

MEMO

TO: Madison Water Utility - Michael Krentz, Tom Heikkinen; PSC Staff

FROM: Trilogy Consulting, LLC

DATE: November 18, 2014

SUBJECT: PROPOSED COST-OF-SERVICE AND RATE DESIGN FOR MADISON WATER UTILITY,
DOCKET #3280-WR-113

The following summarizes the draft cost-of-service study and rate design for your review.

COST-OF-SERVICE ALLOCATION

In order to better reflect the function of the MWU system and recent decisions of the Public Service Commission, the following changes were made to the methodology of the cost-of-service study that was prepared by PSC staff in previous rate cases:

- Determination of system fire flow demands
 - We used a combined population of the entire service area, including wholesale customers and several different methods of estimating fire flow based on population served. The result is very close to the previous assumption, only more precise using a repeatable and documented calculation.
- Determination of system maximum hour demands
 - Previously, the maximum hour was assumed to be 1.5 times that of the maximum day demand. Using the AMI data, we were able to estimate that the actual maximum hour demand for the combined retail system, when compared to the maximum day demand for the same time period, was about 1.31 times the maximum day demand. This results in less costs allocated to maximum hour and more to base usage.
- Transmission and distribution cost allocation
 - In several recent cases, the Commission has determined that transmission mains serve a maximum hour function as well as a maximum day function. Similarly, distribution mains should also serve the maximum day function as well as the maximum hour function. Previously, transmission expenses were only allocated to base and maximum day functions and distribution expenses were allocated only to base and maximum hour functions.
- Customer class demand allocation
 - Public fire protection
 - When determining a base amount of actual water consumption used in fighting fires, PSC has used a standard assumption of one percent of total water sales. However, since wholesale customers already pay for actual water used to fight

fires within their system, we have changed this assumption to one percent of *retail* water sales.

- Allocation to distribution
 - In previous rate cases, PSC has allocated distribution costs to all customer classes, including wholesale customers. However, in most other utilities that serve wholesale customers, distribution costs are allocated only to retail customer classes, as wholesale customers maintain their own distribution systems. As such, we have allocated distribution costs in this cost-of-service only to retail customer classes.
- Customer class demand ratios
 - Based on the AMI data, we have revised the extra capacity ratios used in the cost-of-service to reflect actual demand from each of the customer classes. The following table shows the previous ratios used and the new proposed ratios based on the AMI data:

Customer Class	Max Day Extra Capacity Factor - 2011	Max Day Extra Capacity Factor - Proposed	Max Hour Extra Capacity Factor - 2011	Max Hour Extra Capacity Factor - Proposed
Residential	1.40	0.77	3.40	2.20
Multi-Family	1.20	0.70	3.00	2.32
Commercial	1.20	0.83	3.00	1.78
Industrial	1.00	0.73	2.00	1.93
Public Authority	1.20	1.66	3.00	3.49
Fitchburg	1.20	2.50	3.00	4.43
Maple Bluff	1.20	1.29	3.00	3.66
Shorewood Hills	1.20	0.32	3.00	1.32
Wauvona SD	1.20	0.43	3.00	1.40

These changes, along with the overall increase in revenue requirements, result in varying degrees of cost increases to the different customer classes. The following table shows the percent increases in costs allocated to the various classes. This assumes a 10 percent reduction in extra residential consumption during the peak summer season, June – September, due to the new seasonal conservation rate structure which will be outlined in the next section.

Customer Class	% Increase to Cost Allocation from Current Rates
Residential	21.6%
Multi-Family	22.8%
Commercial	30.8%
Industrial	37.0%
Public Authority	75.9%
Fitchburg	30.0%
Maple Bluff	1.0%
Shorewood Hills	-24.7%
Waunona SD	-22.8%
Overall Public Fire Protection	36.0%
PFP - Madison Retail	35.9%
PFP - Fitchburg	68.5%
PFP - Maple Bluff	28.9%
PFP - Shorewood Hills	50.5%
PFP - Waunona SD	44.9%

RATE DESIGN

We have prepared several alternative cost-of-service studies in order to compare rates under different methodologies; however, the focus is on the version that is included with this memo. This rate design includes a seasonal conservation rate that results in a 10 percent reduction in extra residential consumption during peak months, separates rates for each customer class and collects as near to 100 percent of each customer class’s cost-of-service as possible. For comparison’s sake, we also prepared a rate schedule based on the same structure as the current rates.

