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**From:** Shawn Koorn, HDR  
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**Subject:** SPU Retail Wastewater Rate Structure Review

## Introduction

HDR Engineering, Inc. (HDR) was retained by Seattle Public Utilities (SPU) to assist in the review of its retail water cost allocation as well as the water and wastewater rate structures. This memo will discuss the review of SPU's retail wastewater rate structure. This memo will compare and contrast SPU's current rate structures with industry trends and other comparable utilities. As a note, SPU provides wastewater collection and conveyance as King County Metro (Metro) provides wastewater treatment. The wastewater rate structure is based on the total cost of both collection and Metro treatment charges.

## Rate Terminology

Prior to reviewing SPU's current wastewater rate structures, it is helpful to understand the basic terminology that is related to rate structures and rate designs. The initial starting point in considering a rate structure is the relationship between fixed costs and variable costs. Fixed costs do not vary with the level of flow of wastewater. Debt service is an example of a fixed cost. In contrast, variable costs tend to change with the quantity of water treated or conveyed. Examples of variable costs are the cost of chemicals and electricity. However, for SPU, the majority of the O&M costs are fixed as a result of Metro providing wastewater treatment, which is a fixed amount charged to SPU based on the customer data. In addition, the collection costs are also primarily fixed as these costs don't change significantly as a wastewater flow changes. Wastewater rate structures vary depending on the utility's specific goals and objectives and ranges from a flat fixed charge to a 100% volumetric charge. Many wastewater rate structures include both a fixed or minimum charge, and a volumetric (consumption) charge. Provided below is a more detailed discussion of the fixed and variable charges.

**Fixed Charges** – Fixed charges can take many forms. These fixed charges may be labeled or called base charges, minimum charges, customer charges, etc. Regardless of the label used, their purpose is to collect a portion of the fixed costs associated with serving a customer, regardless of the customer's contribution of wastewater volumes.

Historically, wastewater rates only contained a fixed charge component, as the wastewater flow of a specific customer is difficult to measure or estimate. For this reason, a flat fixed charge for all customers was typical. However, given the availability of water consumption (metered) data, the presence of a consumption, or volume, charge for wastewater rates has

grown in popularity both around the country and locally. This has resulted in utilities transitioning from a flat fixed charge to a charge that included a volumetric component based on water consumption data.

Fixed charges for a wastewater utility typically do not vary by meter size, as is typical with water utilities. However, some wastewater utilities do charge the fixed component by water meter size.

**Variable Charges** - While it was noted that there are different approaches that can be used to collect fixed charges, the same can be said for variable or volumetric charges. For a wastewater utility, volumetric consumption charges are generally based upon metered water consumption as a surrogate for actual wastewater flows. As was alluded to previously, estimating flow for a specific customer can be difficult. Typically, for residential customers, average winter water use (i.e., average water consumption over a set period of winter months) provides the best estimation. This is because it is assumed that during the winter months, the majority of water usage will be for domestic purposes and therefore, will contribute to the wastewater flows. For commercial or industrial customers, on the other hand, monthly or annual water consumption is used as the majority of commercial customers are assumed to use all water domestically and have limited use for irrigation.

**Rate Structure** – Rate structure involves defining the rate *level* and *structure*. The rate level reflects the amount of revenue that is to be generated, or collected, from the rates while the structure is how the customers are charged or how the bill is calculated.

## Overview of SPU's Current Wastewater Rates

To begin the review of SPU's wastewater rates, we begin with a brief history of where they have been:

- Starting in 1974, the wastewater rate structure only included a fixed monthly charge per customer and there was no volumetric component.
- The first major change occurred in 1982 when the fixed charge for residential customers decreased significantly and for the first time, a volumetric charge was established.
- The next major change that happened was in 1989 when the fixed meter charge was discontinued and the rate structure was simplified to be 100% volumetric based rates.
- Throughout the 1990s and to the present day, there have been no major rate structure changes, only the level of rates has been adjusted to reflect the cost of providing service.
- Starting in 2008, a portion of Metro treatment costs have been allocated to the drainage fund to reflect the costs associated with wastewater flow from the drainage system.

Provided in Table 1 is a summary of SPU's current wastewater rates.

