Report to Utility Committee
December 3, 2020

EPCOR WATER SERVICES INC.

Performance Based Regulation Renewal
Fixed/Variable Rate Analysis

TABLE OF CONTENTS

1.0 OVERVIEW

Since the approval of the 2017-2021 PBR application for EWSI (EPCOR Water Services Inc. - Water and Wastewater), Utility Committee has provided a number of motions and directions for items to be addressed either prior to, or within, the next application. In terms of the rate structure and design, the following was identified

> "That Administration work with EPCOR on the following: Possible changes to rate structures to deal with changes in volume."

Volume changes result both from the general long-term decline in water consumption driven by changes in technology and increased awareness of conservation as well as by weather related seasonal fluctuations. These volume changes can have a direct impact on the utility's revenue stability in both the short term by year over year weather related variances as well as over the longer term by the continued decline in water consumption. Ultimately, the longer-term financial performance of the utility can be challenged because the utility's costs are largely (over 80%) fixed and do not vary with consumption.

Most utilities across North America have addressed declining consumption with adjustments to the fixed/variable components of their rate structure as part of an overall rate strategy. While rates are primarily intended to recover the revenue requirement, rates structure and design are typically used to achieve additional aims beyond simply collecting money. There is a need to balance the somewhat conflicting goals of fixed and variable rates, in addition to other considerations. Higher levels of fixed rates provide an increased level of revenue stability for the utility and support its longer-term financial viability. Conversely, higher levels of variable charges are often used to incent conservation, particularly when combined with an inclining block structure to provide ratepayers an adequate price signal.

This paper will address one means to address consumption variability for EWSI's Water and Wastewater businesses and assess the associated impact on revenue stability and rates. The focus of the assessment will be confined to the fixed/ variable components of the rate structure and will ultimately conclude with changes that are contemplated for the upcoming PBR submission. Other mechanisms to address volume changes have not been addressed as they are seen as outside the overarching goals of the PBR structure. Specifically, deferral accounts can be used to pass all of the risk of consumption fluctuations to customers. This would result in annual rate adjustments for differences between actual and forecast consumption volumes. EWSI does not believe customers would support such a change in approach. Rate stability and predictability should continue to be maintained as they are key principles of the PBR as set out in the Water & Wastewater Bylaw.

Additional broader changes to the rate structures are also not currently planned for either Water or Wastewater (or Drainage) in the upcoming applications. As the total revenue requirement remains the same under any rate design scenario, alterations in rate structures and design typically entails forecasting consumption under alternative constructs such as customer classes or class sub-divisions, consumption tiers, etc. There are also challenges related to the resulting rate changes to any specific customer class when their ability to pay may be compromised (e.g. charging higher rates to the

commercial class), particularly in a time of increased rate sensitivity. The changes to historic consumption patterns driven by COVID and the accompanying economic downturn have increased the forecast risk that is borne by the utility, in a time when the forecast risk is already significantly high. In other words, there are already significant challenges in forecasting total revenue within the current customer's classes and rate tiers. That challenge would be increased if the classes were changed or volume tiers adjusted as part of a broad scale rate structured/design revision.

As a result of these considerations, rate structure and design changes are currently planned to be kept to a minimum across all three utilities. This will serve to mitigate some forecast risk in the application with the underlying intent of maintaining revenue forecasting accuracy. The current rate structure and design appear to be well accepted by ratepayers, and it is assumed that maintaining the status quo generally will not be met with concerns. Customer engagement research conducted to date bears this out.

2.0 BACKGROUND

EWSI's Fixed-Variable Split

EWSI's current Water and Wastewater fixed charges are designed to recover customer related costs including billing, meter and service related costs. The segregation of these costs to the fixed component of a customer's bill is a common practice across the water industry as these costs are not impacted by changes in the levels of consumption. Based on rates over the 2017 to 2021 PBR term, approximately 15% of Water's revenue is generated from the fixed service charge. Table 1 illustrates the percentage of fixed versus variable revenue by customer class for water.

