WUTC DOCKET: UE-200900 UG-200901 UE-200894
EXHIBIT: ELJ-2
ADMIT ☑ W/D ☐ REJECT ☐

**Exh. ELJ-2**
**Dockets UE-200900, UG-200901, UE-200894**
**Witness: Elaine L. Jordan**

**BEFORE THE WASHINGTON**
**UTILITIES AND TRANSPORTATION COMMISSION**

| | |
|---|---|
| **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,**<br><br>**Complainant,**<br><br>**v.**<br><br>**AVISTA CORPORATION, d/b/a AVISTA UTILITIES,**<br><br>**Respondent.** | **DOCKETS UE-200900, UG-200901, UE-200894 (*Consolidated*)** |

**EXHIBIT TO**
**TESTIMONY OF**

**Elaine L. Jordan**

**STAFF OF**
**WASHINGTON UTILITIES AND**
**TRANSPORTATION COMMISSION**

***Excerpt of Jason Ball Testimony in 2019 PSE GRC (UE-190529)***

**April 21, 2021**

**Exh. JLB-1T**
**Dockets UE-190529 and UG-190530**
**UE-190274/UG-190275 (*consolidated*)**
**Witness: Jason L. Ball**

**BEFORE THE WASHINGTON**
**UTILITIES AND TRANSPORTATION COMMISSION**

| | |
|---|---|
| **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,**<br><br>**Complainant,**<br><br>**v.**<br><br>**PUGET SOUND ENERGY,**<br><br>**Respondent.** | **DOCKETS UE-190529 and UG-190530 *(Consolidated)*** |
| **In the Matter of the Petition of**<br><br>**PUGET SOUND ENERGY**<br><br>**For an Order Authorizing Deferral Accounting and Ratemaking Treatment for Short-life UT/Technology Investment** | **DOCKETS UE-190274 and UG-190275 (*consolidated*)** |

**TESTIMONY OF**

**Jason L. Ball**

**STAFF OF**
**WASHINGTON UTILITIES AND**
**TRANSPORTATION COMMISSION**

***Cost of Service***
***Rate Spread***
***Rate Design***
***Pricing Pilots***

**November 22, 2019**

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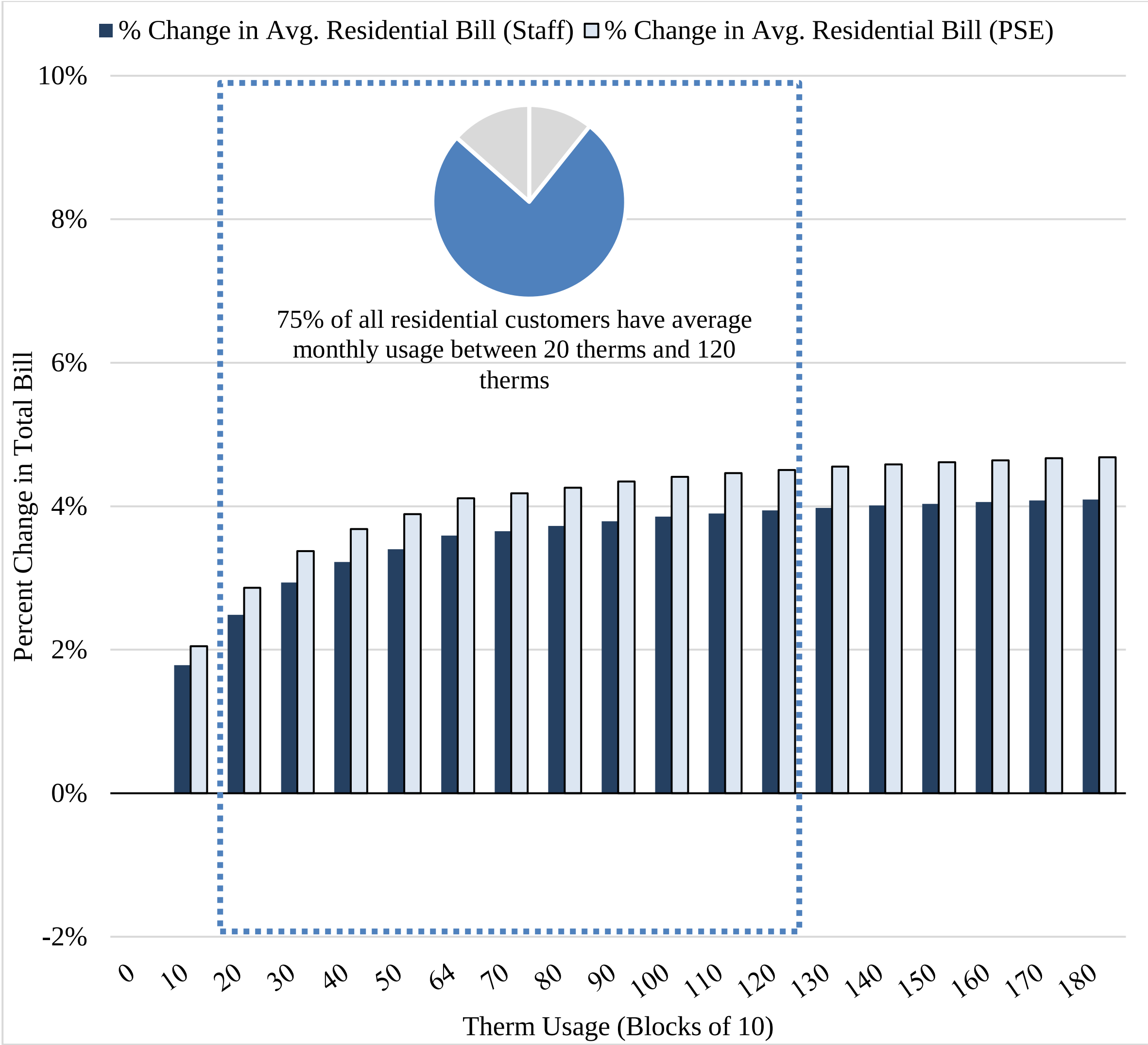


## IX. PRICING PILOTS

**Q. Please summarize your recommendations regarding pricing pilots for the Commission.**

A. In the present dockets, I recommend the Commission direct PSE to file a revised proposal for an electric Demand Aggregation Pilot Program based on Staff's proposed design and evaluation elements.[34] Further, I recommend that the Commission require PSE to prepare pilot programs for both electric time-of-use rates and electric critical-peak-pricing rates. I also recommend that the Commission direct PSE to engage with local resources, such as Pacific Northwest National Laboratory (PNNL), to evaluate the potential for a real-time pricing pilot program. Finally, I recommend that the Commission entertain deferred accounting treatment for expenses associated with developing and administering these programs.

**Q. What is a pricing pilot?**

A. A pricing pilot offers a unique price of electricity to a limited number of customers as an experiment with a rate structure. A common example is time-of-use rates. Pricing pilots allow a utility to gather data on things such as program costs and benefits, price responsiveness, and administrative complexity. Since pricing pilots typically rely on volunteers they offer a distinct advantage: the utility engages with the customers most willing to provide feedback and to tolerate fluctuations in program design. This allows the utility to evaluate potential benefits and to work out potential problems before making a decision on whether or not offer the price to the entire ratepayer population.

[34] I also recommend that the Commission set out the appropriate design and evaluation elements for evaluating pricing pilots.