**Table 1**  
**Summary of 2016 Wastewater Rates**

<b>Residential &amp; Commercial</b>	<b>\$ / CCF</b>
Collection C	\$4.58
Treatment Rate	<u>7.69</u>
Total Consumption Rate	\$12.27

[1] - 1 CCF = 748 gallons

[2] - Minimum charge = 1 CCF

[3] - Summer (May – Oct) residential bills are based on average winter water use (Nov – Apr.)

As can be seen in Table 1, SPU charges its customers entirely on a volumetric, per CCF basis for the collection costs and the Metro treatment costs allocated to the wastewater rates. As noted, a portion of Metro treatment costs, approximately 6.05%, are allocated to the drainage rates. During the summer period from May to October, single family residential and duplex customers are billed based on the lower of their actual consumption for the billing period or the customer’s average winter water use which is defined as consumption from the prior November to April. It should be noted that SPU bills most of its customers on a bi-monthly basis.

## Current Industry Trends

As with any industry, the thinking and practices have changed over time. This is also true with wastewater utility rate structures. Namely, as total costs and customer bills have increased and resources/capacities have become more constrained, the industry philosophy and thinking concerning rate structures has changed and evolved.

For the vast majority of the history of wastewater rates, the predominant rate structure was a flat fixed rate with no volumetric component. As noted, one of the main reasons for this is that there is not a simple way to measure actual wastewater flows, that is, wastewater volumes. In light of metered water rates and the availability of water consumption data, utilities began to introduce a volume, or consumption, charge into wastewater rate structures. Over time, as additional emphasis was placed on conservation efforts, more utilities began to include a volume charge as a method perceived to increase water conservation. Many utilities also utilize average winter water consumption for billing purposes rather than total water consumption. Utilizing average winter water consumption for wastewater billing takes into consideration that outdoor use, or summer water use for outdoor purposes (i.e., lawn watering), does not impact overall sewer demands. Most recently, given the increased costs associated with wastewater treatment, due to regulatory requirements and total demands, utilities have been trending back towards revenue stability and fixed charges to reflect the fixed costs to provide service. Additionally, equity between customers has become a greater concern when reviewing the costs associated with serving residential, multi-family residential, various types of commercial customers, and industrial customers.

At the current time, in HDR's opinion, there appears to be two key rate structure trends occurring in the wastewater rate setting industry. These are revenue stability, and affordability.

- **Revenue Stability** – For most of the history of wastewater rates, the majority were solely fixed in nature, so actual flow contribution was not incorporated. As utilities have continued to transition to volumetric based wastewater billing, the need for revenue stability has moved to the forefront. The issue is driven further by the declining per capita consumption which constrains a utility's revenue stream even more. The industry has been experiencing a decline in per capita consumption for many years and as consumption has declined, so have consumption based revenues. As a result, many utilities are evaluating their rate structure to assess the revenue predictability and stability or adjusting rate levels to reflect the decline in consumption based revenues.
- **Affordability** – Historically, wastewater rates have been 25% - 50% more than water rates which means affordability is now a large concern for many utilities across the county. Also, since rates have been moved toward volumetric rates and consumption levels have declined, utility rates have had to be raised to maintain sufficient revenues to maintain and operate the utility. Inflationary pressures as well as increased regulatory compliance costs have also driven average monthly bills up in recent years. The 2012 AWWA Water and Wastewater Rate Survey notes that the annualized wastewater rate increase from 1996 to 2012 was 5.1%; compare that to the consumer price index (CPI) over the same time of 2.5% and water utilities at 4.9%. This increase is the result of a variety of factors such as regulatory requirements, renewal and replacement needs, etc. With this increase comes the concern that wastewater bills are, or will become, unaffordable. This is an issue utilities across the U.S. are facing and policy decisions are necessary to develop assistance programs to help those customers where the bill becomes unaffordable. In recent years, the City of Seattle has made increasing the number of households in its Utility Discount Program a priority, with a goal of doubling the enrollment between 2014 and 2018. When an increasing number of customers receive discounts through this program, additional upward pressure is placed on rates for other customers as the total cost to provide service does not change based on ability to pay.

Additionally, many utilities are expanding the number and size of renewal and replacement projects and infrastructure improvements to meet current, and proposed, regulatory requirements. This results in additional pressure on rates in order to adequately fund these projects and also maintain reliable systems.