Table 1
Water - Fixed vs Variable Revenue

Customer Class	Fixed	Variable
Residential	19.0%	81.0%
Multi-Res	4.7%	95.3%
Commercial	10.8%	89.2%
Total	**15.1%**	**84.9%**

Based on rates over the 2017 to 2021 PBR term, approximately 17% of Wastewater's revenue is generated from the fixed service charge as per Table 2. The percentage of fixed versus variable revenue varies significantly by Wastewater customer class. Unlike Water which uses an equivalent meter calculation to charge higher fixed rates to larger customers, Wastewater charges the same fixed charge to all customers which results in a lower fixed revenue percentage for the Multi-Residential and Commercial customer classes.

Table 2
Wastewater – Fixed vs. Variable Revenue*

Customer Class	Fixed	Variable
Residential	25.9%	74.1%
Multi-Res	1.2%	98.8%
Commercial	4.6%	95.4%
Total	**16.9%**	**83.1%**

* Does not include overstrength revenue.

The fixed variable split of revenue within Drainage is markedly different than either Water or Wastewater, owing to both the manner in which rates are determined as well as decisions made to increase the fixed component. As part of the City of Edmonton Drainage Services – 2013 Cost of Services Study prepared by Grant Thornton, the City of Edmonton updated the drainage rate structure to increase the fixed revenue component from 15% to 30%. Figure 1 is taken from the City of Edmonton Drainage Services – 2013 Cost of Services Study and provides some background on the City of Edmonton Drainage rate design.

Figure 1

The 2011 Rate Study also found that the trend for utilities is to move to a higher fixed fee component, however very few have gone as far as 69% of revenues. Most utilities were targeting between 20% to 30% from fixed rate revenues. Given that the City's Sanitary Utility costs are highly fixed in nature compared to a utility with both conveyance and treatment, the higher end of the range (approximately 30%) was selected to be generated from fixed rate revenues. This represented doubling the 2011 proportion of 15%. Subsequent changes were made to the rate structure to achieve an approximate 30% contribution from fixed rate revenues and 70% from variable rate revenues.

Table 3, 4, and 5 provide a breakdown of fixed vs variable charges for EPCOR Drainage base on 2018-2019 actuals.

Table 3
Sanitary Fixed vs Variable Revenue

Customer Class	Fixed	Variable
Residential	41.7%	58.3%
Multi-Res	11.1%	88.9%
Commercial	19.8%	80.2%
Total	**32.0%**	**68.0%**

Table 4
Storm – Fixed vs Variable Revenue

Customer Class	Fixed	Variable
Residential	100.0%	0.0%
Multi-Res	100.0%	0.0%
Commercial	100.0%	0.0%
Total	**100.0%**	**0.0%**

Table 5
Total Drainage – Fixed vs Variable Revenue

Customer Class	Fixed	Variable
Residential	60.1%	39.9%
Multi-Res	25.3%	74.7%
Commercial	58.9%	41.1%
Total	**55.5%**	**44.5%**

Storm rates are based on fixed factors and do not have any consumption based determinants. As a result, the total drainage fixed percentage is 56%. Sanitary rates, which are determined by both fixed and consumption based determinants generate fixed revenue at approximately double the level seen in either Water or Wastewater.

Bill Comparison

Table 6 provides a comparison of residential water bills for 10 communities in western Canada. Bills have been calculated using each community's 2019 water rates and 15m^3 of consumption. All communities with the exception of Spruce Grove and Sherwood Park have a higher fixed service charge percentage than EWSI's Water utility. On average, for communities with a higher fixed service charge than EWSI's Water utility, the fixed service charges make up 37% of their bills versus 17% for EWSI. Overall, the average fixed portion for all communities is 30%.

