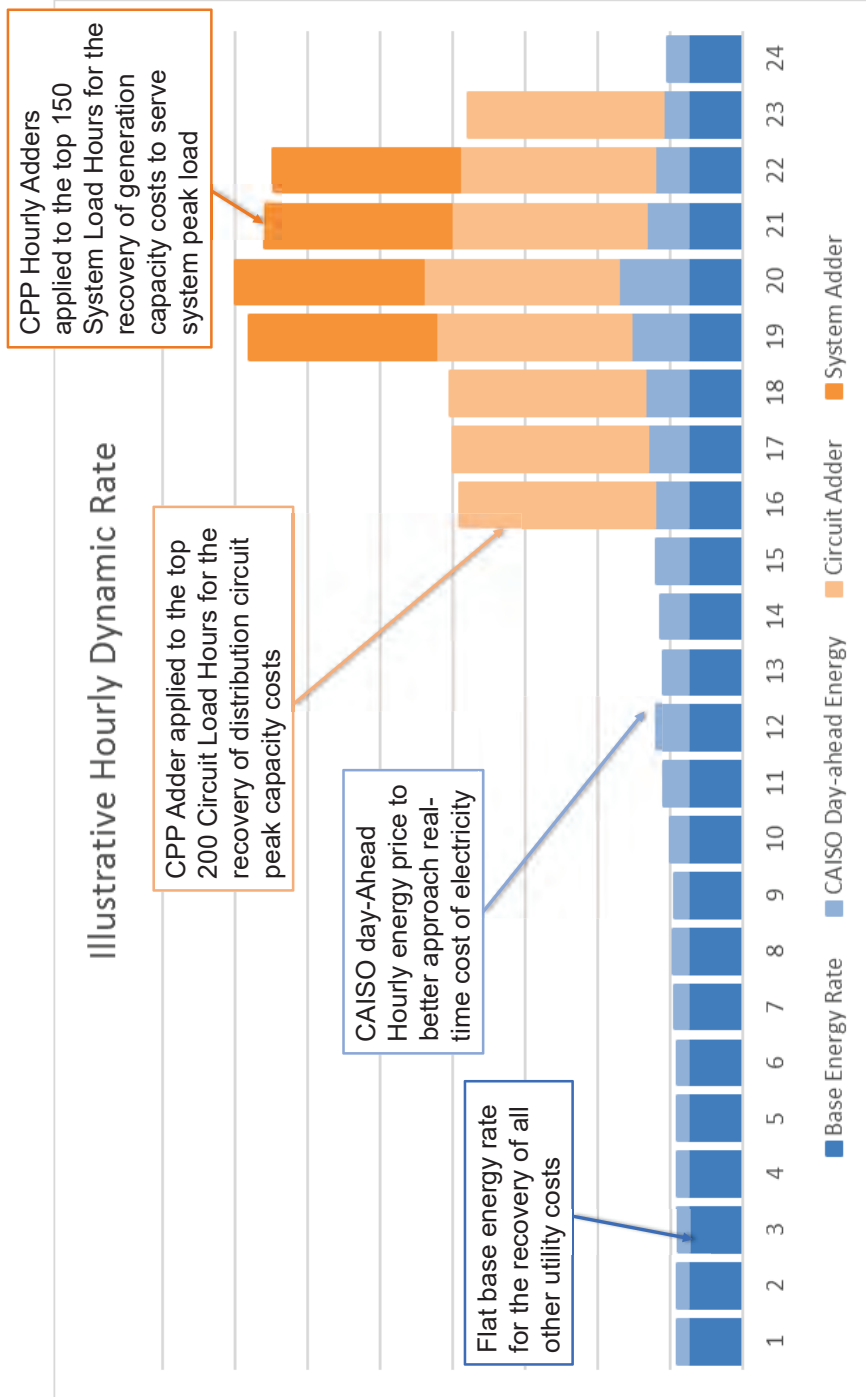
Cost Recovery



Design of an Hourly Dynamic Rate

Advanced technologies partnered with more complex and granular rate design can create more opportunities for low cost hours

Illustrative Hourly Dynamic Rate



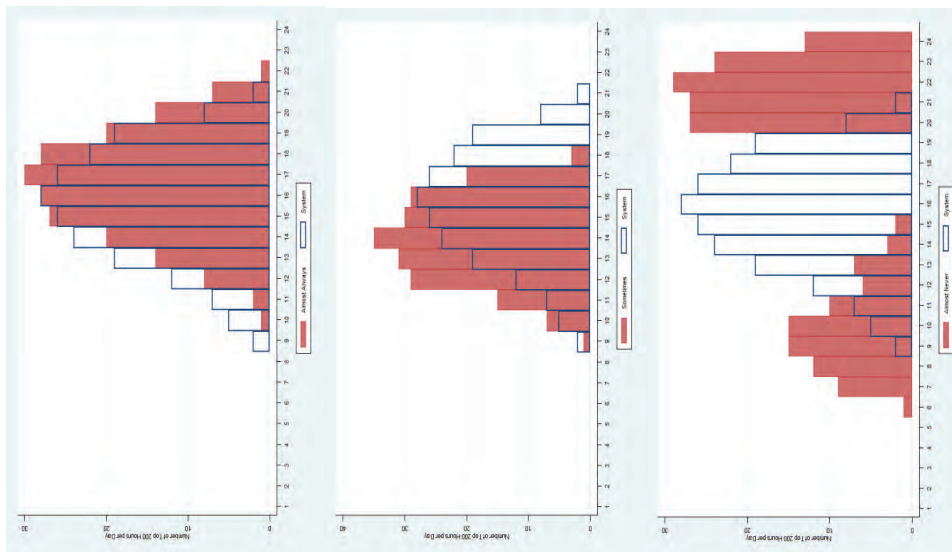
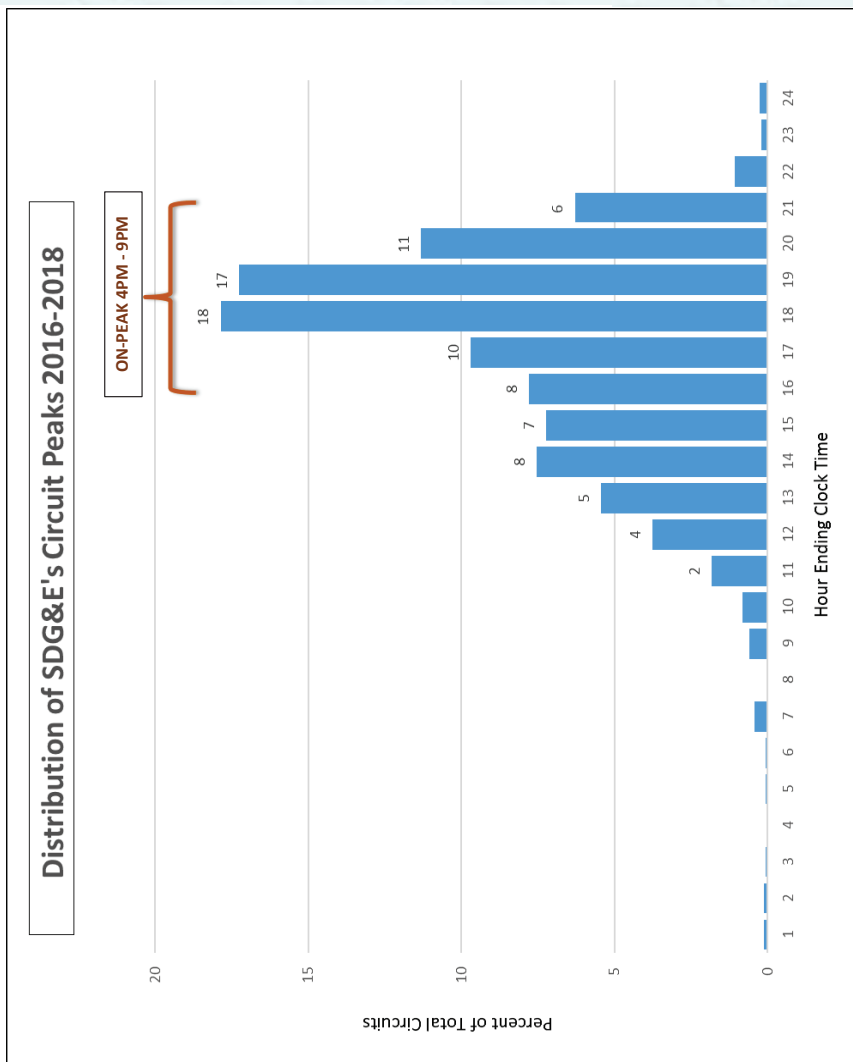
CPP is an energy rate option that provides a “capacity” price signal

Circuit-level CPP provides a locational price signal while preserving customer equity by still charging all customers the same price



Comparison of System and Circuit Peaks

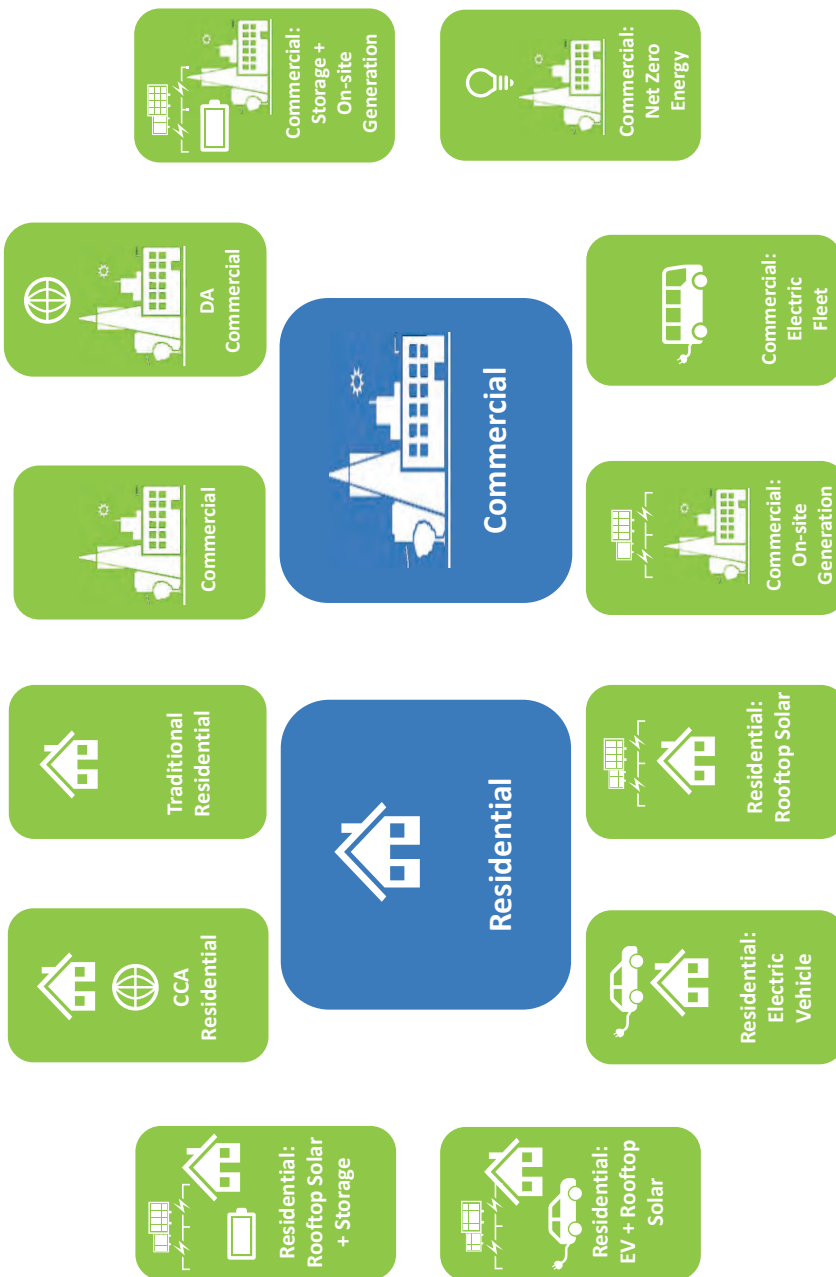
The timing of circuit peaks may not align with system peak