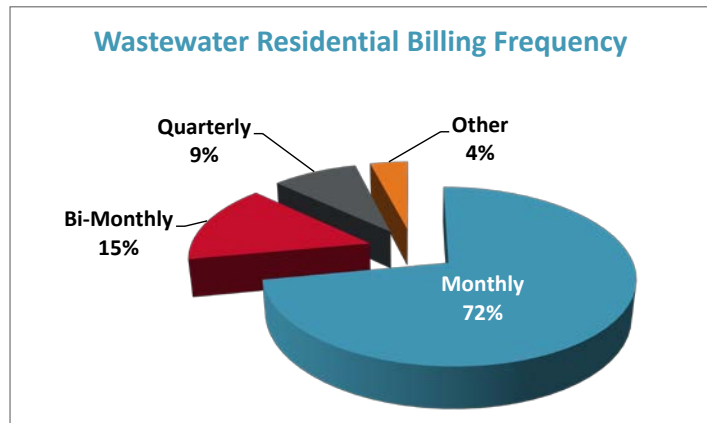
## U.S. Wastewater Rate Review

To gain perspective of wastewater rates, HDR utilized American Water works Association, (AWWA) 2012 Water and Wastewater Rate Survey. This survey shows statistics about rate structure and billing as summarized from the respondents.

To start, the billing frequency for residential customers was reviewed in order to compare and contrast SPU's current billing schedule. As can be seen in the graph below, the most common

billing frequency of the surveyed utilities is on a monthly basis at 72%. A bi-monthly and quarterly frequency was less common at 15% and 9%, respectively. Currently, SPU bills the majority of its customers on a bi-monthly basis, just as with the water utility. The frequency of billing varies from utility to utility and is a balancing of cost savings and the price signal or bill impact. However as the level of customer bills have increased, many utilities have transitioned to monthly billing to minimize the impact of the bills. The billing frequency may also be affected by the timing of other utility, or entity, billings such as a single bill for water, sewer, garbage, etc.

As noted from the AWWA 2012 Water and Wastewater Rate Survey, although the level of the fixed charge varies from utility to utility, the vast majority of wastewater utilities have some form of fixed or minimum charge. Specifically, approximately 95% of the participating wastewater utilities had some level of charge for zero (0) consumption. In general the fixed charge is the same for all customers; however, it can vary by customer class

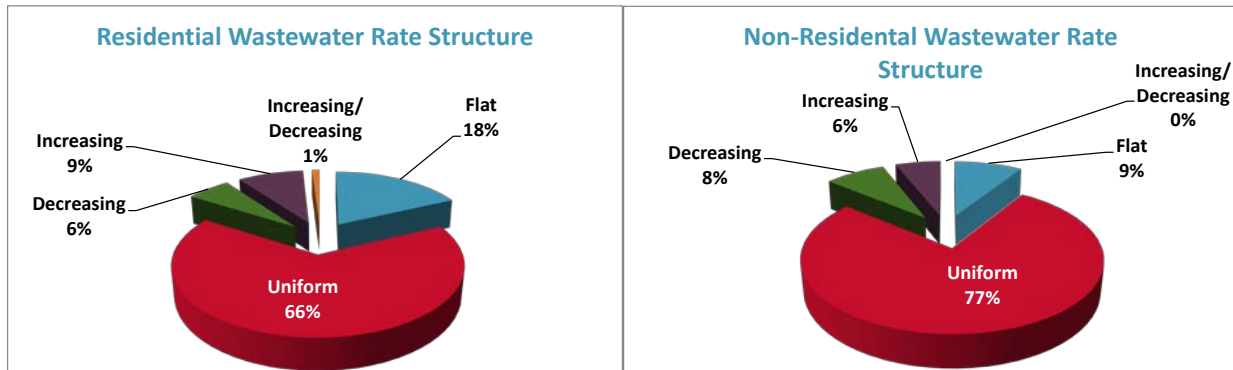


of service depending on the type of fixed charge (e.g., minimum charge, customer charge). Of the surveyed wastewater utilities, the average residential charge for zero consumption was \$12.41/month. At a minimum, most utilities have fixed charges to reflect the cost associated with meter reading, billing/accounting and collection costs. For comparison purposes, SPU's does not current have a monthly fixed charge for residential customers, there is, however, a monthly minimum charge of 1 CCF, as shown in Table 1.