Table 6
2019 Average Residential Comparison (15m^3)

Municipality	Fixed	Variable	Total Bill	Fixed Percentage
Spruce Grove	-	51.53	51.53	0%
Sherwood Park	5.36	38.25	43.61	12%
Edmonton	**6.63**	**31.87**	**38.50**	**17%**
Vancouver	8.25	17.98	26.23	31%
Sturgeon County	21.00	45.75	66.75	31%
Saskatoon	11.89	23.18	35.07	34%
Winnipeg	16.50	27.30	43.80	38%
Calgary	15.36	24.00	39.36	39%
St Albert	16.33	25.05	41.38	39%
Regina	24.90	29.70	54.60	46%

Bill comparisons for Wastewater have not been developed as they are not informative. Unlike water services which are relatively consistent among cities and communities, the nature and extent of wastewater treatment vary significantly across cities and communities. Differences in wastewater treatment processes, the inclusion of certain services in property taxes, and geographic and climatic factors impact the comparability of rates.

Revenue Stability

Higher fixed rates are often introduced to address issues of revenue stability. Most utilities who do so are seeking to address the impact of declining water use and seasonal driven fluctuations in water demand on their financial stability. Increasing the fixed service charge helps to reduce the impact of both consumption and customer count variance on revenue.

EWSI Water is forecasting a revenue variance of approximately $50M in the current 2017-2021 PBR term, as illustrated in Table 7.

Table 7
Water PBR Revenue by Customer Class ($ Millions)

Driver	Residential	Multi-Res	Commercial	Total
Non-Routine Adjustments	(4.1)	(0.3)	(0.8)	(5.1)
Inflation	(15.5)	(3.9)	(4.6)	(23.9)
Consumption/Count	6.2	(7.3)	(19.3)	(20.4)
Total	**(13.4)**	**(11.4)**	**(24.6)**	**(49.4)**

EWSI Wastewater is forecasting a revenue variance of approximately $26M in the current PBR term as seen in Table 8.

Table 8
Wastewater PBR Revenue by Customer Class ($ Millions)

Driver	Residential	Multi-Res	Commercial	Total
Non-Routine Adjustments	(3.86)	(0.06)	(0.25)	(4.16)
Inflation	(6.40)	(1.85)	(2.20)	(10.45)
Consumption/Count	4.04	(4.62)	(11.12)	(11.69)
Total	**(6.22)**	**(6.52)**	**(13.57)**	**(26.31)**

Theses variances are largely attributable to lower than forecast inflation adjustments and lower than forecast consumption. The long-term declines in water consumption are forecast as part of the PBR application, so these variances do not contribute significantly to the variances illustrated above (except for variances from the initial forecast). A large portion of the consumption variance noted in these tables is likely attributable to seasonal fluctuations. As noted in the PBR Performance reports, residential consumption in 2019 has been negatively impacted by high precipitation in the summer months. A similar trend has also impacted 2020, in addition to the changes in consumption driven by COVID.

Revenue Requirement Composition

The ability of a utility (or any business) to absorb revenue variations is dependent upon the degree to which the underlying costs can be adjusted to offset changes in revenue. As capital-intensive businesses with high level of fixed costs, most utilities cannot adequately adjust their costs to meet revenue variations, at least in the short tem.

Not unlike other utilities, EWSI's Water and Wastewater revenue requirements are comprised of predominantly fixed components in the respect that they do not increase or decrease with the volume of water produced/treated in a year. Tables 9 and 10 below are based on the recent 2019 PBR Progress Report and detail the major components of the respective revenue requirements. As noted, of Water's $186 million revenue requirement, 85% or $158 million is fixed. For Wastewater treatment 86% or $80 million is fixed of the $92 million revenue requirement,

Table 9
Water 2019 Revenue Requirement ($ Millions)

Item	$		%
Fixed			
Operating Expenses (Total System)			
Staff, Contractors, Vehicles & Supplies	50.90		
Billing, Meters and Customer Service	10.40		
EWSI Shared Services	12.00		
Corporate Shared Services	12.10		
Franchise Fees Fixed & Property Taxes	2.40		
Total Operating Expenses	87.80		
In City Share at 81.4%		71.47	38.5%
Other Revenue		-5.50	-3.0%
Depreciation and Amortization		28.40	15.3%
Return on Rate Base Financed by Equity		34.40	18.5%
Return on Rate Base Financed by Debt		29.00	15.6%
Total		157.77	84.9%
Variable - Total System			
Power and Other Utilities	10.30		
Chemicals	11.70		
Franchise Fees Variable	12.50		
Total	34.50		
In City Share at81.4%		28.08	15.1%
In-City Total		185.85	100.0%