**Q. How are you applying this definition to the present case?**

A. For the purposes of this case, I believe sufficient research exists on the potential benefits of several types of pricing.[35] Therefore, I limit my recommendations to those dynamic pricing structures which have already been reviewed or tested in other jurisdictions. This does not necessarily preclude, but does not directly include, the possibility of evaluating pricing structures that are in the early proof-of-concept stage. Rather, my recommendation recognizes the organizational and managerial burden that a pricing pilot can present.[36] As a whole, Staff's proposals are designed to reduce barriers to pricing reform, rather than exacerbate them.

**Q. How is the remainder of your testimony organized?**

A. My testimony related to pricing pilots has five sections.

1. The Need and Value of Pricing Pilots highlights industry changes and Washington state policies that require new and innovative rate designs.
2. The Design of Pilots summarizes the principles and development of pricing pilots.
3. The Evaluation of Pilots discusses the elements that should be included in the evaluation of pricing pilots.
4. PSE's Proposed Demand Aggregation Pilot discusses the Company's proposed pilot based on the previous three sections.

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[35] Ball, Exh. JLB-9, Time-Varying and Dynamic Rate Design, RAP, at 29-39.
[36] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 34-35.

5. Staff's Proposal to Develop Additional Pricing Pilots underscores the need for PSE to develop additional pricing pilots for both residential and commercial & industrial customers.

**Q. Overall, what principles should be used in the consideration, design, and evaluation of pricing pilots?**

A. Since pricing pilots are essentially about the *rates* that are offered to customers, it is useful to rely on principles that are fundamental to rate regulation. In 1961, James Bonbright offered a series of principles to consider when building rates. Indeed, both Piliaris and Taylor cite to these principles in their testimony for PSE.[37]

While these principles provide a useful guidepost for developing utility rates, they require updating for 21st century technology, customer expectations, and utility systems. The Rocky Mountain Institute (RMI) provides an excellent summary, detailed in the table below:[38]

**Table 6 - A 21st Century Interpretation of the Bonbright Principles of Public Utility Ratemaking**

| BONBRIGHT PRINCIPLES | 21ST CENTURY INTERPRETATION |
|---|---|
| ***Rates* should be practical, simple, understandable, acceptable to the public, feasible to apply – and free from controversy in their interpretation.** | *The customer experience* should be practical, simple, and understandable. New technologies and service offerings that were not available previously can enable a simple customer experience even if underlying rate structures become significantly more sophisticated. |

[37] Piliaris, Exh. JAP-1T at 16:3-10; Taylor, Exh. JDT-1T at 21:3-15.
[38] Ball, Exh. JLB-11, Rate Design for the Distribution Edge, RMI, at 38.

| | |
|---|---|
| ***Rates* should keep the utility viable, effectively yielding the total revenue requirement and resulting in relatively stable ash flow and revenues from year to year.** | *Rates* should keep the utility viable by encouraging economically efficient investment in both centralized and distributed energy resources. |
| ***Rates* should be relatively stable such that customers experience only minimal unexpected changes that are seriously adverse.** | *Customer bills* should be relatively stable even if the underlying rates include dynamic and sophisticated prices signals. New technologies and service offerings can manage the risk of high customer bills by enabling loads to respond dynamically to price signals. |
| ***Rates* should fairly apportion the utility's cost of service among consumers and should not unduly discriminate against any customer or group of customers.** | *Rate design* should be informed by a more complete understanding of the impacts (both positive and negative) of DERs on the cost of service. This will allow rates to become more sophisticated while avoiding undue discrimination. |
| ***Rates* should promote economic efficiency in the use of energy as well as competing products and services while ensuring the level of reliability desired by customers.** | *Price signals* should be differentiated enough to encourage investment in assets that optimize economic efficiency, improve grid resilience and flexibility and reduce environmental impacts in a technology neutral manner. |

I rely on these principles as I develop a framework for designing and evaluating pricing pilots.

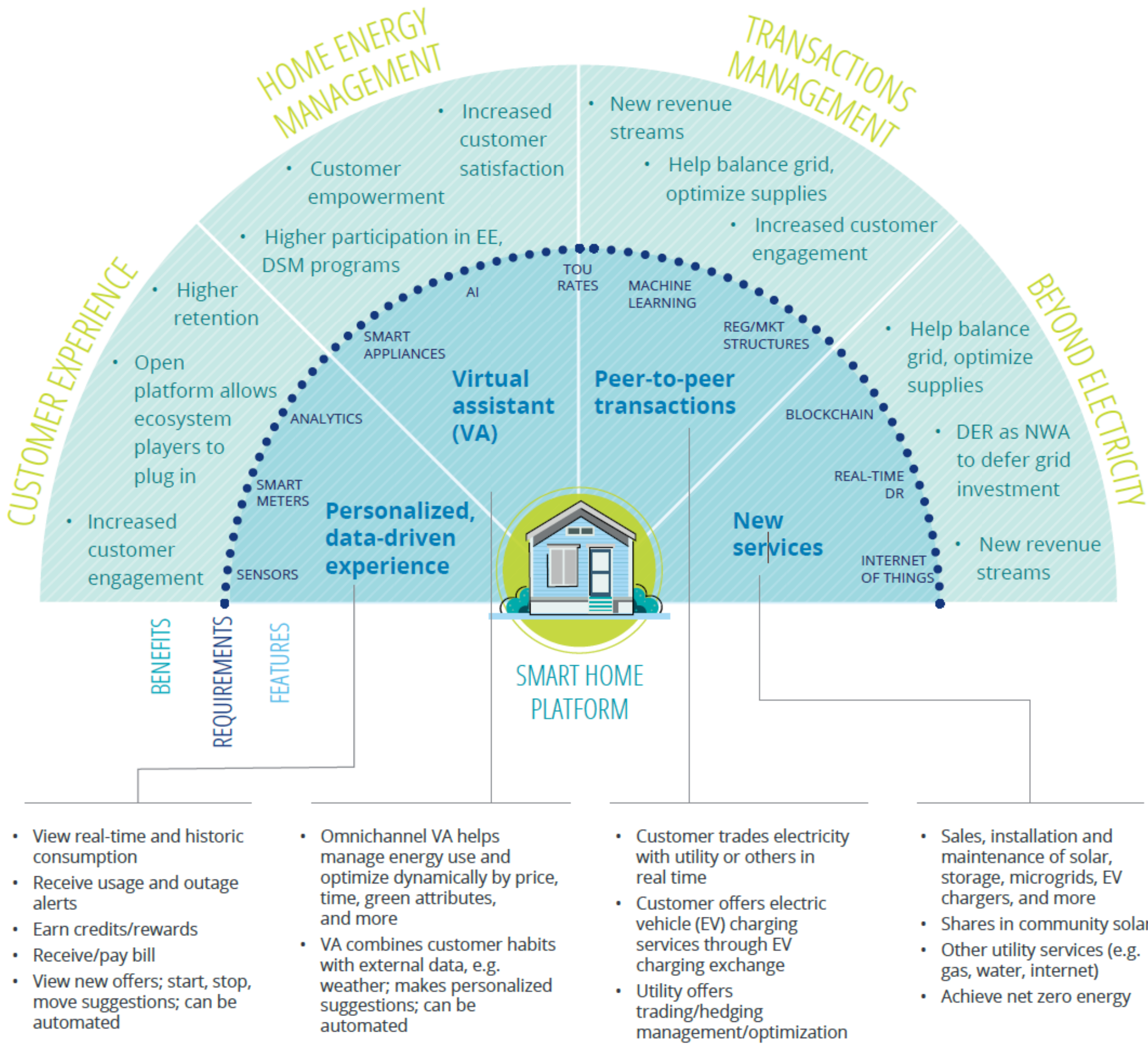
### A. The Need and Value of Pricing Pilots