In some cases, utilities also included a certain level of consumption allowance in the fixed charge. Approximately 21% of the utilities responding to the survey included some level of allowance. On average, those with an allowance provided approximately 2,500 gallons in the monthly fixed or minimum charge.

The next perspective reviewed was the rate structure used for residential and non-residential customer classes. Provided in Figure 2 is a summary of the rate structures for the utilities responding to the AWWA 2012 Water and Wastewater Rate Survey.

**Figure 2**  
**Summary of the 2012 AWWA Water & Wastewater Rate Survey**



As shown in Figure 2, the survey indicates that for wastewater utilities, a uniform rate structure is the most predominate. As a point of reference, SPU currently charges all customers a uniform rate for all consumption; residential customers are billed in the summer on the lower of the actual consumption for the billing period or their average winter water usage while the non-residential customers are charged based on water consumption for the billing period. With that in mind, SPU’s rate structure, a uniform volume charge based on water consumption, reflects the typical rate structures in the [AWWA 2012 Water and Wastewater Rate Survey](#). However, as noted, approximately 95% of the utilities in the survey have both a fixed and volume charge while SPU does not include a fixed charge component, only a minimum charge for 1 CCF.

### Regional Wastewater Rate Comparison

In addition to the AWWA Rate Survey, HDR compared SPU’s water rates to 24 other local/regional wastewater utilities within the Seattle/Tacoma/Everett/Spokane areas, 19 of these also receiving wastewater treatment services through Metro. All of the utilities’ wastewater rates reviewed contained a fixed charge for residential customers. In most cases, the regional utilities included a direct pass through of the Metro treatment charge to the residential customers. A few of the regional utilities had a single flat rate for all wastewater costs, but do mention, or note, the Metro component in the rate schedules, ordinances, or resolutions. Approximately 33% of regional residential rates contain a variable charge component either based on water consumption, winter water consumption, or use over a specific threshold (e.g., 6 CCF/month). However, it should also be noted that while many utilities directly pass through the Metro charge to residential customers, the collection of the metro charge for commercial customers was generally charged on a volumetric basis on water consumption. In these cases the utilities had separate customer classes of service established for residential and non-residential customers.

Upon reviewing the residential consumption (variable) charges of the regional utilities surveyed, 25% had a tiered volumetric (usage) charge and 75% had a uniform rate. This also reflects the similar results in the AWWA survey as the predominate rate structure was a uniform rate structure. As a side note, in reviewing the residential rate structures for the regional utilities, 4 of the 8 utilities with a variable rate included an allowance in the fixed monthly charge.

In general, the wastewater rate structures reviewed in the region reflect similar findings as the AWWA rate survey. Many utilities have a fixed charge component, in this case it appears to be driven by passing through the Metro fixed charge, and several of the utilities include a volumetric component. Compared to the regional utilities, SPU's rate structure at 100% volumetric is somewhat unique given the lack of a fixed charge outside of the minimum monthly charge of 1 CCF. However, SPU's wastewater rate allows for customers to control the level of their wastewater bill based on the lower of their average winter water consumption or actual consumption for the billing period. In this way, SPU is providing the customer with a price signal that reflects the costs being placed on the system. This provides equity between customers with varying levels of water consumption, or average winter water use, and the costs associated with providing collection and treatment service when compared to a direct pass through of a fixed treatment charge from Metro.

## National Wastewater Rate Comparison

In addition to the regional rate comparison, utilities of similar size from around the country were reviewed in order to give further perspective. Although the local/regional comparison can bring in variables specific and unique to one area such as climate or annual precipitation, for Seattle, there are fewer comparably sized cities or utilities. HDR reviewed 15 different utilities from across the U.S. and include the following utilities:

- New York
- Kansas City
- Washington D.C.
- Atlanta
- Boston
- Johnson County
- Columbus
- Portland (OR)
- San Francisco
- San Diego
- Louisville
- Charlotte
- Birmingham
- Irving
- Oakland

In reviewing the rate structures, many of the same trends can be seen with these large utilities across the country. 80% utilities have fixed meter charges, with two utilities having a fixed charge that varied by meter size.