Table 10
Wastewater 2019 Revenue Requirement ($ Millions)

Item	$	%
Fixed		
Operating Expenses (Total System)		
Staff, Contractors, Vehicles & Supplies	20.50	
Billing, Meters and Customer Service	7.10	
EWSI Shared Services	4.30	
Corporate Shared Services	4.00	
Franchise Fees Fixed & Property Taxes	1.82	
Total Operating Expenses	37.72	41.0%
Other Revenue	-6.90	-7.5%
Depreciation and Amortization	18.00	19.5%
Return on Rate Base Financed by Equity	11.50	12.5%
Return on Rate Base Financed by Debt	19.30	21.0%
Total	79.62	86.4%
Variable - Total System		
Power and Other Utilities	5.30	
Chemicals	1.20	
Franchise Fees Variable	5.98	
Total	12.48	13.6%
In-City Total	92.10	100.0%

The high level of fixed costs is attributable to both the high level of capital assets in each business (seen in the revenue requirements as depreciation, amortization, interest and return on equity) as well as a high level of staff related costs in the O&M expenses. Water's revenue requirement contains a limited number of major cost categories that vary based on the amount of water produced:

- Power - Based on historical data the number of Mega Watt hours (MWH) consumed in a given year can vary up to 5,000 MWH between a year with high and low production (pumping costs). Under Water's current power contract, this increase in consumption can increase costs by approximately $0.5M in a given year.

- Franchise Fee – Franchise fees are calculated based on a percentage of revenue Water (and Wastewater) earns within the City of Edmonton. As the majority of the revenue is variable (consumption based), approximately 85% of franchise fees can be considered variable.

- Chemicals – The costs for chemical used in the water treatment process are normally assumed to vary with the volume of water treated and are categorized as variable in the analysis above. However, based on high-level observations it appears this may not always be the case. Over the 2007 to 2019 period, the average chemical costs are actually higher in years with lower consumption. Lower consumption is directly related to increased precipitation, which also causes increased run-off into the river. Ultimately, higher use of chemicals is required to

address the lower river quality that results when this occurs. Chemicals are also impacted by changes in the commodity prices as well as foreign exchange as many are sourced from the US. The combination of these factors complicate attributing chemical price changes to a single source.

From a wastewater perspective, power is the largest variable cost as it is required to operate the plant. Chemicals have a lower impact given there are fewer chemicals required in the wastewater treatment process.

Overall, EWSI's Water and Wastewater business are predominantly fixed and the cost structure vary little with changes in revenue.

3.0 ANALYSIS

The preceding background illustrates that EWSI's Water and Wastewater percentage of revenue generated by fixed charges is out of alignment with both drainage and the majority of surrounding communities. Moreover, as EWSI is experiencing issues with revenue stability, and argument can be made that the fixed charges should be increased. The following analysis identifies the impact on the ratepayers and the utility's revenue if fixed charges were to be increased. This analysis has been completed based on two scenarios:

1. **20% Fixed Revenue** – In this scenario, the fixed fee for all classes were increased uniformly until Water and Wastewater's fixed revenue averages 20.0% across the customer classes. This scenario requires a 35% increase to the fixed service charges for Water ratepayers and a 19% increase for Wastewater ratepayers for all customer classes. There was also a corresponding decrease in variable charges.

2. **25% Fixed Revenue** – In this scenario, the fixed fee for all classes were increased uniformly until Water and Wastewater fixed revenue averages 25.0% across the customer classes. This scenario requires a 70% increase to the fixed service charge for Water users and a 52% increase for Wastewater uses for all customer classes. There was also a corresponding decrease in variable charges.

Scenario Summary

Table 11 and 12 summarize the changes that were made to the fixed charges for Water under the two scenarios that were analyzed.