**Q. Why are pricing pilots needed?**

A. Customer expectations regarding how they receive and pay for electricity are evolving. While this is a well-documented phenomenon, it is difficult to gauge what customers actually want when discussing the prices of electricity. This is because, in the aggregate, a customer's expectations simultaneously lag and drive customer demand. A clear example is the telecommunications industry following the invention of the smartphone. Customer expectations and their demand for smartphones shifted *after* the product first became available – the demand for smartphones was almost nonexistent before the apple iPhone.[39] However, once the iPhone appeared on the market, the customer demand for more variation lead to the most prolific marketplace for apps being owned a different company – Google.[40] As illustrated in the Figure 7 below, customer demand now shifts the product, but only after it has been digitized. Electricity, and its pricing, is going through the same phenomenon by virtue of customers demanding an improved customer experience.[41]

[39] Ball, Exh. JLB-12, Innovation in the Mobile Industry, at 12.
[40] *See generally* Wikipedia, Google Play Store (last visited Nov. 19, 2019), *available at* https://en.wikipedia.org/wiki/Google_Play
[41] Ball, Exh. JLB-13, Digital Innovation: Creating Utility of the Future, at 9.

**Figure 7 - Illustration of Grid Digitization Affecting Electric Customers**




**Q. What is the impact of changing customer expectations on electricity and its price?**

A. Again, it is useful to look at the telecom industry. The shift in customer demand following the invention of the smartphone charted a new course for software: in essence, customers increasingly expect to merge their virtual systems with their physical environment.[42] What started in the software sphere has migrated to the physical one, creating what is often called the internet of things (IoT). The IoT can be best be described as the physical manifestation of virtual products and services; for example "smart" speakers now can order products, switch on lighting, or place to-go orders all through voice or automated control.[43]

In the electricity industry, IoT has a different name: grid digitization. Just like the IoT, grid digitization is the physical manifestations of virtual products: things such as automated thermostat control based on GPS location, customer self-generation, or electric vehicles with batteries that can be used as demand response. Whether customer expectations have reached the point of driving these changes versus lagging them is difficult to say. However, if the customer expects the ability to control their bill, another principle of rate design, they will find the means to do so. In order to give the customer the options to control their bill, PSE needs to understand how and to what degree customers value different price signals.

**Q. What other changes in the utility industry create a need for pricing pilots?**

A. The utility operating environment is evolving as rapidly as customer expectations. Just like customers who want options, utilities want to maximize the value of their systems. A key, and relatively unexploited, element of this value is the exchange of information between the customer and the utility:

> IoT technology offers the possibility to transform agriculture, industry, and energy production and distribution by increasing *the availability of*

[42] Ball, Exh. JLB-14, The Internet of Things: Mapping the Value Beyond the Hype at 9.
[43] *Id.*

> *information along the value chain of production* using networked sensors.[44]

The value chain for a utility extends from the facility that generates electricity to the meter at which it is consumed. In the 20th century, miles separated these transactions and weeks separated the date of consumption and the bill that had a price signal. In the 21st century, energy can be generated mere feet away and prices can change in real-time. As a recent paper by RAP discussed:

> Pricing can be designed to reflect grid management needs at regional, utility, zonal, nodal and even circuit levels…What market designers and stakeholders need to do is develop markets on each scale that reward innovative solutions to provide energy and use transmission and distribution lines efficiently. Providing capacity alone is almost meaningless, because that only establishes a promise to be available, while energy and reserves are what are necessary to run the grid.[45]

Unfortunately, these possibilities have been limited primarily to avoid revisiting the principles of cost of service and rate design. This was seen when the Commission approved Avista's proposed electric vehicle charging pilot where the Commission refrained from determining if the proposed EV charging rates adhered fair, just, reasonable and sufficient standard.[46] Instead the Commission approved a pilot to gather more information on the pricing structure, in order to judge what level of rates would be appropriate. The implicit acknowledgement of this order is that pricing should not act as a barrier to grid evolution. Instead, the price of electricity should

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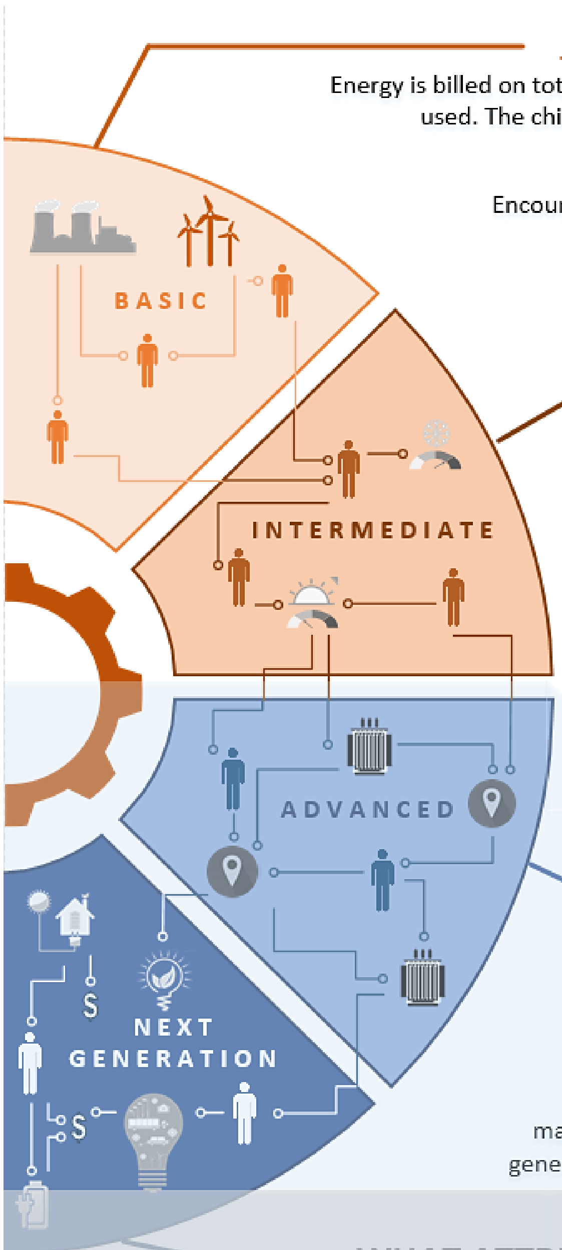
[44] Ball, Exh. JLB-15, The Internet of Things: An Overview, at 10 (emphasis added).
[45] Ball, Exh. JLB-16, Flexibility for the 21st Century Power System, at 18.
[46] As the Commission noted, "Staff and stakeholders agree with Avista that the unknown utilization of the planned charging stations is a barrier to designing cost-based rates. Avista further contends that a cost-based rate may not be competitive with the market, and could inhibit use of DC fast chargers and EV adoption in Avista's service territory. Until more information becomes available, we find it reasonable to adopt a market-based rate for DC fast chargers in the Pilot Program." - *Wash. Utils. & Transp. Comm'n v. Avista Corp.*, Docket UE-160082, Order 01, at 6 ¶ 20 (Apr. 28, 2016).

meet the expectations for a positive customer experience and economically efficient rates.