When reviewing the volumetric, or consumption, charges, the trend was also similar to the regional comparison where the majority of the rate structures were a uniform rate. Of the rate structures for the national utilities, only 1 of the 15 utilities reviewed included an allowance in the fixed monthly charge.

After reviewing a survey of national water rate structures, the relationships appear to be similar with what the region and AWWA survey review revealed. Again, the majority of wastewater

rates contain a fixed charge for both residential and non-residential customers, and a uniform volume charge. Regionally, the majority of the utilities have a flat fixed charge for residential customers and a combined fixed charge and volume charge for commercial customers. National utilities were more likely to have a combined fixed and volumetric based rate structure. This may be driven by the fact that many of the local utilities are collection only systems and a regional utility provides treatment services.

## Rate Design Criteria and Considerations

Prudent rate administration dictates that several criteria must be considered in setting rates. The attributes of sound rate structures have been documented in a number of rate setting manuals. However, the foundation for evaluating rate structures is generally credited to James C. Bonbright in the *Principles of Public Utility Rates*.<sup>1</sup> The manual *Principles of Public Utility Rates* provides utility managers and policymakers an understanding of pricing policies, theories and economic concepts that support various rate designs. Bonbright's list of the attributes of a sound rate structure is quoted in a number of other rate manuals and is often paraphrased and simplified in reading utility rate study reports. A simplified list of these attributes of a sound rate structure is listed below:

1. Rates which are easy to understand, from the customer's perspective
2. Rates which are easy for the utility to administer
3. Consideration of the customer's ability to pay
4. Continuity, over time, of the rate making philosophy
5. Policy considerations (encourage conservation, economic development, etc.)
6. Provide revenue stability from month to month and year to year
7. Promote efficient allocation of the resource
8. Equitable and non-discriminating (cost based)

Many contemporary rate economists and regulatory agencies feel that the last consideration, cost-based rates, should be of paramount importance and provide the primary guidance to utilities on rate structure and policy. HDR also agrees with this position.

This implies that a cost of service approach has been used to establish the proposed rates. The result of setting rates based on generally accepted cost of service approaches is that it provides SPU's customers with the proper price signal as to what their consumption or usage is costing. When evaluating SPU's current wastewater rate designs, all of the above listed criteria should be taken into consideration. However, it is difficult - if not impossible - to design a rate which meets all of the goals and objectives listed above. For example, it may be difficult to design a rate that takes into consideration the customer's ability to pay, and one which is cost-based. In designing rates, there will always be trade-offs between the various goals and objectives. These goals and objectives may also result in implementing rates that don't follow cost of service principles to meet the overall rate setting goals and objectives.

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<sup>1</sup> James C. Bonbright; Albert L. Danielsen and David R. Kamerschen, *Principles of Public Utility Rates*, (Arlington, VA: Public Utilities Report, Inc., Second Edition, 1988), p. 383-384.



Prioritizing SPU's goals and organizing its objectives will aid in this process and add clarity for decision making purposes. The results of a prioritization process can then be used to develop rate structure alternatives that best meet the identified goals and objectives.

## Alternative Wastewater Rate Structures

Based on the review of the regional and national utility rate structures, along with HDR's experience in establishing wastewater rates, three rate structures have been reviewed. These are as follows:

1. Maintain the current rate structure
2. Maintain the current rate structure and add a monthly fixed charge
3. Bifurcate the rate between collection and treatment; pass through the treatment charge from metro on a fixed charge basis

The first alternative would maintain the current wastewater rate structure on a 100% volumetric basis with a minimum charge of 1 CCF per month. As noted, this rate structure allows for customers to control the level of the wastewater bill based on the lesser of the average winter water or current billing period water consumption. This rate structure is also simple to understand and provides a conservation incentive. While revenue stability may be a concern, the frequency with which SPU reviews wastewater rates allows for adjustments to the rates to reflect changes in water consumption patterns.