Table 11
Water - Fixed Revenue by Class

Customer Class	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	19.5%	25.8%	32.2%
Multi-Res	4.6%	6.1%	7.6%
Commercial	10.4%	13.9%	17.4%
Total	**15.1%**	**20.0%**	**25.0%**

Table 12
Water - Fixed Rate Increases

Customer Class	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	N/A	35.0%	70.0%
Multi-Res	N/A	35.0%	70.0%
Commercial	N/A	35.0%	70.0%

Table 13 and 14 present the same information except for Wastewater Treatment.

Table 13
Wastewater - Fixed Revenue by Class

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	25.9%	29.9%	36.4%
Multi-Res	1.2%	1.5%	2.0%
Commercial	4.6%	5.6%	7.3%
Total	16.9%	20.0%	25.0%

Table 14
Wastewater - Fixed Rate Increase

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	N/A	19.0%	52.0%
Multi-Res	N/A	19.0%	52.0%
Commercial	N/A	19.0%	52.0%

Assumptions

The following assumption were used in the analysis:

- The analysis was based on the 2017-2021 PBR application using both actual/forecast results.
- The increase to the fixed service charge was applied as a onetime increase to 2017 rates.
- Any increase to the fixed service charge results in a decrease to variable rates.

- Using the original 2017 to 2021 PBR rates model, 2017 variable rates were reduced to ensure the total revenue collected by customer class over the PBR term did not change. (Residential $621.8 million, Multi-Residential $165.3Million, Commercial $213.5 Million)

Results - Revenue Stability

Tables 15 and 16 summarize the consumption and customer count variance in the current PBR term for each of the scenarios for water and wastewater respectively. Increasing the fixed service charge would slightly decrease the impact that seasonal variability has on EWSI's revenue. Over the 2017 to 2021 PBR, EWSI would have collected between $1.4 to $2.8 million more revenue in water and $0.5 to $1.5 million more in wastewater if the fixed service charge had been increased as per the scenarios.

Table 15
Water - Fixed Revenue Increase

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	6.2	6.1	6.0
Multi-Res	(7.3)	(7.1)	(6.9)
Commercial	(19.3)	(18.0)	(16.7)
Total Variance	**(20.4)**	**(19.0)**	**(17.6)**
Additional Revenue	**-**	**1.4**	**2.8**

Table 16
Wastewater - Fixed Revenue Increase

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Residential	4.0	3.9	3.7
Multi-Res	(4.6)	(4.4)	(4.0)
Commercial	(11.1)	(10.7)	(9.9)
Total Variance	**(11.7)**	**(11.1)**	**(10.2)**
Additional Revenue	**-**	**0.5**	**1.5**

Increasing the fixed charge would also have an impact on the rebasing adjustment. Effectively, an increase in fixed charges decreases the rebased adjustment as the effects of declining consumption are offset, at least partially.

Results - Residential Bill Impact

Table 17 summarizes the average monthly residential bill impacts for the two scenarios analyzed for Water. A negative amount represents a reduction in the average bill. Increasing the fixed service charge would have had minimal impact to average consumption customer (14m^3 to 16m^3), but the fixed increase would have increase the average bill of lower consumption users and decrease the average bill of high volume users.

Table 17
Water - Monthly Residential Bill Impact (15mm Meter)
($)

Consumption	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Low (5m^3)	N/A	1.71	3.42
Medium (15m^3)	N/A	0.01	0.02
High (40m^3)	N/A	(4.66)	(9.33)
Fixed Portion of 15m^3 Bill	18%	25%	31%

Table 18 summarizes the average monthly residential bill impacts for the two scenarios analyzed for Wastewater. The results demonstrate the same general trends as with Water but with a slightly lower rate increase.

Table 18
Wastewater - Monthly Residential Bill Impact (15mm Meter)
($)

Consumption	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Low (5m^3)	N/A	0.70	1.87
Medium (15m^3)	N/A	0.35	0.95
High (40m^3)	N/A	(0.50)	(1.35)
Fixed Portion of 15m^3 Bill	24.8%	28.9%	35.5%

Results - Multi-Residential Bill Impact

Table 19 and 20 summarizes the average monthly multi-residential bill impacts for the scenarios for Water and Wastewater respectively.