**Q. Do the objectives of rate design you discussed previously support the need for pilot programs?**

A. Yes. As I discussed above, electricity pricing exists across four tiers: how much is consumed, when it is consumed, where it is consumed, and what is consumed. I have updated the graphic I used above to identify what is possible with the pricing pilots PSE and Staff are proposing:

**Figure 8 - Updated Tiers of Energy Consumption**




## HOW MUCH ENERGY IS CONSUMED?

Energy is billed on total usage. This is the traditional method and is still widely used. The chief advantage of prices with this information is simplicity.

**BENEFITS**

Encourages lower energy usage by reducing total bills.

**EXAMPLES**

Per-kWh Charges, Inverted Blocks, and NCP-Demand Charges.

## WHEN IS ENERGY CONSUMED?

Energy consumption is a matter of timing. This form recognizes the different costs of energy production at different times of day.

**BENEFITS**

Reduces powers costs at peak-times by incenting customers to change when they use electricity

**EXAMPLES**

Time-Of-Use (TOU), Critical Peak-Pricing, and CP-Demand Charges.

## WHERE IS ENERGY CONSUMED?

Energy consumption is about location. Different areas may have attributes that contribute differently to the production of electricity.

**BENEFITS**

Reduces system costs by managing consumption and generation at a granular level.

**EXAMPLES**

Locational Marginal Pricing (LMP) and Real-Time Pricing.

## WHAT ATTRIBUTES OF ENERGY ARE CONSUMED?

The next evolution of the Grid assigns costs to micro-transactions. This allows the platform provider, a utility, to enable services across multiple vectors. This includes: competitive alternatives, local micro-grids, IoT integration, and more.

**BENEFITS**

The utility provides services that can be used to meet many different types of needs based on multiple factors

**EXAMPLES**

Transactional Energy and New York REV

As this figure shows, Staff's and PSE's proposed pilot programs fall in the second "intermediate" category. Further, Staff is recommending the Company engage with PNNL to evaluate the value of real-time pricing. Depending on how such a pricing pilot is implemented, this may be in the "intermediate" or "advanced" tier.

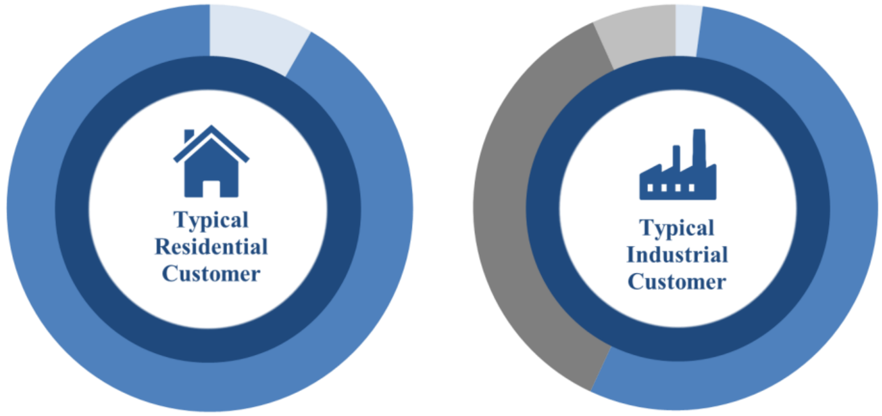
The final tier, "next generation," which answers the question what attributes of energy are consumed, is not relevant in the near term. In essence, this question looks at utilities as a pipeline through which price signals travel up and down the supply chain of electricity. Different prices for the individual attributes of electricity supply allow more efficient optimization of each individual element. An example of this is the potential savings from Volt-VAr optimization, which is a disaggregation of pricing information for the utility.[47] However, this kind of optimization requires a more mature form of grid digitization before it can be implemented. In the near-term, pricing pilots can improve the current rate structures, which are in the "basic" tier and those perform poorly at providing accurate price signals.

**Q. Why do the current rate structures perform poorly at providing accurate price information?**

A. Traditional rate design relies on average cost pricing, with little to no variation based on the time of use or location of consumption. The graphic below shows the few elements in a bill for a PSE customer.[48]

[47] Ball, Exh. JLB-17, Volt-VAr Optimization Benefits, at 1.
[48] Based on graphic in Ball, Exh, JLB-11, Rate Design for the Distribution Edge, RMI, at 12.

**Figure 9 - Graphical Depiction of PSE Bill Elements**




| | |
|---|---|
| BASIC CHARGE | Single rate that does not vary month-to-month. Includes billing and metering costs |
| ENERGY CHARGE | Billed rate for energy usage and generally includes costs that, from a utility perspective, are "fixed" |
| DEMAND CHARGE/ REACTIVE POWER | Billed rate that varies with actual demand. Generally is based on peak demand from the customers perspective, rather than when the utility is experiencing its peak as whole |

Each element of these bills closely relate to the level of consumption, the "how much is used" tier, rather than the advanced "when" or "where" tiers. However, even the level of consumption is poorly communicated. For example, PSE's current residential tariff charges for electricity on a per-kWh basis across two blocks of usage. All 1.01 million residential PSE customers on the same tariff pay the same price for the 601st kWh that they pay for the 10,001st kWh.

**Q. Does the lack of accurate pricing information in the current rate structures also affect Commercial & Industrial (C&I) customers?**

A. Yes, but it is more a question of willingness to participate. As discussed by the Rocky Mountain Institute, large customers have historically had more sophisticated billing structures.[49] When queried about requests for new pricing pilots, PSE responded:

> Puget Sound Energy ("PSE") has ongoing dialogue with its largest customers, many of whom have multiple locations throughout the utility service area and who, through those discussions, complain, comment and/or generally request pricing structures that are more reflective of the nature of the service provided to them by PSE. The concept underlying the proposed pilot in this case has been discussed with one PSE customer, in particular, for several years and would be responsive to many of the general types of comments heard from similarly situated customers served by PSE.[50]

**Q. If C&I customers already have more sophisticated pricing, how can they benefit from new pricing pilots?**

A. As was done in the 20th century, 21st century prices for C&I customers should align with the incentives of the utility.

> Consider that under most market structures firms are rewarded for increasing the utilization of their existing capacity. In the power sector, this means that profitability will increase as system load factors (the ratio of total consumption to maximum potential consumption, given actual peak demand) increase. As a practical matter, this is achieved through the shifting of on-peak demand to off-peak hours, when marginal costs are lower. Total system costs will be lower as well; everyone is better off. But what if on-peak demand is served by low- or non-emitting resources and off-peak demand is served by highly polluting ones? This is precisely the conundrum faced at times in places where on-peak usage may be met at the margin by natural gas and hydro-electric production, while off-peak

[49] Ball, Exh. JLB-11, Rate Design for the Distribution Edge, RMI, at 12.
[50] Ball, Exh. JLB-4, Company's responses to various data requests, at 3.

> usage variations are often served by ramping the output of coal-burning plants up and down.[51]

The pricing structures for most C&I customers have traditionally aligned with the incentive structure the utility faces. This is seen in the relevant demand charges, whereas residential customers typically only have energy based rates. Since higher load factors could drive down utility *average* costs, utilities build the demand rate to incentivize flatter load curves. This works well when utilities rely on large, baseload generating resources located miles away from the actual point of sale.[52] However grid digitization, and especially distributed energy resources, disrupt this model since they are physically closer to the actual consumption of electricity.

**Q. What benefit does the combination of pricing pilots and distributed energy resources provide?**

A. Recent legislation requires utilities to obtain clean energy and references DER in multiple places.[53] Pricing pilots are a hidden complement to DER, with value streams that support, rather than inhibit, each other. The table below, provided by RMI, illustrates this point. [54]

[51] Ball, Exh. JLB-9, Time-varying and Dynamic Rate Design, RAP, at 7 n. 4.
[52] *Id.*
[53] *See e.g.*, RCW 19.405.020; RCW 19.280.030(1)(h); RCW 19.280.100.
[54] Ball, Exh. JLB-11, Rate Design for the Distribution Edge, RMI, at 11.