The Myth of the Average Customer

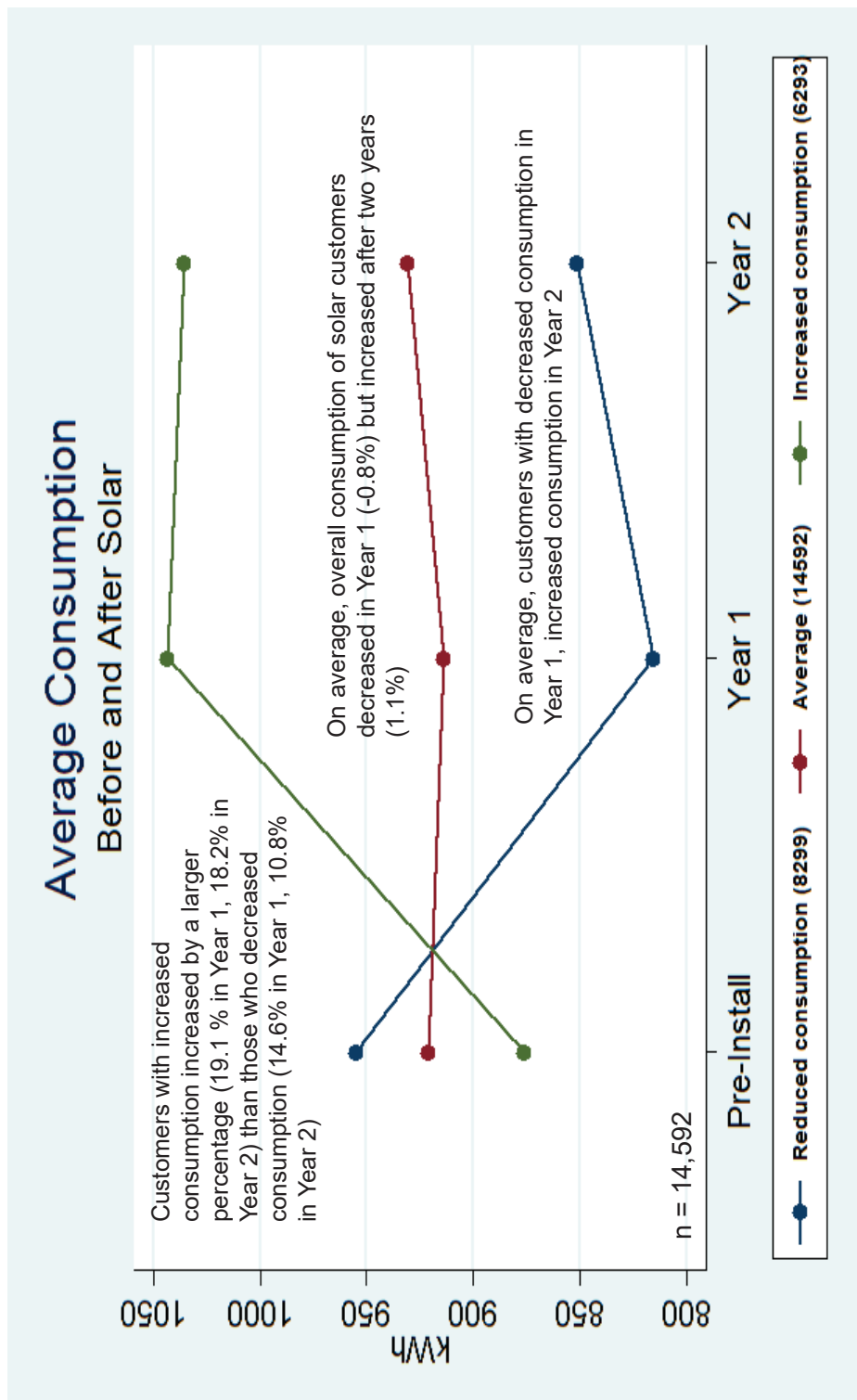
A holistic approach to rate architecture is needed to treat each customer fairly and avoid cost-shifting as customer needs continue to diversify





Residential Customer Before and After Solar Net Energy Consumption after Solar Installation

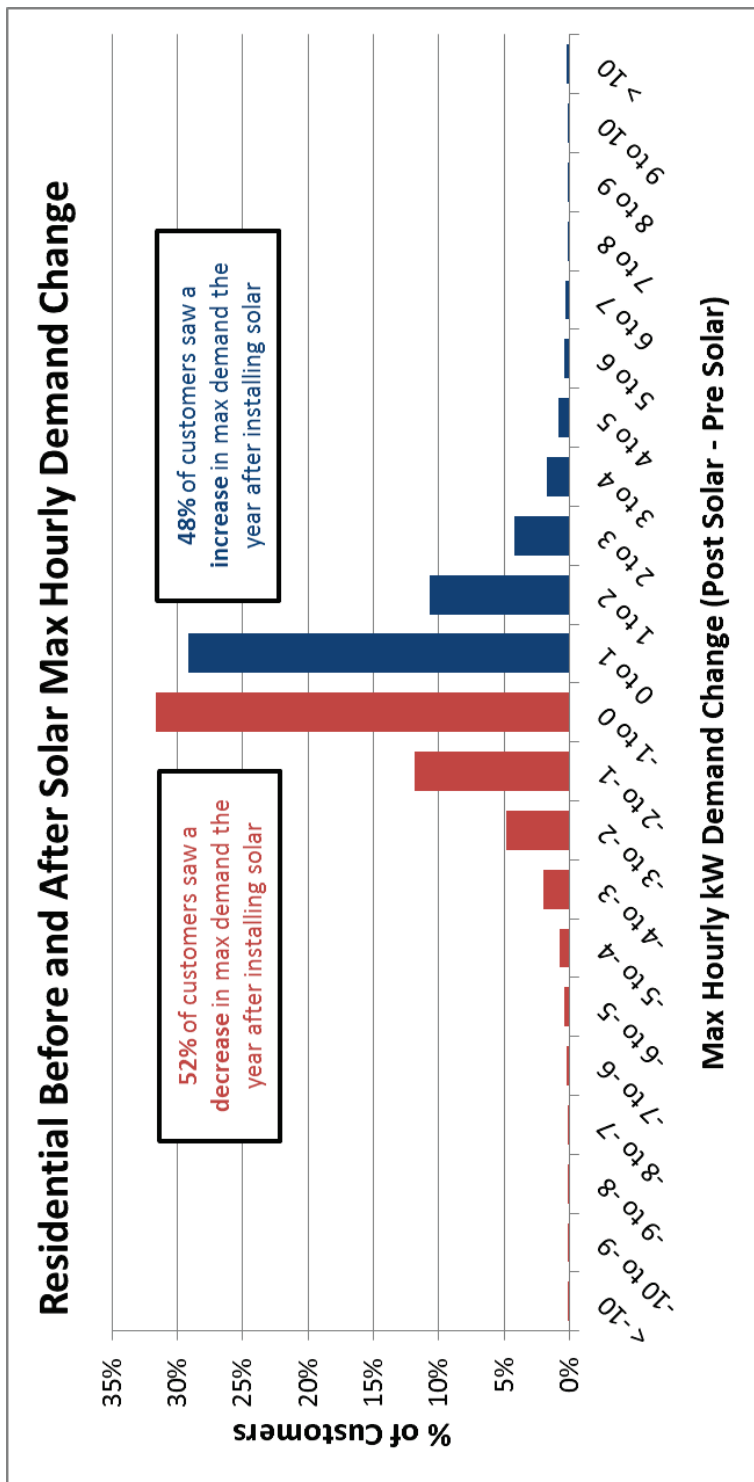
One year after the installation of solar, 56.9% of customers decreased consumption and 43.1% increased consumption





Residential Customer Before and After Solar Demand - 1 Year after Solar Installation

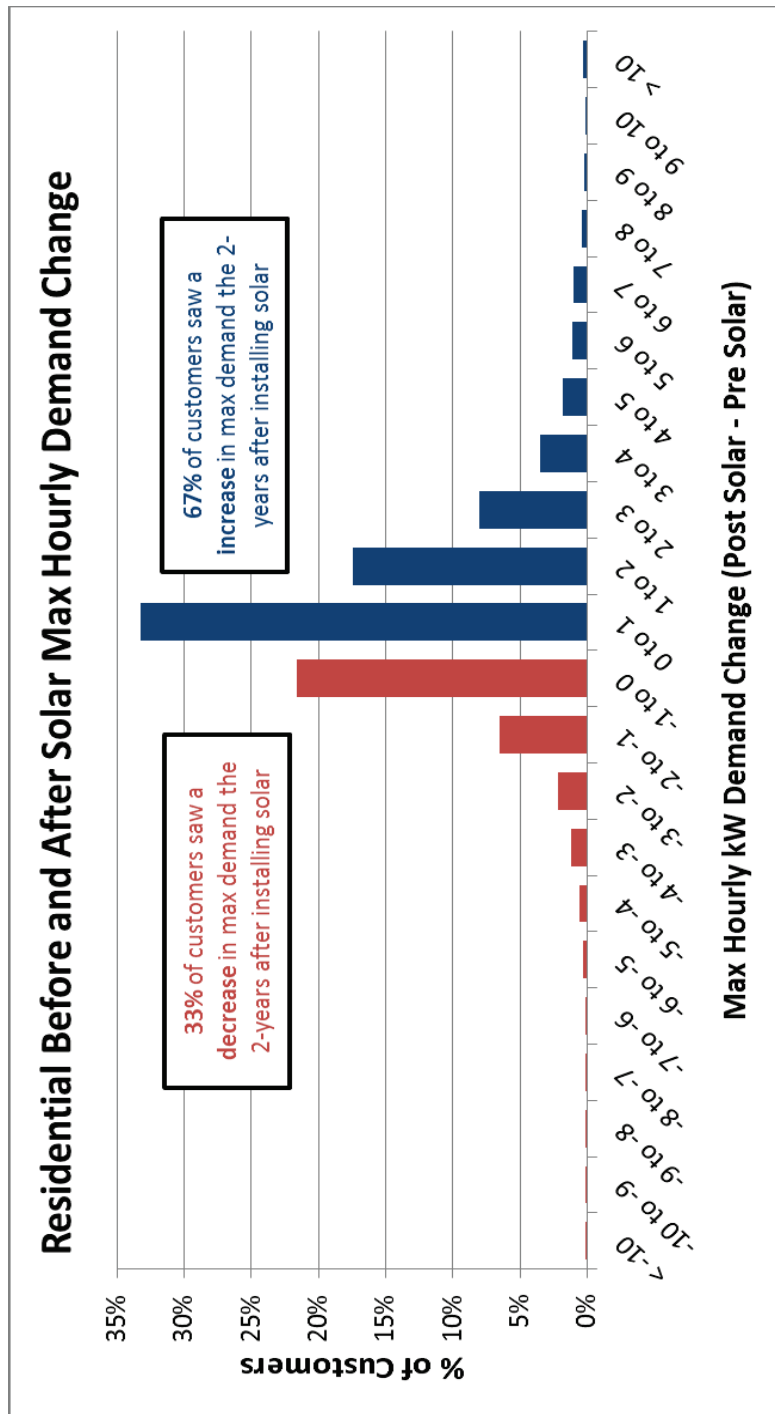
52% of residential customer with solar decreased maximum hourly demand by an average of 14% 1 year after installation, while **48%** increased their maximum hourly demand by an average of 17%