Table 19
Water - Monthly Multi-Residential Bill Impact (50mm Meter)
($)

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Low (50m^3)	N/A	18.74	37.47
Medium (500m^3)	N/A	6.84	13.67
Medium (2,000m^3)	N/A	(27.49)	(54.97)
High (4,000m^3)	N/A	(70.25)	(140.51)
Fixed Portion of 500m^3 Bill	6%	8%	11%

Table 20
Wastewater - Monthly Multi-Residential Bill Impact (50mm Meter)
($)

	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
Low (50m^3)	N/A	(0.85)	(2.27)
Medium (500m^3)	N/A	(16.29)	(43.65)
Medium (2,000m^3)	N/A	(67.75)	(181.59)
High (4,000m^3)	N/A	(136.36)	(365.50)
Fixed Portion of 500m^3 Bill	1.0%	1.2%	1.6%

Similar to the residential class, increasing the fixed service charge increases the average bill of lower consumption users and decreases the average bill of high volume users. Wastewater uses the same fixed and variable rates for all customer classes. As a result all customers that use more than 25m^3 see a bill reduction and customers that use less 25m^3 see a bill increase. In Table 20, all customers shown use more the 25m^3 resulting in the negative amounts for all customers in the table.

Results - Commercial Bill Impact

Table 21 and 22 summarizes the average monthly commercial bill impacts under the scenarios for water and wastewater respectively.

Table 21
Water - Commercial Bill Impact ($)

Consumption	Meter Size	Current Rates	Scenario 1 20% Fixed	Scenario 2 25% Fixed
10 m^3	15mm	N/A	1.90	3.80
50 m^3	15mm	N/A	(0.59)	(1.18)
50 m^3	25mm	N/A	3.21	6.42
500 m^3	25mm	N/A	(24.82)	(49.64)
100 m^3	40mm	N/A	6.43	12.86
500 m^3	40mm	N/A	(18.48)	(36.96)
500 m^3	80mm	N/A	6.87	13.75
3,000 m^3	80mm	N/A	(110.83)	(221.66)
20,000 m^3	150mm	N/A	(661.97)	(1,323.95)
50,000 m^3	150mm	N/A	(1,759.77)	(3,519.54)

Table 22
Wastewater - Commercial Bill Impact ($)

Consumption	Meter Size	Scenario 1 20% Fixed	Scenario 2 25% Fixed
10 m^3	N/A	0.42	1.13
50 m^3	N/A	(0.68)	(1.82)
100 m^3	N/A	(2.06)	(5.52)
500 m^3	N/A	(13.08)	(35.06)
3,000 m^3	N/A	(81.96)	(219.68)
20,000 m^3	N/A	(487.98)	(1,307.99)
50,000 m^3	N/A	(1,127.46)	(3,022.06)

As with the residential and multi-residential customer class, increasing the fixed service charge would increase the average bill of lower consumption users and decrease the average bill of high volume users. Over the 5 year PBR term smaller commercial customers (approximately 12,000 customers or 61% of the customers) could expect to pay between $115 and $315 more while the largest customers could see savings between $100K and $300K over the 5 year term.

4.0 CONCLUSION

As noted at the outset, there is a need to balance the somewhat conflicting goals of fixed/variable rates splits. Higher levels of fixed rates provide an increased level of revenue stability for the utility and support its longer-term financial viability. Minimizing fixed charges supports the goal of water affordability, particularly for low-income ratepayers. Higher levels of variable charges are also used to incent conservation, particularly when combined with an inclining block structure to provide ratepayers an adequate price signal.

Based on the preceding analysis, EWSI's Water and Wastewater have a lower fixed component of revenue than comparable communities. The planned approach of increasing the fixed service charge to the average 25% level in the upcoming PBR application would decrease the season variability in revenue. This level of increase is seen as having minimal impact to residential medium/average consumption customers (14m^3 to 16m^3) and would decreases variability on customers bills (similar bill month to month). Cost of Service principles would also imply that charging higher fixed charges to the lower volume customers is a better reflection of the cost of providing service to those customers given the large majority of the cost is fixed. Lastly, as both water and wastewater would remain at relatively low fixed rates, the impact on conservation programs is seen as very limited.