**Table 7 - Distributed Energy Resources (DERs)**

| Definition | | Examples | Variable Output | Controllable |
|---|---|---|---|---|
| **Efficiency** | Technologies and behavioral changes that reduce the quantity of energy that a customer needs to meet all of their energy-related demands. | LED light bulbs | | |
| | | High-efficiency appliances | | |
| | | Building shell improvements | | |
| **Distributed generation** | Small, self-contained energy sources located near the final point of energy consumption. | Solar PV | ✓ | |
| | | Combined heat & power | | |
| | | Small-scale wind | ✓ | |
| **Distributed flexibility & storage** | Technologies that allow the overall system to use energy smarter and more efficiently by storing it when supply exceed demand, and prioritizing need when demand exceeds supply. | Demand response | | ✓ |
| | | Eclectic vehicles | | ✓ |
| | | Thermal storage | | ✓ |
| | | Battery storage | | ✓ |
| **Distributed intelligence** | Technologies that combine sensory, communication, and control functions to support the electricity system and magnify the value of DER system integrations (e.g. islandable microgrids, connected thermostats, EV chargers, and water heaters). | Microgrids | | ✓ |
| | | Home-area network & smart devices | | ✓ |
| | | Smart inverter | | ✓ |

In short, the 20th century grid paired *controllable* generation with *variable* load. The 21sth century grid flips this paradigm and pairs *variable* generation with *controllable* load. Pricing pilots can evaluate this paradigm for potential savings that reduce overall system costs.

**Q. How can pricing pilots reduce overall system costs?**

A. Pricing pilots, and by extension their application to the general ratepayer population, have the potential to significantly reduce energy consumption. For example, an international study on dynamic pricing, conducted across 163 pricing treatments in seven countries found:

> The amount of demand response increases as the peak to off-peak price ratio increases but at a diminishing rate. When coupled with enabling technologies, price responsiveness increases even more. Of course, there are many drivers of demand response besides the price ratio. The length of the peak period, number of pricing periods, climate, and appliance ownership can all affect the average customer response during the peak period. Additionally, the marketing of dynamic pricing rates has a tremendous impact on customer response, for customer awareness and education is critical to the success of time varying pricing. Finally, the section of customers into time-varying rate experiments can affect the results of these studies. Because we were unable to control for these factors in this initial analysis, there are some outliers in our dataset which require further inspection. **Even then, the surprising amount of consistency in the results shows that utilities and policymakers can be confident that dynamic pricing and time-of-use pricing will yield significant load reductions.**[55]

The authors found that "[o]ur analysis supports the case for the rollout of dynamic pricing wherever advanced metering infrastructure is in place."[56]

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[55] Ball, Exh. JLB-18, International Evidence on Dynamic Pricing, at 16. (emphasis added)
[56] *Id.* at 1.

**Q. How does the deployment of AMI support the need for pricing pilots?**

A. The granular data about electrical consumption gathered by AMI infrastructure allows utilities to improve price signals and by extension the customer experience. At the same time, the offering of advanced pricing options is a critical component of realizing the full benefits of AMI infrastructure. For example:

> With the use of new technologies, savings can be determined in near-real time to benefit a range of stakeholders and provide a baseline consistency across applications… These efforts hold great promise for facilitating deeper energy efficiency savings through better customer engagement, program optimization, and potentially increased accuracy and certainty in savings determination.[57]

**Q. Does the Commission have existing guidance on pricing pilots?**

A. No. However, the Commission does have a policy statement on pricing in general:

> The Commission expects that time-of-use metering and rate designs will be examined on a case-by-case basis in rate investigations or other proceedings considering the varying circumstances of each utility and each utility's customer classes.
>
> The Commission will consider a broad range of factors when examining advanced metering and rate design proposals. The factors most pertinent to any case, and the manner in which such factors are appropriately evaluated, will depend on the specific details of proposals and may change over time with changing circumstances, loads, and technologies.[58]

In essence, the Commission has stated a preference for flexibility over hard-and-fast rules. Pricing pilots align with this preference by examining the specific characteristics of improve rate design to meet the needs of the utility's customers.

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[57] Ball, Exh. JLB-19, The Status and Promise of Advanced M&V, at 27.

[58] *In re the Comm'n's Investigation of Pub. Util. Regulatory Policies Act Standards Pertaining to Smart Metering and Time of Use Rates*, Docket UE-060649, Interpretative and Policy Statement, 10, ¶¶ 32-33 (Aug. 23, 2007).

**Q. Should the Commission update this guidance?**

A. Yes. As I discuss in the next two sections, I recommend the Commission provide direct guidance to PSE on what needs to be included in a pricing pilot. This allows the utilities to know what the Commission expects to see in the design and evaluation of pricing pilots.

**Q. Please summarize the need for pricing pilots as well as updated Commission guidance.**

A. As utilities consider how they will comply with new energy laws and state policy, they will need to gain experience with the options provided by new technology. In particular, Grid Digitization will disrupt older rate structures that are out of step with 21st century principles. Without guidance, utilities will face uncertainty for future pricing proposals. This uncertainty creates regulatory risk that may have a chilling effect on examining rate design options for complying with new laws and policies. Most importantly, this guidance is needed immediately so that utilities can begin collecting information. Since pricing pilots generally need a few years to complete, it is better that PSE begin them now rather than wait until it is too late to reap the benefits.

### B. The Design of Pricing Pilots

**Q. What elements of design should be included in a proposal for a pricing pilot?**

A. I reviewed several sources and relied on the updated principles of Bonbright to determine common design components for pricing pilots. I have summarized eight elements across three categories that I believe are critical to the design of a pricing pilot.

**1. GOALS: What is the purpose of the pricing pilot?**

a) Pricing pilots should utilize Specific, Measurable, Achievable, Relevant, and Time-Bound (S.M.A.R.T.) goals. This ensures that a program is clear, defined, and has identifiable results.[59]

b) Pricing pilots should be both practical and understandable. Developing complex pricing structures cannot be done in a vacuum; customer expectations and engagement need to be taken into account. The pricing pilot should be accessible to customers and not, by virtue of its design, present a barrier to participation in dynamic pricing.