Residential Customer Before and After Solar Demand - 2 Years after Solar Installation

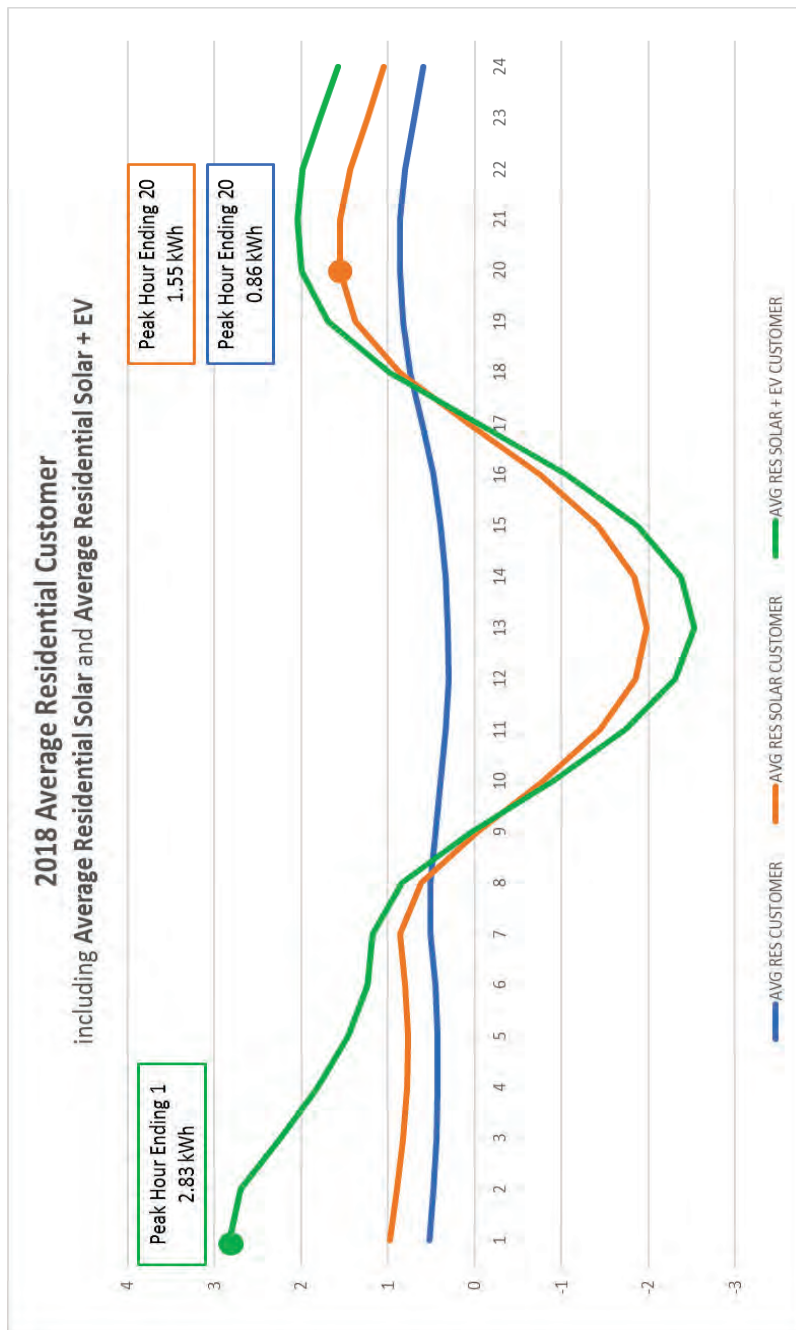
33% of residential customer with solar decrease maximum hourly demand by an average of 14% 2 years after installation, while **67% increased** their maximum hourly demand by an average of 22%





Customer adoption is transforming customer energy needs

While the adoption of solar results in lower net consumption, the average residential customer with solar has significantly higher demand, over 80%, than the average residential customer. Customers with solar and EV have an average demand over 3 times the average residential customers.



The average residential customer has a peak of 0.86 kWh at 8 pm

The average residential solar customer has a peak of 1.55 kWh at 8pm

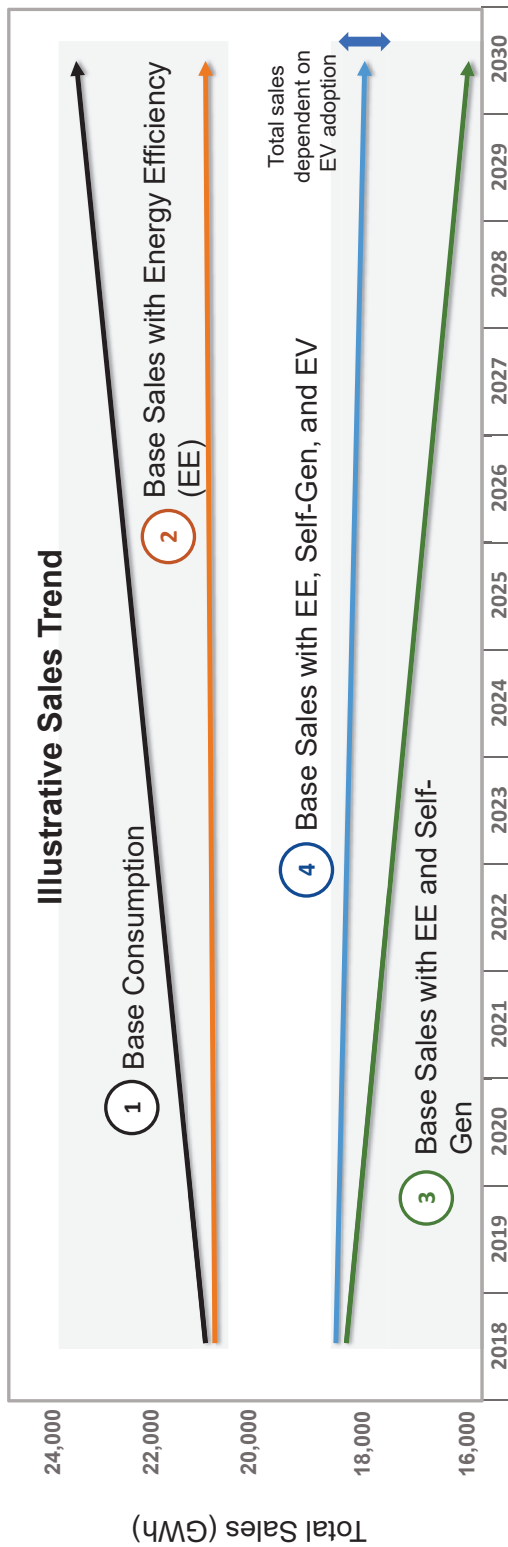
The average residential solar + EV customer has a peak of 2.83 kWh at 1am

Customer Adoption is a key driver behind SDG&E's Sales Forecast



Customer adoption of energy efficiency (EE), solar (PV) and electric vehicles (EV) are primary drivers behind SDG&E's sales forecast

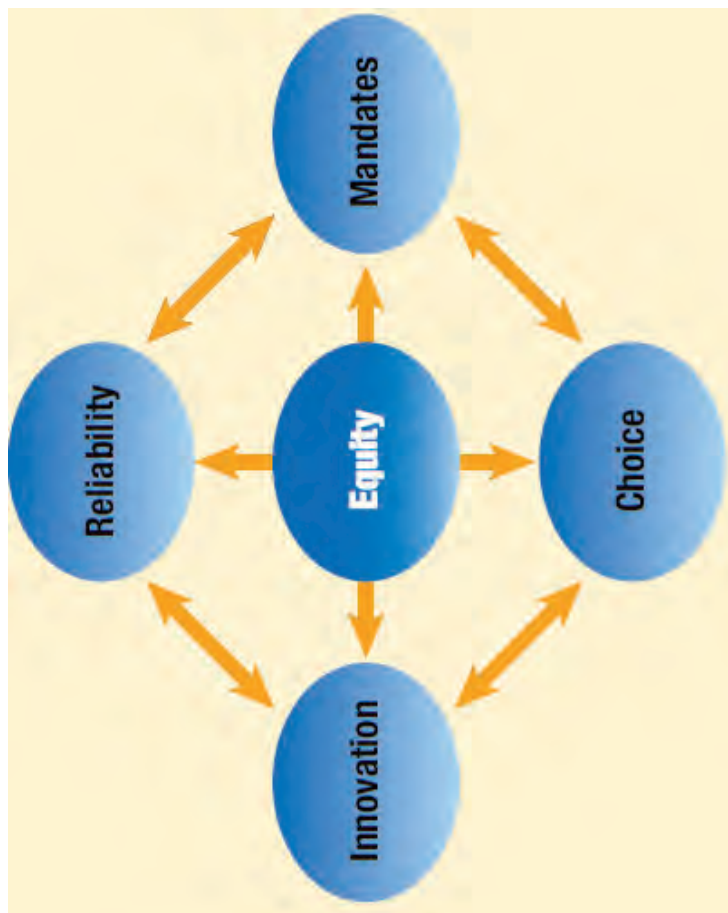
1.	Sales increase absent EE and self-generation	2.	Including EE causes sales to be relatively flat	3.	Self-generation results in declining future sales	4.	EV adoption mitigates decline or increases sales
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Competing Priorities Put Pressure on Rate Design



Policy goals, customer engagement, and technology trends have encouraged the emergence of an increasingly decentralized landscape of consumers, retailers, and suppliers who engage with the electricity system in divergent ways, expect different levels of service and find value in distinct products and services





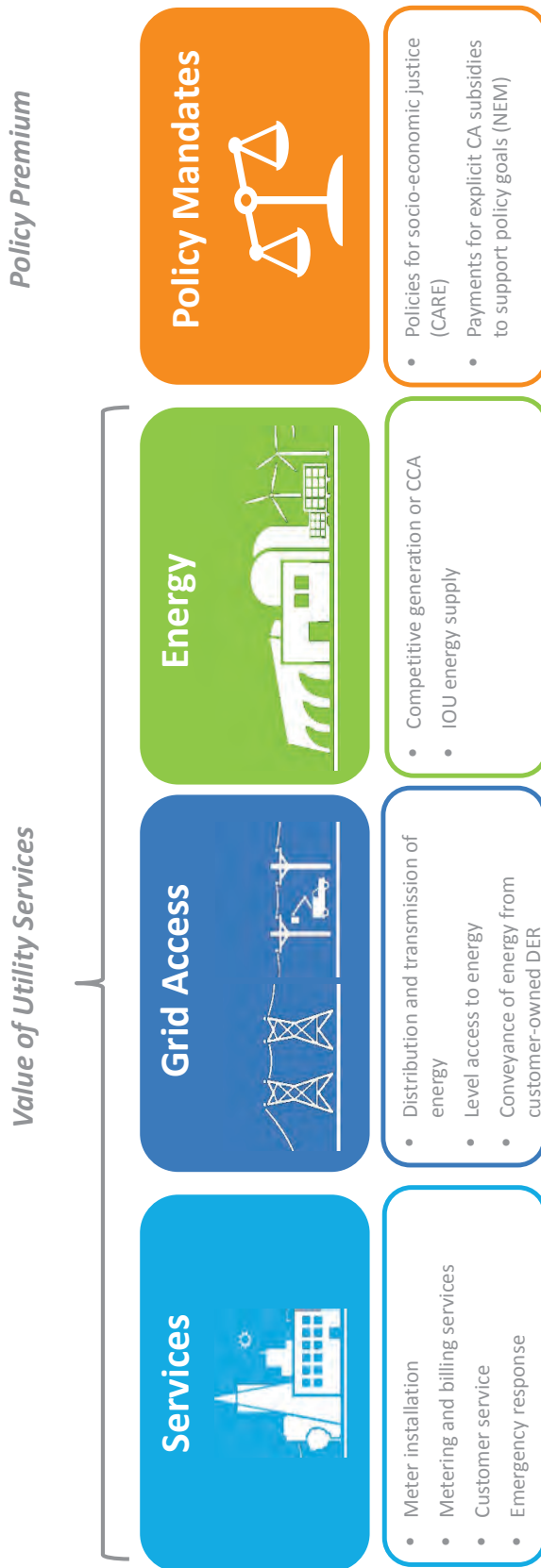
Key MRA Principles Informing Rate Design