Fixed Charges

Fire Protection – We have designed fire protection charges to recover the cost-of-service assigned to that class. We have also proposed to increase the private fire protection charges in proportion to the increase in overall fire protection. We have also included non-customer properties in the fire protection revenues using the list of private wells in the MWU service area, excluding those that are for irrigation, undeveloped properties, and properties that do not have MWU water available to their properties. As

most of these are residential properties, we assumed that they would be charged the same rate as a 5/8" meter. The following shows the current and proposed public fire protection charges:

Public Fire Protection Charge

Connection Size	Current Monthly Charge	Proposed Monthly Charge	Percent Change
5/8-inch	\$1.50	\$2.02	35%
3/4-inch	\$4.25	\$6.00	41%
1-inch	\$9.50	\$13.00	37%
1 1/4-inch	\$12.50	\$18.00	44%
1 1/2-inch	\$17.50	\$24.00	37%
2-inch	\$37.50	\$51.00	36%
3-inch	\$125.00	\$170.00	36%
4-inch	\$275.00	\$374.00	36%
6-inch	\$500.00	\$680.00	36%
8-inch	\$1,000.00	\$1,360.00	36%
10-inch	\$1,750.00	\$2,380.00	36%
12-inch	\$2,500.00	\$3,400.00	36%

The current and proposed private fire protection charges:

Connection Size	Current Monthly Charge	Proposed Monthly Charge	Percent Change
1 1/2-inch	\$1.75	\$2.40	37%
2-inch	\$2.45	\$3.30	35%
3-inch	\$4.35	\$5.90	36%
4-inch	\$7.30	\$9.90	36%
6-inch	\$14.55	\$19.80	36%
8-inch	\$23.30	\$31.70	36%
10-inch	\$35.00	\$47.60	36%
12-inch	\$46.65	\$63.40	36%
14-inch	\$58.30	\$79.30	36%
16-inch	\$70.00	\$95.20	36%

General Service Fixed Charges – We designed the general service fixed charges on the basis of collecting about 19 percent of general service revenues, resulting in total fixed charges (including public fire protection) accounting for about 29 percent of revenues from rates. This results in only collecting about 70 percent of the cost-of-service of the general service fixed charge component, with the volumetric rates making up for the difference. The following are the proposed general service fixed charges:

Service Charge

Connection Size	Current Monthly Charge	Proposed Monthly Charge	Percent Change
5/8-inch	\$4.50	\$6.60	47%
3/4-inch	\$5.25	\$7.70	47%
1-inch	\$7.75	\$11.40	47%
1 1/4-inch	\$10.00	\$14.70	47%
1 1/2-inch	\$12.50	\$18.40	47%
2-inch	\$18.50	\$27.20	47%
3-inch	\$30.00	\$44.10	47%
4-inch	\$45.00	\$66.20	47%
6-inch	\$77.50	\$113.90	47%
8-inch	\$120.00	\$176.40	47%
10-inch	\$176.00	\$258.70	47%
12-inch	\$235.00	\$345.50	47%

Residential Volumetric Rates

We performed a detailed analysis of the residential AMI data to determine their demand characteristics, including the extent of the peak season, the number of customers who use a given amount of water each week/month, and the amount of water those customers use each week/month. In summary, we have determined that the peak water usage season begins near the end of May and runs through at least the middle of September. For rate-setting purposes, we have set the peak season, where customers would be charged for excess usage, as June through September. We have also proposed the base amount of usage during the peak season to be 6,000 gallons per month, with an excess charge applied to any usage over 6,000 gallons. At this level, about 50 percent of usage during those months would be charged at the excess rate, with that usage coming from about 21 percent of residential customers. The following shows the proposed rates (the excess charge only applies during the peak season – all usage is charged the base rate during off-peak season):

Volume Charge - Residential

JUNE - SEPTEMBER	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
BASE	6,000	\$2.81	\$2.96	5.3%
EXCESS (PEAK)	6,000	\$2.81	\$4.48	59.4%

OCTOBER - MAY	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
ALL		\$2.81	\$2.96	5.3%

For comparison's sake, if the residential rates were to remain uniform for all usage, with no corresponding reduction in peak usage, the rate would be about \$3.21 / 1,000 gallons.

Multi-Family Volumetric Rates

We performed similar analysis with the multi-family class. Based on the most recent 12 months of data, usage for multi-family customers is generally steady throughout the year with a slight dip around Christmas and a large, short peak between the end of August and mid-September. This, along with the unavailability of data on the number of units in each building, led us to conclude that a uniform rate for all usage would be appropriate for the multi-family class at this time. The following shows the current and proposed rates:

Volume Charge - Multi-Family

	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
FIRST	62,331	\$2.34	\$2.63	12.4%
OVER	62,331	\$1.83	\$2.63	43.7%

Commercial Volumetric Rates

Similarly, the AMI data for the commercial class did not indicate any clear patterns of usage that would dictate a rate structure other than a uniform rate for all usage, at this time. The following shows the proposed rates for the commercial class:

Volume Charge - Commercial

	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
FIRST	62,331	\$2.34	\$2.68	14.5%
OVER	62,331	\$1.83	\$2.68	46.4%