**2. STRUCTURE: What are the components of the pricing pilot?**

a) Pricing Pilots should be designed to provide a meaningful signal. Ideally, all of the tiers of electricity consumption should be reflected in the pricing pilot (How much energy is used, when energy is used, where energy is used, and what is used). The pilot should clearly articulate how and why it is addressing some or all of these tiers.

b) Pricing pilots should be based in cost causation. Rates cannot be divorced from their legal and regulatory underpinnings. Therefore, the *starting place* for any rate should be the underlying cost drivers.

c) Pricing pilots should be feasible to implement. The design of a pricing pilots should not itself be a barrier to success.[60]

**3. ADMINISTRATION: How is the pricing pilot administered?**

a) Pricing Pilots need to have Internal Validity. The pricing pilot, as a sample of the broader ratepayer population, must have statistically valid

[59] Ball, Exh. JLB-9, Time-varying and Dynamic Rate Design, RAP, at 40-41. Staff introduces S.M.A.R.T. goals here as an addition to RAP's recommendations to guide the creation of "ratemaking objectives."
[60] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 35-36.

roots. Clear program design with transparency in assumptions will help the utility, regulator, and customer make better choices.[61]

b) The pricing pilot should have consistent and regular reporting. Communication between regulators, stakeholders, and the utility is critical to ensuring a successful pricing pilot.[62]

c) The pricing pilot should prioritize customer engagement and communication. A successful program will engage and communicate information to consumers in an effective manner so as to improve the overall experience.[63]

## C. The Evaluation of Pricing Pilots

**Q. How should a pricing pilot be evaluated?**

A. I reviewed several sources to develop general evaluation protocols. This is not meant to be an exhaustive list but instead should serve as a minimum guide reviewing a pricing pilot. The Commission should review any pilot for:

**1. STUDY FINDINGS**

a) A clear summary of findings and recommendations going forward especially in relation to S.M.A.R.T. goals.
b) Communications with study participants and specific suggestions for improvement.
c) Generalization of findings and their applicability to broader ratepayer population, including the amount and degree of participation required for a cost-effective program.[64]

[61] *Wash. Utils. & Transp. Comm'n v. Puget Sound Energy*, Dockets UE-011570 & UG-011571, Twelfth Supplemental Order, 16, ¶¶ 33-34 (June 20, 2002) (2001 TOU Order). Ball, Exh. JLB-20, Experiences of Vulnerable Customers, Lawrence Berkeley National Laboratory, at 65.
[62] 2001 TOU Order at 16, ¶¶ 33-34.
[63] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 35.
[64] 2001 TOU Order UE-011570 at 16, ¶ 34

d) Measurement of effect on vulnerable populations and recommended mitigation strategies.[65]

**2. DEVELOPMENT AND ADMINISTRATION OF STUDY**

a) Discussion of any type of assumptions made in the design, application, or analysis of pricing pilots.[66]
b) Overview of data collection needs and methods.[67]
c) Discussion of education and outreach efforts with customers including:[68]
    a. Education efforts, with particular focus on those designed to increase customer acceptance and retention, engagement, satisfaction, and knowledge of rates.[69]
    b. Delivery channels.
    c. Customer reception to information, their overall feedback, and their suggestions for improvements.[70]
    d. Engagement specific to vulnerable populations.
d) Refinements or other changes made to the study and program during its operation.

**3. PROGRAM COSTS AND BENEFITS**

a) Statistical review of costs and benefits to customers in comparison to a control group or other statistically valid sample of behavior from customers with default electricity rates. This should include: [71]
    a. Distribution of bill impacts associated with pilot rates for various customer segments.
    b. How load impacts vary by rate period and selected customer segments.
    c. How load impacts vary by different areas, such as climate or rural/non-rural boundaries.
    d. Review of vulnerable customers in relation to other customer groups and the distribution of bill impacts.[72]
b) Summary of costs and benefits to the utility in comparison to an appropriate baseline, such as the most recent Integrated Resource Plan, including:

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[65] Ball, Exh. JLB-20, Experiences of Vulnerable Customers, Lawrence Berkeley National Laboratory, at 90.
[66] 2001 TOU Order at ¶ 34.
[67] *Id.*
[68] Ball, Exh. JLB-21, Nexant Report on TOU Pricing Opt-In Pilot Plan, at 11.
[69] *Id.* at 83.
[70] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 34.
[71] Ball, Exh. JLB-21, Nexant Report on TOU Pricing Opt-In Pilot Plan, at 80-81.
[72] Ball, Exh. JLB-20, Experiences of Vulnerable Customers, Lawrence Berkeley National Laboratory, at 63.

a. The costs and benefits of the program to the utility.
b. Pricing pilot software and/or physical integration requirements and costs.[73]
c. Existing capabilities of required operating systems, limitations, and potential barriers to expansion.[74]
d. Effects, if any, on long-term planning requirements.

c) Overall effects on peak and energy consumption including:
a. Methods for measurement and verification of energy savings and reduction in peak usage.[75]

d) Summary of Regional benefits of program, including quantifiable factors such as reductions to GHG's, air benefits, etc.[76]

e) Customer acceptance/complaints, and satisfaction with program participation.[77]

**4. <u>PROGRAM RISKS</u>**

a) Sensitivity of program outcomes to periods of wholesale price stability or instability.[78]

b) Summary of relationships with vendors directly or indirectly related to program and any risks from their software on the operations of the general program.[79]

c) Customer outreach and engagement associated with a broader default participation rate, such as availability of call centers.[80]

d) Privacy implications from customer participation and methods to ensure security of consumer information.

**Q. Over what timeline do you recommend evaluating a pricing pilot?**

A. I recommend that utilities provide the Commission with annual updates on the pricing pilots. Utilities should also present the full evaluation, including all the

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[73] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 17-18.
[74] *Id.*
[75] *"For example, how does more-timely continuous savings feedback impact savings realization and customer experience? What types of facilities and measures do M&V 2.0 tools work well for, and where is additional human expertise required? What are the tradeoffs between time, cost, and accuracy?"* Ball, Exh. JLB-19, The Status and Promise of Advanced M&V, at 24.
[76] 2001 TOU Order UE-011570 at ¶ 34.
[77] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 25-29.
[78] 2001 TOU Order UE-011570 at ¶ 34.
[79] Ball, Exh. JLB-10, Experiences from Consumer Behavior Studies on Engaging Customers, DOE, at 35.
[80] *Id.* at 28

criteria above, to the Commission upon completion of the pilots. I also believe the Commission should express a preference for pricing pilots that last no more than three years. This should provide an adequate amount of time to collect data on the effects of dynamic rate structures.

### D. PSE's Proposed Demand Aggregation Pilot

**Q. Please describe the Company's proposed Demand Aggregation Pilot Program.**

A. The Company's proposal unbundles power cost in the demand rate for large customers served at multiple locations. This is accomplished through three steps:

1. Demand is determined across all locations where a particular customer receives service.
2. Demand at all locations measured at the time of the system peak, called Coincident Peak (CP) Demand, is billed at a rate that includes power generation and transmission costs only.
3. Demand for all locations measured individually at the time of maximum usage, called Non-Coincident Peak (NCP) Demand, is billed at a rate that includes all other costs, such as distribution facilities.

The Company proposes that the pricing pilot begin January 1, 2021.

**Q. What is Staff's recommendation regarding the Company's proposed Demand Aggregation Pilot Program?**

A. I recommend the Company file a revised proposal that incorporates Staff's proposed design and evaluation elements. Staff supports in concept the Company's proposal to unbundle demand for customers served at various locations. This type of demand charge is a clear application of cost causation and from within the "intermediate" tier of energy consumption. Further, this proposal fits well with the 21st century version of Bonbright's principles. For instance, the Company discussed that larger customers "consider themselves one customer of PSE, not many."[81] In essence, these customers want a cleaner *customer experience*.

**Q. Does the design of the Company's proposed Demand Aggregation Pilot fit with the design requirements you proposed earlier?**

A. It is difficult to say. While the Company certainly characterizes this as a pricing pilot, PSE's direct testimony and responses to data requests seem to indicate that the Demand Aggregation Pilot is simply an update to certain aspects of rate design. For instance, there is no limit on the participation of customers that are involved in the electrification of transportation.[82]

PSE's design seems to suffer from unclear goals: Who is the target audience? What is the pricing pilot trying to measure? What will benefits will be measured against? How will customer education and outreach be conducted? The answers to these question are all unclear. The Company cites several hypothetical reasons for

[81] Pilaris, Exh. JAP-1T at 31:13-14.
[82] There are, however, limits for other customers including a maximum participation rate. *See* Pilaris, Exh. JAP-1T at 33:11-35:6.