The second alternative would maintain add a monthly fixed charge to collect a portion of the fixed costs on the system and remove the 1 CCF minimum. As noted, revenue stability has been a recent trend given the decline in per capita water consumption. This can be further impacted given SPU's 100% volumetric based rate, over 1 CCF. As water consumption may continue to decline, wastewater rate revenues may also be impacted if rates are not adjusted in a reasonable period. For residential customers this may be mitigated by the use of the winter water average for billing purposes during the summer months. However, a decline in winter water consumption could have an impact on SPU's wastewater revenue stream, if rates are not adjusted soon after the decline in consumption occurs. However, given SPU's past practice of reviewing rates every 2 years, SPU has been able to adjust rates to reflect the recent declines in water consumption for wastewater billing purposes. Commercial revenues may be more at risk and vulnerable to declining consumption given the wastewater rate is based on all water consumption. Currently, SPU has projected consumption to be essentially flat for the next several years in the most recent (2016 – 2018 rate study). The fixed charge could range from a low of collecting customer related costs (e.g., billing) to a high of including a portion of the fixed costs on the system. As noted, many of the regional utilities charge a flat rate for residential customers. Again, this appears to be due to the direct pass through of Metro treatment charges, but the majority of the regional utilities also have at least a minimal fixed charge for the collection services as well.

The third alternative would bifurcate, or split, the rate between the collection and treatment components. Currently, SPU passes through the cost from Metro, after allocating an equitable portion to the drainage fund, within the volumetric rate. However, Metro charges SPU a flat

rate per Residential Equivalent Unit (REU). Each residential customer equals one REU and the number of REUs are calculated for the commercial customer class of service based on consumption. For this alternative, the Metro charge would be passed through on a fixed basis equal to each customer based on the charge from Metro for the customer. The collection related costs could remain a 100% volumetric component. This would help stabilize the revenue stream and minimize the impacts of changes in the rate from Metro as it would be a direct pass through to the customers. However, this would also remove the customer’s ability to control their bill as the Metro charge would be a monthly flat rate. In addition, the flat rate charged by Metro may not reflect the costs of individual customers due to the lower than average consumption for SPU’s residential customers. This would also have affordability impacts as the current monthly Metro charge is only slightly lower than the current average SPU customer bill in the winter period at approximately 4 CCF, and would also need to include the collection related costs. As a result, the customers would lose the majority of their ability to control the bill, may discourage conservation, result in increased affordability concerns, and possible billing system changes being required. Under this approach, commercial customer may still be charged a volumetric rate for Metro charges.

Provided below is a summary of the alternative rate structures for consideration.

Alternative	Advantages	Disadvantages
Current Rate Structure	<ul style="list-style-type: none"> <li>• Simple to understand and administer</li> <li>• Conservation oriented</li> <li>• Ability to control bill (affordability)</li> <li>• Ability to pass through Metro increases</li> <li>• Conservation incentive</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal revenue stability</li> </ul>
Maintain Rate Structure; add fixed charge remove 1 CCF minimum	<ul style="list-style-type: none"> <li>• Minimal increase in revenue stability</li> <li>• Ability to pass through Metro increases</li> <li>• Reflect a greater portion of the fixed costs of providing service</li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• Increased affordability concerns</li> <li>• Additional complexity</li> </ul>
Bifurcate the Rate Structure Between Treatment and Collection	<ul style="list-style-type: none"> <li>• Minimal increase in revenue stability</li> <li>• Ability to pass through Metro increases</li> <li>• Increased equity between customer groups for treatment costs</li> </ul>	<ul style="list-style-type: none"> <li>• Additional complexity</li> <li>• Affordability impacts</li> <li>• Minimal conservation incentive and no ability to control the bill</li> <li>• Calculation of REUs for commercial customers</li> <li>• Billing system constraints</li> </ul>

## Conclusions and Recommendations

In review of SPU's wastewater rate structure several items were noted. First, if SPU desires to revise the current wastewater rate structure, HDR would recommend a fixed charge be added to the current rate structure that reflects a portion of the fixed costs that is greater than the current 1 CCF minimum. As noted in the 2016-2018 Drainage and Wastewater Rate Study consumption is projected to maintain relatively flat over the next several years. However, if consumption continues to decline, this could have an impact on the level of wastewater revenues if rates are not adjusted in a timely manner, which has not been the case for SPU in recent years. Adding a fixed charge could provide some additional level of revenue stability during times of reduced water consumption. However, this may also results in additional affordability concerns due to the possible increase as a result of a monthly fixed charge greater than the current 1 CCF minimum charge. Adding a fixed charge would reflect typical industry rate structures and rate structure in the region. A direct pass through of the Metro charge appears to result in more disadvantages than advantages at this time given SPU's customer consumption patterns.