Modern Rate Architecture Key Principles			
<p>Transparency</p> <p>Costs are clearly allocated to products and services</p> <p>Subsidies are clear and measurable</p>	<p>Equity</p> <p>Maintain affordable average rates</p> <p>Rates are fair and minimize cost shifts</p> <p>Customers are credited appropriately for providing value</p>	<p>Sustainability</p> <p>Rates represent cost of service</p> <p>Customer pay for costs incurred on their behalf</p>	<p>Access</p> <p>Customer have options to manage their energy services</p> <p>Customers have equal access to options</p>



New Rate Architecture Needed

A new rate architecture is needed to address technology evolution and customer choice in a way that clearly identifies the value of utility services distinct from the costs and benefits of policy mandates

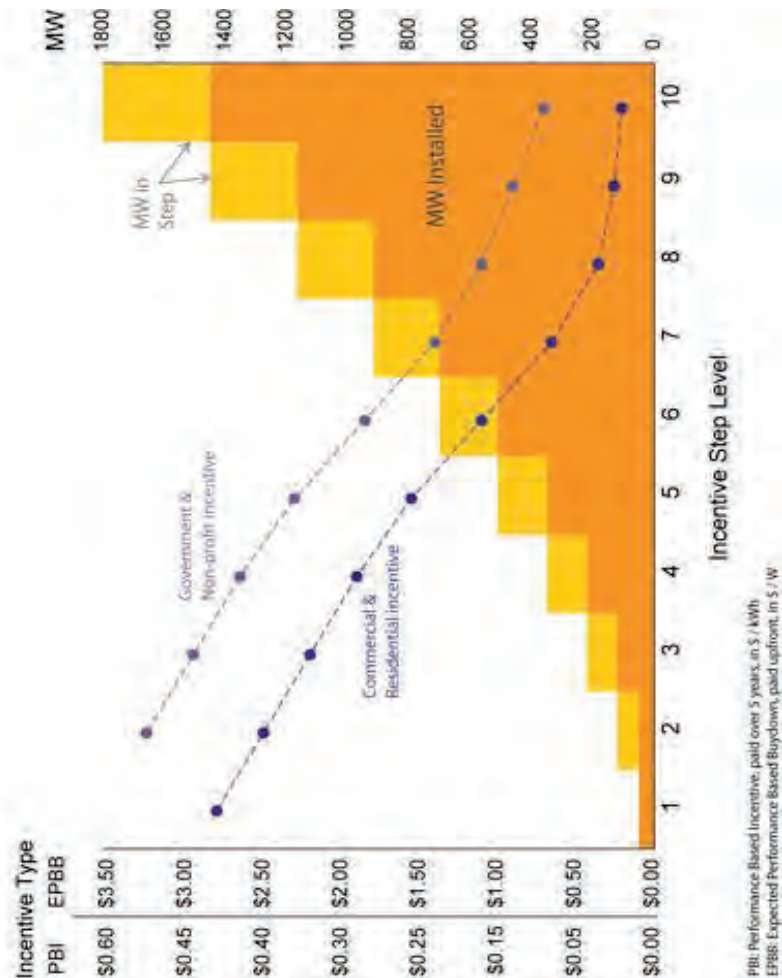




Case Study: California Solar Initiative

A sustainable policy subsidy is direct and transparent and declines as policy objectives are achieved

CSI Incentives Declined as the Program Progressed







Introduction

Dr. Ren Orans founded E3 in 1989, a consulting firm with approximately 70 staff based in San Francisco. An economist and engineer, he has focused throughout his career facing the electricity industry.

Ren is a longtime advisor to policy makers and executives in every corner of the electricity arena: regulators, utilities, system operators, independent power producers, environmental groups, and investors.

Ren has been actively working in Hawaii for more than 20 years.

Education:

PhD, Civil Engineering, Stanford University
BA, Economics, University of California, Berkeley



Ren Orans, PhD

Managing Partner





- + Recap of Presentations**
 - Ahmad Faruqui, Brattle
 - Jim Lazar, RAP
 - Travis Kavulla, R Street
 - Chris Yunker, Hawaii DBEDT
 - Jennifer Davidson, SMUD
 - Cyndee Fang, SDG&E
- + Summary and Key Takeaways**



Ahmad Faruqui, Brattle

- + Smart appliances, sensors/communications, and DERs and changing the way customers interact with utilities
- + The existing paradigm of small fixed charges and flat energy charges is not suitable to this and needs to be updated

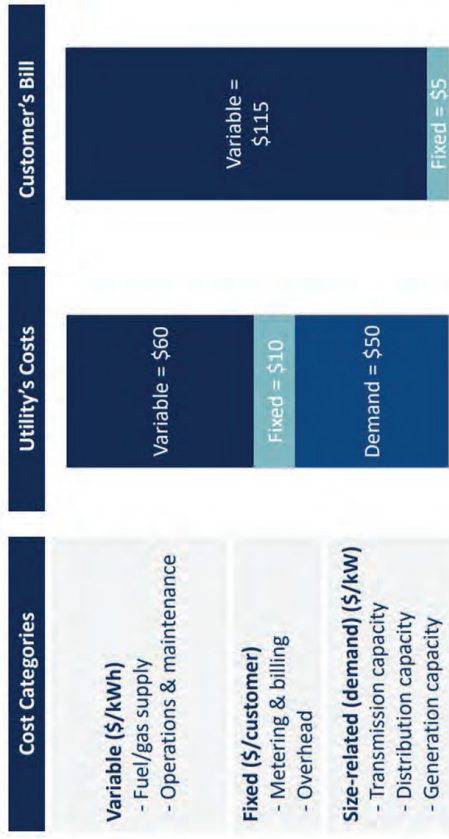
+ Rate designs should mirror the utility's cost of generating and delivering electricity

- Fixed: \$/customer
- Demand: \$/kW
- Variable \$/kWh with TOU

+ Benefits of a 3-part advanced rate design

- More customer control
- Minimization of cross-subsidies
- Reduced long-run costs due to more efficient investments/behavior/peak reduction

- + Customer considerations should be taken into account to balance other objectives – should roll out gradually with pilots
- + Many utilities are moving in this direction and adopting TOU, demand charges, and DER-specific rates





Jim Lazar, RAP

+ Key rate design principles

- A customer should be allowed to connect to the grid for no more than the cost of connecting to the grid
- Customers should pay for power supply and grid services in proportion to how much they use, and when they use it
- Customers delivering power to the grid should receive full and fair value – no more and no less

+ Other industries have significant fixed costs but recover costs primarily through variable charges

+ Recommendations

- Divide residential class between single-family and multi-family
- Move toward residential TOU rates
- Limit non-residential demand-charge to site infrastructure only and use TOU principles to recover grid coincident peak costs

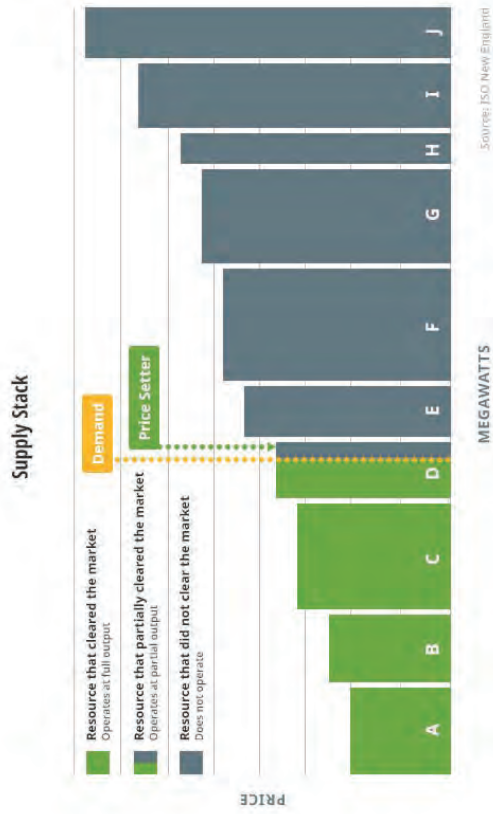
Impact of 0 kWh Solar Customer with TOU NEM

Rate Element	Amount	Unit	Period	Usage kWh	PV kWh	Net kWh	Billed Amount
Customer	\$ 11.50	Month		1			\$ 11.50
Off-Peak	\$ 0.153	kWh	9 AM - 5 PM	195.3	477	(281.70)	\$ (43.10)
Mid-Peak	\$ 0.345	kWh	All	198.6	42	156.60	\$ 54.03
On-Peak	\$ 0.436	kWh	5-10 PM	140.1	15	125.10	\$ 54.54
				534	534	0.00	\$ 76.97



Travis Kavulla, R Street

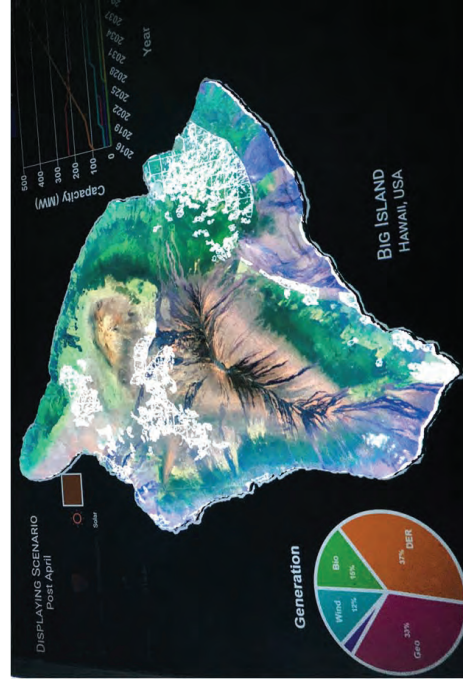
- + Rate design should align individual incentives with utility/societal costs
- + Utility variable costs are decreasing and fixed costs are increasing as Hawaii moves toward 100% renewable
- + Hawaii can create a cost-based market to determine locational marginal price of grid-delivered energy
 - Customers buy a baseline quantity of energy and then can use more or less by paying/being credited at the marginal cost
 - Will require adaptation in a 100% renewable system with “no variable costs
- + Regulatory flexibility is key – don’t be overly prescriptive and allow special rates to match a customer’s peculiar situation





Chris Yunker, Hawaii HSEO

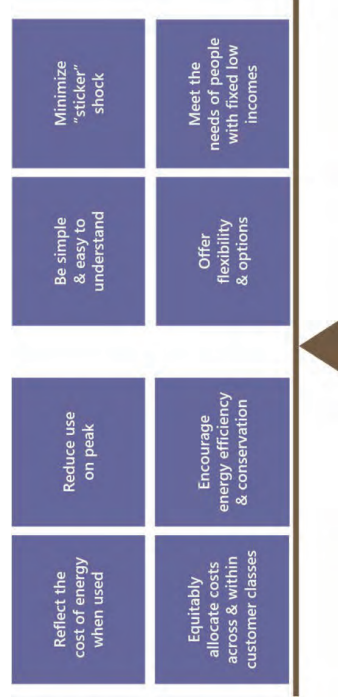
- + DER will play a significant role in Hawaii's renewable energy future due to land constraints
- + Rates will play a significant role in the customer decision to adopt DER
- + Rates should not incentivize customers to defect from the grid which would result in a utility "death spiral"
- + Each island is unique – should rate offerings reflect these differences?