Demand Aggregation Pricing, such as removing demand barriers to electrification of vehicle. However, when queried for more information, the Company simply cited their testimony.[83]

Further, when queried about how many customers would participate, the Company responded that the answers to these questions are currently unclear.[84] This makes judging the pricing pilot, and measuring its practicality, relationship to cost-causation, or level of internal validity uncertain.

**Q. Is the Company's proposed evaluation of the Demand Aggregation Pilot sufficient to meet the evaluation you proposed earlier?**

A. No. The Company makes little to no mention of how it will evaluate the program, how the goals of the program will determine its success, or the proposed process for reviewing the pricing pilot. When queried, the Company responded that:

> PSE would further note that it is proposing this program as a pilot and, as such, this could potentially include a review of how this pricing structure helps increase electric vehicle adoption.[85]

This is another example of how the Company's proposal has failed to establish S.M.A.R.T. goals or how it will evaluate them. Without these goals, the company and the Commission will have difficulty judging the program objectively.

### E. Staff's Proposal to Develop Additional Pricing Pilots

[83] Ball, Exh. JBL-4, Company's responses to various data requests at 4.
[84] *Id.* at 5.
[85] *Id.* at 6.

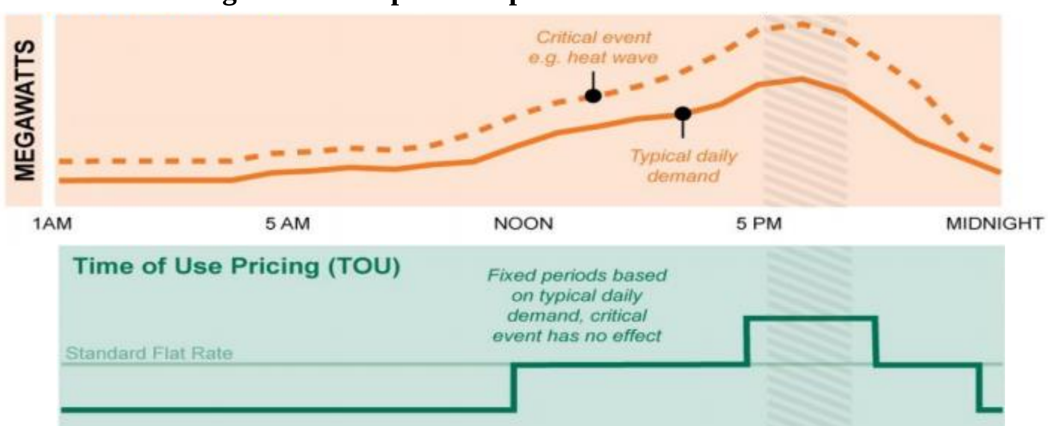
**Q. Does you have any additional recommendations regarding pricing pilots for PSE?**

A. Yes. I recommend that the Commission require PSE to prepare pricing pilots for both an electric time-of-use rate and an electric critical-peak-pricing rate. I also recommend that the Commission direct PSE to engage with local resources, such as PNNL, to evaluate the potential for a real-time pricing pilot.

**Q. What is a time-of-use (TOU) rate?**

A. A TOU rate is a structured price that is pre-determined but changes during set periods. These periods can include seasons, months, weeks, days, or hours. Generally, TOU rates are designed to encourage customers to shift electricity usage away from peak periods. Ideally, TOU rates have a ratio between peak and non-peak rates of at least 2:1.[86] The graphic below illustrates how TOU pricing works.[87]

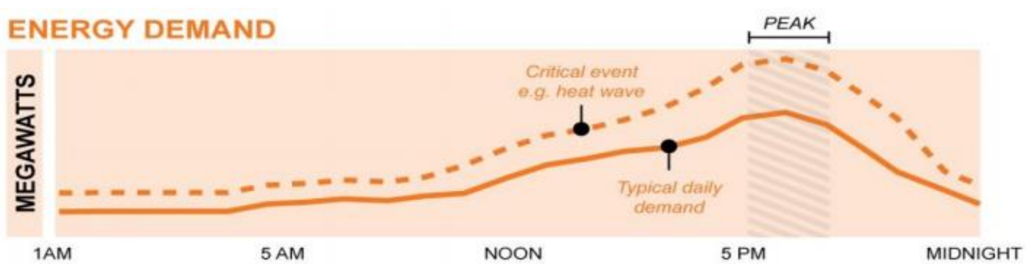
**Figure 10 - Graphical Depiction of Time-of-Use Rates**




[86] Ball, Exh. JLB-18, International Evidence on Dynamic Pricing, at 7.
[87] Ball, Exh. JLB-22, A Primer on Time-Variant Electricity Pricing, EDF, at 10.

**Q. What is a Critical-Peak Pricing (CPP) rate?**

A. A CPP has a structured base rate as well as a large "surge" price during critical pricing events. Before such an event, usually somewhere between a day and an hour, the utility provides CPP participants a warning about the upcoming pricing period. During the event period, the "surge" price is added to energy usage. This is designed to significantly reduce usage during the peak period. Ratios between "surge" prices and base rates can be as large as 20:1.[88] The graphic below illustrates how CPP

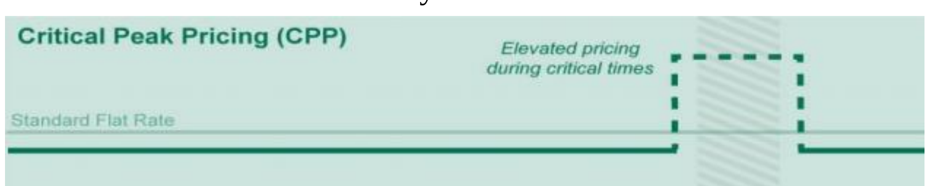



pricing works.[89]

**Figure 11 - Graphical Depiction of Critical Peak Pricing**

**Q. Why is Staff recommending that the Company begin <u>both</u> a TOU and CPP pricing pilot?**

A. Rate structures should reflect the reality of customer behavior: customers value price




signals when consuming electricity.[90] TOU and CPP pricing pilots can gauge the amount of responsiveness that actual customers in PSE's service territory will have

[88] Ball, Exh. JLB-18, International Evidence on Dynamic Pricing, at 7.
[89] Ball, Exh. JLB-22, A Primer on Time-Variant Electricity Pricing, EDF, at 10.
[90] *See generally* Ball, Exh. JLB-11, Rate Design for the Distribution Edge, RMI.

to various, time based, price signals. Unfortunately, the current rate design recognizes only the "basic" tier of energy consumption and largely ignores the "intermediate" and "advanced" tiers.

**Q. How can Customers be empowered to respond to price signals?**

A. Customer education about the intersection between energy usage and price is a critical conversation. Unfortunately, because few customers would be able to say with any accuracy how much energy each electric device in their household consumes, they are unable to apply a optimize decisions to engage in the use of electricity (e.g. turning on a light, leaving on a computer, increasing the temperature of a water heater, etc.). Consequently, it isn't until after the billing period is over that a customer knows which level of pricing they were paying for the additional kilowatt-hours.