Jennifer Davidson, SMUD

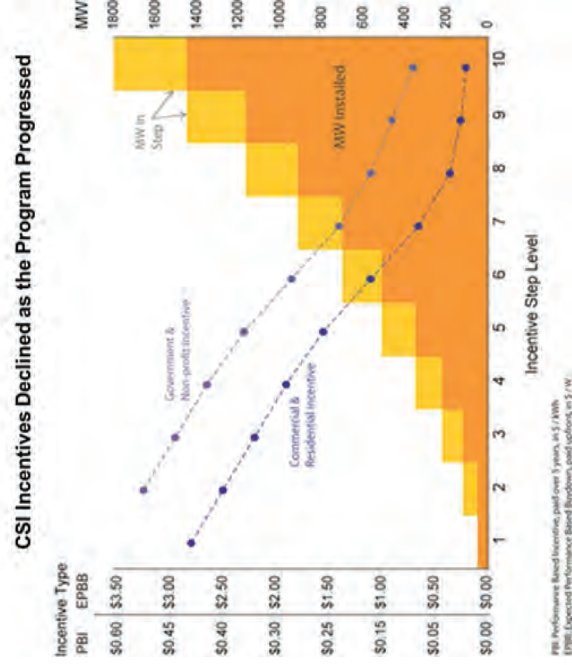
- + Establish rate design principles that must be balanced when setting rates
- + Urgent need for rate structures to evolve due to widening gap between cost causation and revenue collection
- + SMUD experience:
 - Increase fixed charge: \$7/mo → \$20/mo
 - Changed tiered rates to time-of-day rates
 - Overhaul of low-income rates to provide benefits to those most in need
 - SmartPricing pilot: 95% of customers satisfied





Cyndee Fang, SDG&E

- + Hourly dynamic rate can create many opportunities for low-cost hours
- + Misalignment between circuit peaks and system peaks must be considered
- + There is no “average” customer: must design rates to treat all customers fairly
- + Solar customers are unique and most have significantly higher peak demand than non-solar customers
- + Rate design must balance competing objectives/principles
- + Sustainable policy subsidy is direct and transparent and declines as policy objectives are achieved



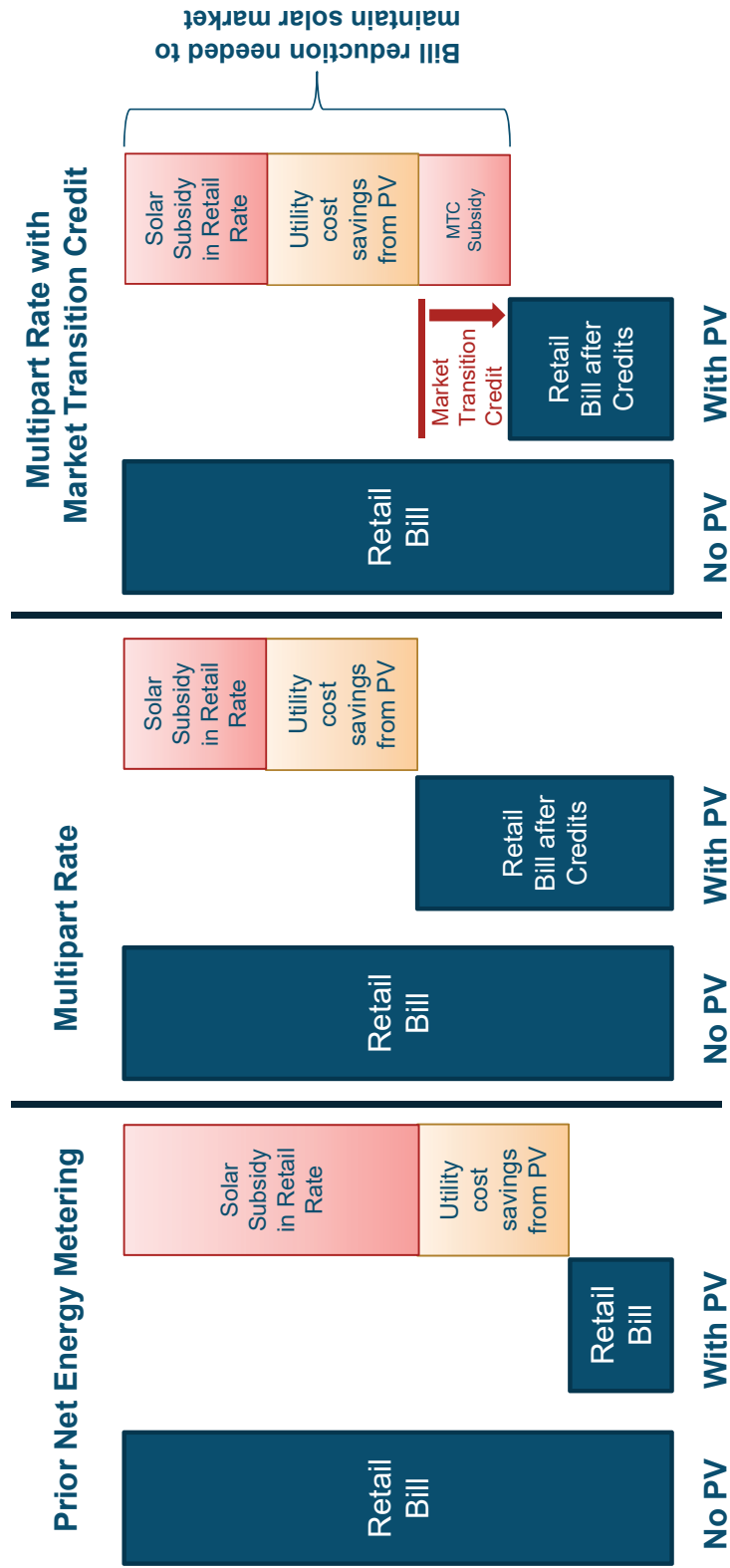


Summary and Key Takeaways

- + Long-term advanced rate design answer is clear:**
 - Dr. Faruqui described the efficient, fair design of a 3 part rate structure
- + Key question is how does HECO get to a multipart efficient rate design and encourage the right amount of DER with a healthy grid.**
 - Jim Lazar is right that utility costs must be collected in a way that is stable, understandable, and acceptable to customers and in alignment with cost causation
 - Jennifer Davidson says to balance the design objectives, you have to have a roadmap that gradually phases into the higher fixed charges.
 - Travis Kavulla tells us to be flexible and continually adjust incentives to achieve your targets
 - Chris Yunker highlights the important role of DER in meeting Hawaii's renewable energy goals due to land constraints which rate design will play a key role in achieving
 - Cyndee Fang has a very interesting idea that really fits what HECO is trying to do with DER, which is to adjust the incentive over time to generate the amount needed and that fits with the overall system plan

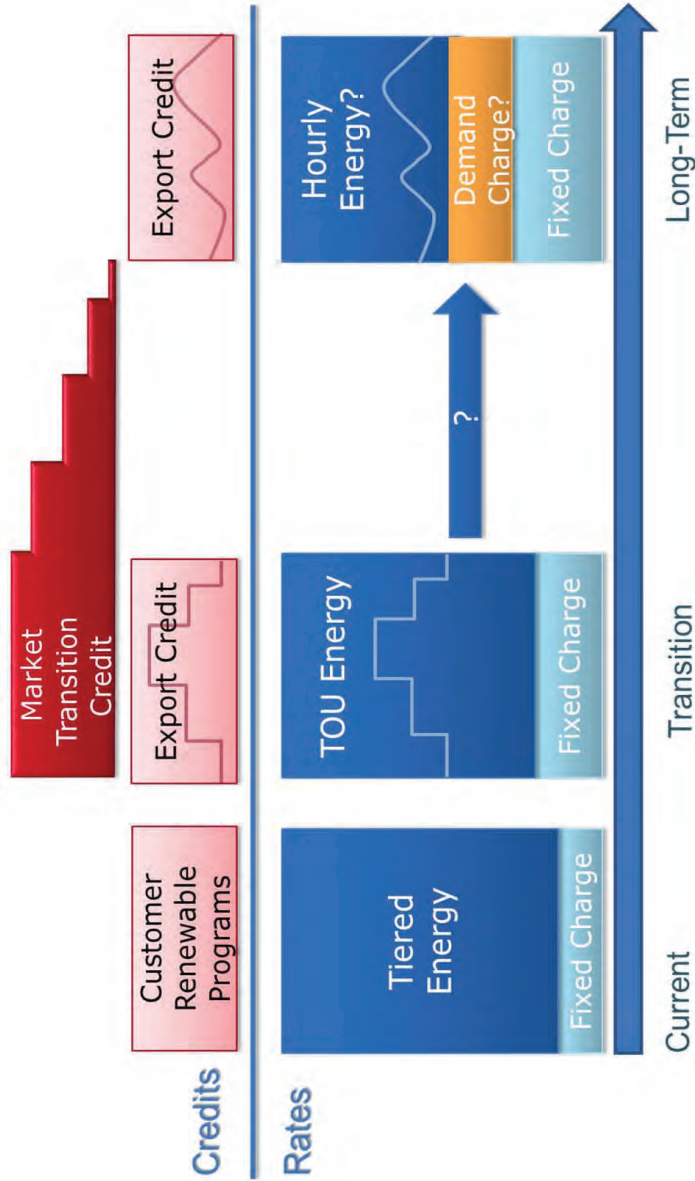


Flexible Incentive for DGPV



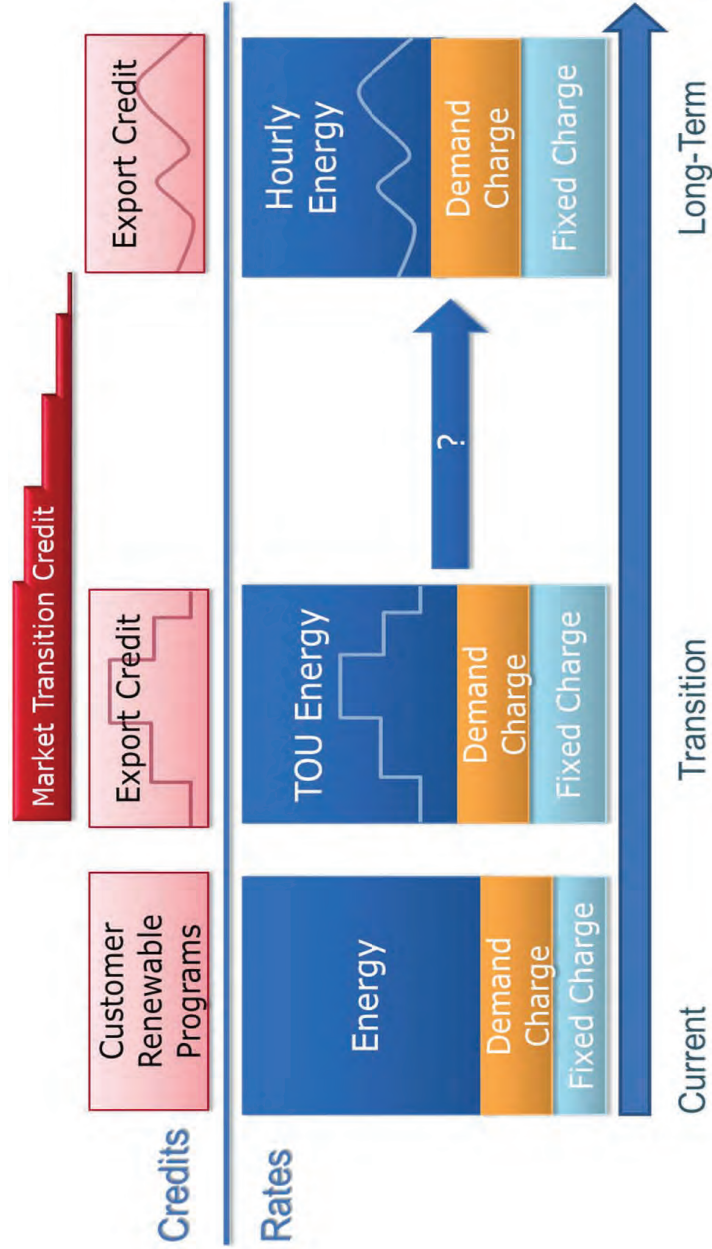


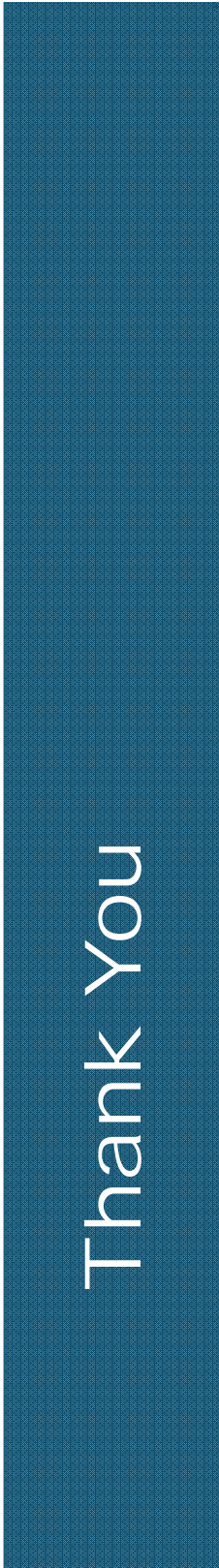
Residential and Small Commercial Transition Structures





Medium and Large Commercial Transition Structure





Thank You

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44 Montgomery St., Suite 1500
San Francisco, CA 94104
(415) 391-5100
ethree.com

Ren Orans, Managing Partner (ren@ethree.com)

Appendix G TOU-RI Lessons Learned

The Companies have identified key lessons learned from our optional TOU-RI program as noted below.

- **Data Collection and Analysis:** The TOU-RI program initially used load profile meters because advanced meters were not available. Gathering variable load data through the use of load profile meters results in high costs. For example, a meter reader spends on average about 5–7 minutes downloading information from a load profile meter. Given a potential program size of 5,000 customers, that equates to 30,000 minutes per year or 500 person hours a year spent downloading data alone. The Companies' Grid Modernization Strategy includes advanced metering applications which can make data collection and analysis much more cost efficient.
- **One-Month Baseline:** Using a one-month baseline combined with seasonal variations is not an ideal method for calculating customer load shift. Load shift measurements use one calendar month as the baseline for all subsequent months on the program. As an example, a baseline established in July is not a good comparison for a January bill. In addition, participating customers, although not advised to change load behaviors for the first month, may do so anyway, which convolutes the analysis. The limited 30 days of baseline load profile is insufficient to evaluate benefits. Ideally, in a designed experiment, there would be a randomized control group in addition to the group on the TOU-RI rate. This would enable us to evaluate the relative impacts between the groups and determine a benefit to the system as well as to customers.
- **Benefits Unclear at Enrollment:** Some customers choose to opt out quickly (for example, in one month) after enrolling if they do not see an immediate cost savings on their bill. While the intention is to give customers flexibility, it also contributes to increased operational costs from multiple truck rolls to change meters and is a potential source of customer dissatisfaction for those customers who may have misunderstood or did not have a means to obtain the enabling tools that would have made participation beneficial. A possible better approach is to help customers assess up front how the program could best fit their lifestyle and energy goals rather than doing so after the fact. Customers would benefit from clearer messages and greater transparency to manage expectations at enrollment to improve customer retention.
- **Small Pilot Size:** For a small pilot program size such as TOU-RI, the cost-to-benefit ratio is very high. This is due to high costs incurred to administer a program for a relatively small number of participants. This is a result of internal costs including meter procurement and installation, meter reading, and program administration.
- **Uncertain Capacity Benefits:** A variable rate is intended to provide one primary benefit: peak load reduction and a shift of that load to off-peak hours. This materializes in (1) a capacity benefit—that is, a sustained reduction of energy use that would require less system capacity to meet load—and (2) an energy benefit of reducing the use of more expensive generation resources at peak and potentially energy generation because the same load that exists at peak may not be needed to be met during off-peak hours. Since participating customers generally do not have energy storage, any reduction in peak use is unlikely to be entirely shifted to off-peak hours. Unfortunately, 30 days of winter load profile data is not sufficient to estimate a baseline to evaluate peak load reduction in summer months. Therefore, it is not possible to estimate the capacity benefit of the TOU-RI rate.

Appendix H Preliminary Comments from the Consumer Advocate

This section has the preliminary comments from the Consumer Advocate, received by the Companies on September 18, 2019.

DAVID Y. IGE
GOVERNOR

JOSH GREEN
LIEUTENANT GOVERNOR



CATHERINE P. AWAKUNI COLÓN
DIRECTOR

DEAN NISHINA
EXECUTIVE DIRECTOR

STATE OF HAWAII
DIVISION OF CONSUMER ADVOCACY
DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
335 MERCHANT STREET, ROOM 326
P.O. Box 541
HONOLULU, HAWAII 96809
Phone Number: 586-2800
Fax Number: 586-2780
cca.hawaii.gov/dca/

September 18, 2019

Mr. Kevin M. Katsura
Director, Regulatory Non-Rate Proceedings
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Katsura:

RE: Docket No. 2018-0141 – In the Matter of the Application of Hawaiian Electric Company, Inc., Hawai'i Electric Light Company, Inc., and Maui Electric Company, Limited For approval to commit funds in excess of \$2,500,000 for the Phase 1 Grid Modernization Project, to Defer Certain Computer Software Development Costs, to Recover the Capital and Deferred Costs through the Major Project Interim Recovery, and Related Requests. Draft Advanced Rate Design Strategy.

On August 23, 2019, the Hawaiian Electric Companies¹ presented a summary of their draft Advanced Rate Design Strategy ("ARDS") and provided a copy of the draft ARDS document.² Pursuant to Decision and Order No. 36230, filed on March 25, 2019, in Docket No. 2018-0141 ("Decision and Order No. 36230"), the Hawaiian Electric Companies are directed to file their ARDS by September 25, 2019.³ Below the Consumer Advocate provides its preliminary comments and recommendations regarding the Hawaiian Electric Companies' draft ARDS. Due to time and resource constraints, the Consumer Advocate's comments are not all-inclusive and the Consumer Advocate may

¹ The "Hawaiian Electric Companies" or "Companies" are Hawaiian Electric Company, Inc. ("Hawaiian Electric"), Hawaii Electric Light Company, Inc. ("Hawaii Electric Light"), and Maui Electric Company, Limited ("Maui Electric").

² ARDS Draft 8_21_19(1).pdf emailed to Energy Stakeholders from O. Simpson on August 23, 2019 ("Draft ARDS").

³ The Commission directed that the Hawaiian Electric Companies file the ARDS within six months of date of Decision and Order No. 36230. Six months from March 25, 2019 is September 25, 2019.

Mr. Katsura
September 18, 2019
Page 2

offer further comments and considerations in response to the Companies' September 25, 2019 filing.

A. BRIEF BACKGROUND.

In Decision and Order No. 36230, the Commission stated:

The Companies' grid modernization efforts can serve as a pathway to enable additional value from DER, and create opportunities for customers to more fully participate in the energy system. These opportunities cannot be fully realized without dynamic rate options and programs that help align customer behavior with grid needs.

...To aid the Companies in maximizing the benefits of advanced meters, the commission directs the Companies to develop a succinct Advanced Rate Design Strategy that describes how the Companies will leverage the technological capabilities of advanced meters to support the Companies' planned programs and the commission's stated priorities.

The Advanced Rate Design Strategy should briefly describe the Companies' plans to offer advanced rate designs and programs, and include advanced rate design proposals for further development and consideration.

The commission expects the Advanced Rate Design Strategy to include at a minimum: (1) a timeline for the Companies to offer updated dynamic rates for all residential and commercial customers (including, the introduction of time-varying rates, critical peak pricing, and real time pricing rate structures); (2) potential rate reform considerations to support low-income customer participation in these offerings; (3) enrollment mechanisms for convenient customer participation in the advanced rate offerings; (4) implementation plans for offering advanced rates, including education and outreach to customers; and (5) evaluation plans for monitoring, verifying, and improving the effectiveness of advanced rate designs. The Advanced Rate Design Strategy should also describe how the advanced rate offerings will complement the Data Access and Privacy Policy discussed above.⁴

⁴ Decision and Order No. 36230, at pages 50-52. The Commission noted that review and further development of the ARDS would proceed in Docket No. 2014-0192, and that parties to Docket No. 2014-0192 would have the opportunity to comment on the ARDS and the Companies would have the opportunity to refine the ARDS accordingly. Decision and Order No. 36230, at 53-54. On August 19, 2019, the Commission issued Order No. 36474 Modifying Hawaii Electric Light Company's Smart Export Program, and Closing the Docket in Docket No. 2014-0192 ("Order No. 36476") directing the Companies to file the ARDS in a new DER investigative docket to be established by the Commission, rather than in Docket No. 2014-0192, as well as in Docket No. 2018-0141.

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The Consumer Advocate notes that the Hawaiian Electric Companies have included the five elements identified above as part of their draft ARDS. The Hawaiian Electric Companies have also a section describing the Data Access and Privacy Framework that will be filed by the Companies on September 25, 2019.

B. THE HAWAIIAN ELECTRIC COMPANIES' PROPOSED FUTURE RATE DESIGN.

The Consumer Advocate supports the transition to rates that provide efficient price signals to consumers by providing greater transparency regarding system costs as they vary over time. While the Consumer Advocate believes that a flat rate option should continue to be available to customers, the Consumer Advocate believes it is increasingly important to establish rates that accurately reflect the costs incurred to provide service to customers, especially as customers face increasing opportunities to make investments that impact their usage and/or ability to provide energy and services back to the grid. Moreover, as customers become more diverse, it will be increasingly important to ensure that costs are fairly allocated to ensure that certain groups of customers do not unduly subsidize the actions or investments or others. The Consumer Advocate contends that this can only be done through the systematic identification of the costs incurred to provide service to different types of customers and the clear and transparent unbundling of costs.