**Q. How does providing TOU and CPP pricing pilots meet the needs of evolving customer expectations?**

A. As virtual software and services become increasingly incorporated in the physical world, the options for customers to fine-tune and control electricity consumption will continue to expand. As RMI puts it:

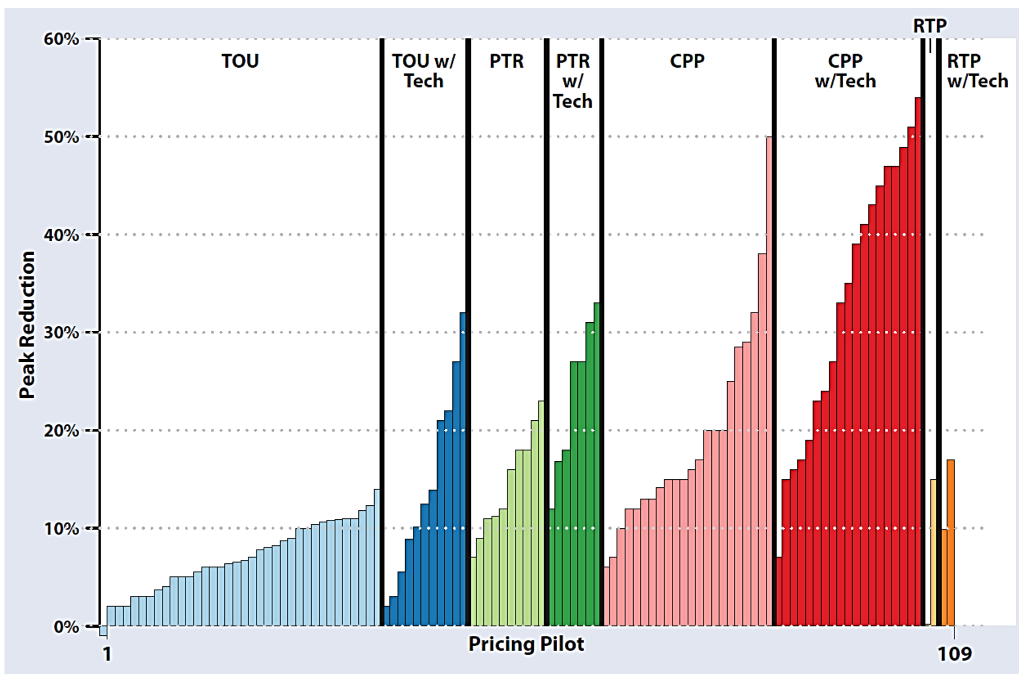
> Customers will respond to these new price signals by shifting their load profile to take advantage of periods of low-cost grid service while making more targeted investments in DERs that can provide greater value to the grid. This combination of price signals beneficially shifting load (such as through home pre-cooling, water heater cycling, and strategic electric vehicle charging) and more optimally directing DER investment can reduce the need for rarely

> utilized peaking generation units, reduce system congestion, and defer distribution upgrades. To achieve this vision, regulators need to establish processes to lead stakeholders through the transition from today to tomorrow.[91]

**Q. What are the expected benefits of a TOU and CPP pricing pilot?**

A. The Regulatory Assistance Project did a review of Time-Varying and Dynamic Rate Design across 109 different pilots:[92]

**Figure 12 - Average Peak Reduction from Time-Varying Rate Pilots**




As this study illustrates, all but one of the pricing pilots resulted in peak reductions. CPP in particular resulted in significant peak reductions, with two reducing peak consumption by over 50 percent.

[91] Ball, Exh. JLB-11, Rate Design for the Distribution Edge, RMI, at 18.
[92] Ball, Exh. JLB-9, Time-varying and Dynamic Rate Design, RAP, at 30.

Further, both Washington State policy and industry literature points towards a distributed energy future. All utilities, including PSE, should be exploring multiple pathways to support the State's energy goals. This is especially true if that pricing can result in significant reductions in peak usage.

Finally, State policy also supports electric vehicle transportation. As the Company acknowledges there is a need for "an array of approaches" that "will ultimately be necessary to fully support the state's policy objectives for promoting transportation electrification."[93] TOU and CPP pricing pilots may help alleviate some of the demand charge problem that electric vehicle charging infrastructure is facing.[94]

**Q. Are other utilities in the Northwest engaging in these types of Pilots?**

A. Yes. Portland General Electric began offering Flex 1.0 in 2015, which included a variant on CPP called Peak Time Rebate. In early 2019, the Oregon Commission approved a permanent version of the program going forward.[95] Seattle City Light is also planning to offer several pricing pilots, including a residential time-of-use pilot and industrial demand response pilot.[96] Across the country, multiple utilities have engaged in pricing pilots to determine the impact and value of different price structures.[97]

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[93] Ball, Exh. JLB-4, Company's responses to various data requests, at 7.
[94] Ball, Exh. JLB-23, EVGO Fleet and Tariff Analysis, RMI, at 5.
[95] Ball, Exh. JLB-24, Oregon Commission Acknowledgement of PGE Pilot, at 1.
[96] Ball, Exh. JLB-25, Memo to Mayor's Office from Seattle City Light, at 1-2.
[97] Ball, Exh. JLB-26, Advancing the Practice of Rate Design, at 7.

**Q. Does PSE support a proposed CPP Pilot program?**

A. PSE has stated that they are "open to exploring the possibility of a pilot program."[98]

**Q. Do you have any other recommendations?**

A. Yes. First, the Commission should require PSE to explore more advanced forms of pricing structures. In 2006 – 2007, the Pacific Northwest National Laboratory ran a very successful demonstration project to "create and observe a futuristic energy-pricing."[99] The project illustrated several benefits that real-time market based pricing can produce. Given that this project is now over 10-years old, I recommend PSE work with PNNL to evaluate whether an additional pilot is warranted and what it could accomplish.

Second, I recommend the Commission entertain future accounting petitions for costs associated with setting up and administering these programs. As discussed by Staff witness Aimee Higby, the Commission generally grants accounting petitions based on extraordinary circumstances.[100] As I discuss in Part A above, broad changes in the utility industry are driving the need for pricing pilots. These changes, I believe, constitute circumstances that may merit extraordinary rate treatment. Further, I believe it is necessary to remove any financial barrier a Company may have to engaging in pricing pilots.

[98] Ball, Exh. JLB-4, Company's responses to various data requests, at 8.
[99] Ball, Exh. JLB-27, PNNL Olympic Peninsula Project, at 7.
[100] Higby, Exh. ANH-1T at 28:15-18.

**Q. Please summarize your recommendations regarding pricing pilots for PSE.**

A. I recommend the Commission direct PSE to: 1) file a revised proposal for an electric Demand Aggregation Pilot Program, 2) prepare pricing pilots for both electric TOU and CPP rates, and 3) engage with local resources, such as PNNL, to evaluate the potential for a real-time pricing pilot. I also recommend the Commission entertain deferred accounting treatment for expenses associated with developing and administering these programs.

These recommendations in total address the current issue facing customers: they do not know what their usage or associated bill will be at the "point of sale"—i.e., when they make a decision to use electricity or not. Thus, the impact of any price signal will be muted since it is disconnected, in real time, between the decision to consume electricity and the actual consumption of electricity. In general, this leads to an oversimplified rate structure and, counterintuitively, a complicated customer experience. Staff's recommendation will allow PSE to address this issue, explore pathways to complying with new energy laws, and meet evolving customer expectations.

Without guidance from the Commission on the design and evaluation of pricing pilots, utilities will face uncertainty when proposing dynamic pricing structures. Such uncertainty creates regulatory risk that may prevent innovative rate designs from being offered to customers. Staff recommends the Commission give direct guidance to PSE so that they can immediately begin developing and offering pricing pilots.

**Q. Does this conclude your testimony?**

A. Yes.