With respect to the types of rates identified in Section 3.3.1, Time Varying and Dynamic Rate Design; Section 3.3.2 Rate Combinations; and Section 3.5, Future State Pricing: A Smooth Glide path to Modern Rate Designs, the Consumer Advocate offers the following comments and recommendations:

1. Time of Use ("TOU") Rates and Critical Peak Pricing ("CPP").

As indicated above and as stated in prior comments and statements of position, the Consumer Advocate supports the establishment of TOU pricing to the extent that such pricing can increase efficiency and reduce system costs by providing more precise signals of the cost and value of electricity at various times throughout the day. The Consumer Advocate also supports the establishment of a CPP program as it is a form of time-variant pricing that would provide participating customers with more accurate signals regarding the cost of energy during system peaks. The Consumer Advocate cautions, however, that while time-variant pricing has great promise, it can also result in great harm if prices are set inefficiently (i.e., do not accurately reflect system costs). In such cases, the time-variant prices may result in higher costs, without comparable benefits, or may induce customers to make long-term, costly, inefficient investments.

To ensure that rates are set appropriately and efficiently, the Hawaiian Electric Companies should provide, as part of the ARDS, a mapping of specific data necessary to develop each type of rate, including fixed and variable charges, and whether the data

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is currently collected or will need to be collected in the future. If the necessary data is not currently available, the Hawaiian Electric Companies should indicate how they will obtain the data and when the data is expected to be available.

2. Critical Peak Incentive.

The Companies state that they have outlined plans to initiate a Critical Peak Incentive ("CPI") Program option, and that the decisions regarding if and when to proceed will depend on the effectiveness of current and planned commercial customer procurement efforts.⁵ The Companies expect to make a determination regarding a CPI option by the fall of 2020. The Companies state that CPI serves a similar purpose to a Critical Peak Pricing ("CPP") opportunity, but that:

[t]he main difference is that instead of customers making choices on the basis of altered pricing for a given period, customers are committing to making themselves available if and when the Companies are in need of peak load reductions. Typically, this event-based approach sees more reliable responsiveness than pricing options; however the Companies may consider a parallel CPP offering or deviate from the CPI plans and redirect efforts to a CPP model, given the impending deployment of advanced meters.⁶

While not explicitly stated, the Companies' CPI program appears to be a form of Peak Time Rebate ("PTR").⁷ Although the Hawaiian Electric Companies indicate that CPP and CPI/PTR serve a similar purpose, the Consumer Advocate contends that PTR is a less efficient way to encourage efficient consumption, because it masks the true cost of providing electricity during peak events by instead raising the prices on all other days and providing compensation for perceived conservation. Moreover, the implementation of PTR raises numerous issues including issues with free riders⁸ and the potential for gaming.⁹ The Consumer Advocate notes that Hawaiian Electric proposed in Docket No. 2008-0074 to establish a PTR as part of its dynamic pricing pilot.¹⁰ The

⁵ Draft ARDS, at 19.

⁶ Draft ARDS, at 20.

⁷ While the Hawaiian Electric Companies have not yet disclosed their plans for a CPI program option, the Consumer Advocate assumes that some form of PTR would be involved. The Hawaiian Electric Companies state that a CPI program option would pay customers incentives for their responsiveness to critical peak event calls. ARDS, at 19.

⁸ In this context, a free rider is a consumer who received a rebate for something they would have done anyway (absent the rebate).

⁹ See, for example, Severin Borenstein's discussion regarding PTR programs: <https://energyathaas.wordpress.com/2014/05/12/money-for-nothing/>

¹⁰ See Hawaiian Electric's Application for Approval of Dynamic Pricing Pilot Program and Recovery of Program Costs, filed on April 24, 2008, in Docket No. 2008-0074, at 12-14.

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Consumer Advocate raised a number of concerns with Hawaiian Electric's analysis of the effectiveness of PTR, especially in relation to CPP, and suggested several modifications to the proposed pilot.¹¹ The concerns raised by the Consumer Advocate included how claimed energy savings would be calculated, including the methodology used to establish customer baseline load, and that the program might create or perpetuate in certain socioeconomic and/or geographical biases. The Commission directed Hawaiian Electric to modify its dynamic pricing pilot program to address the recommendations and concerns raised by the Consumer Advocate.¹² On September 30, 2010, Hawaiian Electric withdrew its application, citing uncertainties regarding smart meter deployment.¹³

Regarding issues with calculating accurate baseline estimates, the Consumer Advocate notes that a study prepared for San Diego Gas & Electric by Freeman, Sullivan & Co. to evaluate its 2012 PTR baseline accuracy found:

While some methods produce reasonably accurate baseline estimates across all customers and all event days, no method is close to being accurate for individual customers on individual event days. Even when averaging across multiple event days, all methods tend to systematically over or underestimate reference load for a substantial share of customers. For example, the best performing baseline, a weather-matching baseline using five days with similar weather, generates baseline errors greater than 24% or smaller than -24% for 20% of customers on the average event day (calculated using 15 event days).

Individual customer regressions and weather matching algorithms (with adjustments) produce more accurate baseline estimates than any other method; however, they are still highly inaccurate for individual customers and individual events.¹⁴ (emphasis added)

...While small same-day adjustments can provide additional improvements in baseline accuracy, these improvements may not hold in a real-world situation in which customers might pre-cool their homes in anticipation of a PTR event or reduce their load in anticipation of the event. Consequently, we do not recommend adopting a same-day adjustment. The marginal gain

¹¹ See, for example, the Consumer Advocate's Statement of Position, filed February 18, 2009, in Docket No. 2008-0074, at 10-14; 16-19; and 20-24.

¹² Order Directing HECO to Modify its Dynamic Pricing Pilot Program, filed on June 5, 2009, in Docket No. 2008-0074. The Commission stated at page 9 that Hawaiian Electric and the Consumer Advocate could alternatively file a stipulated proposed program for the Commission's review and approval, but that Hawaiian Electric regardless needed to provide sufficient supporting evidence to demonstrate that the program would comply with the Integrated Resource Planning Framework and would be cost-effective.

¹³ Hawaiian Electric, Withdrawal of Application, filed on September 30, 2010 in Docket No. 2008-0074.

¹⁴ Freeman, Sullivan & Co., 2012 San Diego Gas & Electric Peak Time Rebate Baseline Evaluation, prepared for San Diego Gas & Electric, April 2013 ("SDG&E PTR Evaluation"), at 1.

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in accuracy based on simulation analysis could easily be offset by errors caused by logical changes in consumer behavior if the assumptions underlying the simulation (that customers do not change usage before the event) are wrong.¹⁵ (emphasis added)

Among the study's key conclusions were that:

- Baseline and payment errors result in payments being made to many customers who do not reduce demand. These payment errors must be recovered from all customers.
- ...[T]he best way to improve PTR cost effectiveness is to shift from default to opt-in enrollment and to target customers that deliver large average demand reductions.¹⁶

Frank Wolak, in his analysis of the Anaheim, California peak time rebate experiment found:

For virtually all customers in the treatment group, the CPP pricing experiment was a very financially rewarding experience... Another important conclusion from the experiment is that the vast majority of rebates appear to have been paid for by consumption reductions during CPP days that treatment customers would have made without the financial incentives provided by the CPP event. One explanation for this result is the method used to set the reference level of peak period consumption was too generous. The other explanation is the incentive effect of CPP customers to increase their consumption during the peak hours of non-CPP days to increase their reference level.¹⁷

Regarding the potential for gaming, the Consumer Advocate notes that the Federal Energy Regulatory Commission ("FERC") has investigated and penalized entities for manipulating baseline loads in order to give the appearance of greater load reductions and reap higher payments. FERC's Office of Enforcement reached settlements with several entities alleged to inflate baseline loads. In June 2013, for example, FERC approved a settlement agreement between the Office of Enforcement and Enerwise Global Technologies, Inc. ("Enerwise"). The Office of Enforcement determined that Enerwise had, among other things, instructed the Maryland Stadium Authority ("MSA") to increase load prior to a test event so that it would appear that that MSA had a larger load

¹⁵ SDG&E PTR Evaluation, at 2.

¹⁶ SDG&E PTR Evaluation, at 2.

¹⁷ Wolak, F. "Residential Customer Response to Real-Time Pricing: The Anaheim Critical-Peak Pricing Experiment," May 24, 2006, at 21.
https://web.stanford.edu/group/fwolak/cgi-bin/sites/default/files/files/Residential%20Customer%20Response%20to%20Real-Time%20Pricing%2C%20The%20Anaheim%20Critical-Peak%20Pricing%20Experiment_May%202006_Wolak.pdf

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reduction than actually occurred.¹⁸ Enerwise agreed to pay a civil penalty of \$780,000, to make \$500,000 in demand response metering and automatic load control technology improvements for PJM customers, and to disgorge \$20,726 plus interest in unjust profits.¹⁹ In August 2013, FERC issued Orders against Lincoln Paper & Tissue, LLC ("Lincoln"); Competitive Energy Services, and Richard Silkman for alleged fraudulent inflation of baseline energy consumption in the New England ISO market.²⁰

The Consumer Advocate contends that any proposed CPI or PTR program must be subject to strict scrutiny to ensure that the proposed program is cost-effective and does not create perverse incentives for consumers. The Consumer Advocate recommends that details regarding any proposed CPI or PTR program be made available as soon as possible²¹ to allow for sufficient vetting and evaluation.

3. Locational Value.

The Companies state:

The Companies do not intend to introduce rates that increase sophistication along the **locational spectrum**, at this time, because of the inherent complexity involved and the risk for customer confusion to outweigh any additional value. That said, in the long-term, it may be worth exploring concepts of locational value to inform [distributed energy resource or "DER"] compensation, where it could help direct customer investment to parts of the grid that need it most, potentially deferring the need for traditional grid investment and benefitting all customers in the process.²² (emphasis retained)

Between 2017 and 2018, the Hawaii Natural Energy Institute, Kevala, Inc., and Gridworks conducted a series of workshops intended to build a tool to help assess the locational and temporal net benefits of DER on Oahu ("Pathways to an Open Grid: Oahu project" or "POG Oahu project"). Both the final report of the POG Oahu project and

¹⁸ Federal Energy Regulatory Commission, Order Approving Stipulation and Consent Agreement, 143 FERC 61,218, issued June 7, 2013, in Docket No. IN 12-15-000, at 7-8. The Office of Enforcement also determined that Enerwise misrepresented to PJM MSA's ability to reliably provide its committed load reduction.

¹⁹ Ibid.

²⁰ See <https://www.ferc.gov/enforcement/market-manipulation.asp>. These dockets involved the manipulation of baseline energy consumption in the Day-Ahead Load Response Program. Lincoln, for example, was ordered to pay \$5 million in civil penalties, and disgorgement of \$379,016.03, plus interest. FERC, Order Assessing Civil Penalty, 144 FERC 61,162, issued August 29, 2013, in Docket No. IN12-10-000.

²¹ The Consumer Advocate recognizes that the Hawaiian Electric Companies intend to make a determination regarding whether to propose a CPI option by the fall of 2020.

²² Draft ARDS, at 19.

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Hawaiian Electric's Locational Value Maps²³ suggest significant geographical variation in the impact of increases distributed generation.²⁴ The Consumer Advocate recommends that the Companies describe and summarize, as part of the draft ARDS, the analysis they have conducted to determine that the "inherent complexity involved and risk for customer confusion" would outweigh the additional value of making available rates that vary by location. The Consumer Advocate also seeks to understand how the Hawaiian Electric Companies' data on locational value might reasonably be used to inform DER compensation, including the specific data that is currently available and any data that would need to be collected.

4. DER Standard Tariff and the Market Transition Credit.

The Companies state:

In 2015, after closing NEM to new customers, the Commission approved two interim successor programs: Customer Grid Supply and Customer Self-Supply. In 2018, the Commission approved the Customer Grid Supply Plus and Smart Export interim programs.

...To simply and standardize customer options going forward, we propose a new long-term Standard DER Tariff to succeed the interim tariffs currently available (e.g., CSS, CGS, CGS+, and Smart Export).

Although these existing programs address fair export compensation to customers providing energy, they do not fully address the cost shift issue. The comparatively small fixed charges paid by self-supplying residential and small commercial customers covers only a portion of their fair share of grid costs and the value of grid services they receive (e.g., standby, regulation).

To properly address potential cost shifts resulting from increased utilization of DER, a new rate design is needed. Although requiring TOU rates is a step in the right direction, electricity rates should reflect three attributes of a customer's electricity usage: (1) the amount of grid-supplied electricity consumed (via a per-kWh rate); (2) the extent to which a customer depends on the grid (via a per-kW demand or grid usage charge); and (3) the costs of maintaining a reliable, modernized, clean electricity grid (via a monthly fixed charge). This multi-part time-variant rate would align DER customers' payments with their fair share of grid costs.²⁵

²³ <https://www.hawaiianelectric.com/clean-energy-hawaii/integration-tools-and-resources/locational-value-maps>

²⁴ See, for example, page 5 of the POG Oahu Review of Stakeholder Proposed Scenarios and Program Findings, August 2018.

²⁵ Draft ARDS, at 21-22.

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The Companies propose to introduce the multi-part time-variant rate as part of its proposed Standard DER tariff. The Companies further state:

To address potential customer concerns or disruptive impacts of requiring TOU rates and, later, a grid usage charge, the Companies propose to include a Market Transition Credit (MTC) in the Standard DER tariff that would provide additional export compensation to DER customers. In doing so, the MTC would support customers' continued rooftop solar adoption and sustain Hawaii's thriving DER industry. The adjustment would decline over time as the costs associated with DER decline, providing a glide path and reliable stability for customers and the market.

Further, customers who provide grid services to the utility, either via utility or third-party programs, would be compensated for the full value of those services.

The Consumer Advocate supports the transition to a Standard DER tariff that would simplify and make transparent the charges DER customers will face as well as the compensation DER customers may receive. The Consumer Advocate also supports the establishment of multi-part time variant rates to better capture the costs by the utility incurred to serve customers. The Consumer Advocate notes, as it has in prior comments, that the development of such rates will require the unbundling of system costs and that procedures be in place to properly identify and record DER implementation costs.²⁶ Doing so is essential to promote transparency and ensure the proper and fair allocation of costs. The Consumer Advocate believes it is critical for the Hawaiian Electric Companies to identify these costs, how they are calculated, and how they are recorded so that meaningful discussion regarding rate design can occur. The Consumer Advocate also believes that it will be important to establish and communicate to consumers the intervals during which pricing will be updated with cost projections to ensure that consumers are not making investment and/or behavioral changes in response to outdated, inefficient price signals.

Regarding the Hawaiian Electric Companies' proposed MTC, the Consumer Advocate has significant concerns regarding the determination and purpose of this credit. As stated in the draft ARDS, the Hawaiian Electric Companies describe this credit as providing "additional export compensation to DER customers" while also "support[ing] customers' continued rooftop solar adoption and sustain[ing] Hawaii's thriving DER industry." The Consumer Advocate has previously expressed these concerns and requested in prior meetings that further clarity be provided regarding what data or factors would go into developing such a credit. To be clear, the Consumer Advocate does not support a credit whose purpose is to support a particular

²⁶ See, for example the Consumer Advocate's Preliminary Statement of Position, filed on June 1, 2015, in Docket No. 2014-0192, at 27-29, and the Consumer Advocate's Comments on the Phase II Preliminary Issues, dated October 13, 2016, at 13.

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industry or technology above or beyond the value that is provided to the grid. This would be akin to “picking winners and losers.” While the Consumer Advocate recognizes that the Hawaiian Electric Companies’ Power Supply Improvement Plans contemplate utilizing a substantial amount of distributed generation, the Consumer Advocate believes that any sustainable DER pricing and procurement program must take into consideration the relative prices of energy procurement from other renewable energy resources, for as long as those resources continue to be available.²⁷ This includes utility-scale projects as well as community-based renewable energy projects. The Consumer Advocate cautions against setting near-term DER prices in response to projected 2040 or 2045 DER targets, as it has been widely recognized that there is considerable uncertainty regarding the technologies and costs that may be available that far in the future.

5. Electrification of Transportation.

The Companies state:

Through rate design, electric vehicles are in a unique position to ensure that EVs charge in a manner that minimizes the costs to the grid, while providing customers with fuel savings relative to gasoline, which helps to drive EV adoption...

Consistent with Commission guidance in the EoT Roadmap docket, the Companies will continue to prioritize EV rate design in the near-term, developing rates that: (1) incentivize charging when there is extra generation on the grid; (2) send appropriate price signals to current and potential EV drivers; and (3) are tailored to each island’s specific grid needs.²⁸

The Hawaiian Electric Companies state that they will address EV rate design in further detail in their Electrification of Transportation (“EoT”) Workplan.²⁹

As stated in prior comments, the Consumer Advocate recognizes the important role EVs can play in achieving multiple policy objectives.³⁰ The Consumer Advocate recommends that the Hawaiian Electric Companies provide, as part of their EoT Workplan

²⁷ If higher cost resources are selected when lower cost alternatives remain available, this increases the cost of grid-supplied electricity and increases incentives for inefficient grid and/or load defection. For customers who cannot otherwise reduce their load, this results in higher bills.

²⁸ Draft ARDS, at 23-24.

²⁹ The Commission ordered the Hawaiian Electric Companies to file a workplan within 90 days of Order No. 36448 Providing Guidance and Directing The Hawaiian Electric Companies to File a Workplan, filed on July 31, 2019, in Docket No. 2018-0135.

³⁰ See, for example, the Consumer Advocate’s Comments Regarding the Hawaiian Electric Companies’ Electrification of Transportation Strategic Roadmap, filed on July 16, 2018, at 3.

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a mapping of how the data collected through current tariffs and initiatives will be analyzed and used to inform future EV rate design and establish sustainable EV charging rates.

C. LOW INCOME CUSTOMER CONSIDERATIONS.

The Consumer Advocate believes that the goals of grid modernization and the transformation of the electric utility must be balanced with affordability. As noted by the Consumer Advocate in Docket No. 2018-0088:

First, affordability means providing sufficient attention to striving towards establishing reasonable customer bills across all customer classes, as well as all types of customers within each of the customer classes. Second, affordability means properly balancing customer bill impacts with other prioritized outcomes considered in this proceeding. Achieving this balance could be one of the greatest challenges before the Commission as Hawaii continues to transform the electric industry. Third, affordability means protecting customers with high energy burdens, particularly low-income and other disadvantaged customers.³¹ (footnote omitted) (emphasis added)

1. Community-Based Renewable Energy ("CBRE") Program.

The Hawaiian Electric Companies note that one of the initiatives underway to create opportunities to expand DER participation to underserved customers, including low income customers, is the CBRE Program. As discussed in prior comments, the Consumer Advocate is concerned that most of the proposals currently under evaluation for Phase 1 of the CBRE Program do not appear to be seeking to serve low income customers.³² Also, while the Consumer Advocate recognizes that any utility CBRE project participating in Phase 2 must reserve at least 50 percent of its capacity for low-to-moderate income ("LMI") subscribers, the Consumer Advocate notes that there are no such requirements to serve low-to-moderate income customers for other Subscriber Organizations ("SO") in Phase 2. As discussed in its comments, the Consumer Advocate believes further discussion is necessary to determine whether SOs

³¹ Consumer Advocate's Metric Brief, filed on January 4, 2019, in Docket No. 2018-0088, at 6. The Consumer Advocate noted that the term "energy burden" was defined as the percentage of a customer's income that is used to pay for electricity bills.

³² See Letter From: Consumer Advocate To: Commission Re: Docket No. 2015-0389 In re Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., Maui Electric Company, Limited and Kauai Island Utility Cooperative, for Approval to Establish a Rule to Implement Community-Based Renewable Energy Program and Tariff and Other Related Matters - Comments Regarding Changes to Phase 2 Framework, filed on August 19, 2019 ("Consumer Advocate CBRE Phase 2 Comments"), at 5-6.

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should be required to implement marketing to LMI customers, and the extent to which it can or should be reasonably expected that SOs would enroll these customers.³³ Such program assessments and potential changes would result in a greater emphasis on reaching out to and serving LMI customers, consistent with the intent of the program.

2. Prospective Rate Offerings for Low-income Customers.

The Hawaiian Electric Companies propose three prospective rate offerings for low-income customers: a budget bill, PTR, and a Subscription Plan.

- **Budget Bill.** The Companies indicate that they are in the process of investigating a budget bill as a way to smooth electricity bill payments and allow customers to more easily budget their finances.
- **Peak Time Rebate.** As discussed earlier, the Consumer Advocate has significant concerns with the use of PTR. Please see the Consumer Advocate's discussion in Section B.2 of this letter.
- **Subscription Plan.** Prior to offering comments on this option, the Consumer Advocate would seek additional information including how the fixed subscription fee would be determined, how the predetermined thresholds would be determined, and how differences in usage and fuel prices relative to the predetermined thresholds would be assessed. The Consumer Advocate also seeks to understand how the proposed Subscription Plan compares to the Prepay Demonstration Program that was the subject of Transmittal No. 14-09, and, in particular, why this option would be attractive to consumers where the Prepay Demonstration Program appeared to have very limited uptake. Hawaiian Electric notified the Commission that it planned to discontinue the Prepay Demonstration Program on December 15, 2015.³⁴

D. ARDS ROADMAP AND TIMELINE.

As discussed above and in other dockets, the Consumer Advocate believes that the identification and unbundling of system costs is critical to ensure that the evaluation of proposed advanced rate designs proceed in a fair and transparent manner. As such, the Consumer Advocate believes that the Hawaiian Electric Companies should address, as part of their timeframes, whether they already track and collect the data necessary to inform the proposed rates, or whether additional data is necessary. The

³³ Consumer Advocate CBRE Phase 2 Comments, at 8-9.

³⁴ Letter to Commission from D. Brown, Subject: Transmittal No. 14-09 For Approval to Establish Schedule RP – Residential Prepaid Service Demonstration, Termination of Schedule RP Effective January 1, 2016, filed December 15, 2015. Based on footnote 2 of the letter, there were 10 participants in the program as of October 23, 2015.

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Consumer Advocate recognizes that the Hawaiian Electric Companies broadly categorized rate modifications into Implementable in the Near Term (2019-2020), MDMS to the End of Grid Mod Phase 1 (2021-2023), and After Grid Mod Phase 1 (2024 and beyond). The Consumer Advocate contends, however, that further detail regarding what unbundled data is currently available to inform near-term pricing proposals is necessary to address concerns that the timeframes proposed are reasonable and achievable.

Sincerely yours,


Dean Nishina
Executive Director

DN:ljt