Industrial Volumetric Rates

Based on the AMI data, it is clear that industrial usage for the class is dominated by a few, very large customers. Those large customers also appear to have more stable usage throughout the year, with smaller peak usage relative to normal usage. Because of this, it would be possible to maintain a 2-tiered rate structure for the industrial class, with an adjustment of the size of the blocks. However, the impact to the large customers would be negligible, so a uniform rate for all usage is proposed at this time. Under this scenario, the proposed rates would look like the following:

Volume Charge - Industrial

	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
FIRST	62,331	\$2.34	\$2.53	8.1%
OVER	62,331	\$1.83	\$2.53	38.3%

Public Authority Volumetric Rates

The public authority class, consisting of the municipal, government and UW meters, showed a consistent pattern of higher usage on weekdays during the day hours. The level of water usage fluctuated throughout the year, with a large spike during a short period of time at the end of August through mid-September. This resulted in their having relatively higher peak ratios compared to the other retail classes, and correspondingly higher rates. Again, at this time, there does not appear to be sufficient data that would warrant a rate structure other than a uniform rate. However, with more data collection, it is possible that there could be justification in the future to create a multi-tiered rate structure or to have separate rates for the different sub-classes. Certainly, the timing of the peak day and hour of usage indicates that it is driven by the UW meters, and they are larger meters on average. However, considering the magnitude of the proposed increase, it may be unfeasible to do that at this time. The following shows the proposed rates for the public authority class:

Volume Charge - Public Authority

	Water Use Block (gallons)	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
FIRST	62,331	\$2.34	\$3.36	43.6%
OVER	62,331	\$1.83	\$3.36	83.6%

Wholesale Volumetric Rates

The wholesale customers were impacted significantly by the changes to the cost-of-service, so their proposed rates vary widely. The main factors are the change in allocating distribution costs and the changes in their demand ratios. Their public fire protection charges were set to recover their cost-of-service and their general service fixed charges are set based on the actual meters that serve their utilities. The following shows their proposed rates, taking into account all of the changes described above:

Public Fire Protection

Wholesale Customer	Current Monthly Charge	Proposed Monthly Charge	Percent Change
Fitchburg	\$95.00	\$160.00	68.4%
Maple Bluff	\$2,200.00	\$2,834.00	28.8%
Shorewood Hills	\$2,200.00	\$3,310.00	50.5%
Waunona Sanitary District No. 2	\$1,250.00	\$1,811.00	44.9%

General Service Charge

Wholesale Customer	Current Monthly Charge	Proposed Monthly Charge	Percent Change
Fitchburg	\$77.50	\$113.90	47.0%
Maple Bluff	\$310.00	\$455.60	47.0%
Shorewood Hills	\$352.50	\$518.10	47.0%
Waunona Sanitary District No. 2	\$155.00	\$227.80	47.0%

Volume

Wholesale Customer	Current Charge (\$/1000 gallons)	Proposed Charge (\$/1000 gallons)	Percent Change
Fitchburg	\$2.19	\$2.76	26.0%
Maple Bluff	\$2.07	\$2.06	-0.5%
Shorewood Hills	\$2.07	\$1.52	-26.6%
Waunona Sanitary District No. 2	\$2.07	\$1.56	-24.6%

The following table shows the overall increase in total revenues from each customer class based on the proposed rates and projected flows, including charges from public fire protection.

Customer Class	% Increase to Revenues from Current Rates
Residential	22.9%
Multi-Family	24.3%
Commercial	31.8%
Industrial	36.9%
Public Authority	69.3%
Fitchburg	37.4%
Maple Bluff	6.7%
Shorewood Hills	-13.3%
Waunona SD	-11.9%

The table on the following page shows the impacts on the monthly bills of some example customers. This table can also be found in the cost-of-service model.

Customer Type	Meter Size (Inches)	Volume Gallons	Monthly Bill with Public Fire Protection		
			Bill at Old Rates	Bill at New Rates	Percentage Change
Small Residential (Off-Peak)	5/8	2,000	\$11.62	\$14.54	25.1%
Small Residential (Peak)	5/8	2,500	\$13.03	\$16.02	23.0%
Small Residential (Annual)			\$145.06	\$180.40	24.4%
Average Residential (Off-Peak)	5/8	4,000	\$17.24	\$20.46	18.7%
Average Residential (Peak)	5/8	5,000	\$20.05	\$23.42	16.8%
Average Residential (Annual)			\$218.12	\$257.36	18.0%
Large Residential (Off-Peak)	5/8	10,000	\$34.10	\$38.22	12.1%
Large Residential (Peak)	5/8	14,000	\$45.34	\$62.22	37.2%
Large Residential (Annual)			\$454.16	\$554.64	22.1%
Very Large Residential (Off-Peak)	5/8	16,000	\$50.96	\$55.98	9.9%
Very Large Residential (Peak)	5/8	30,000	\$90.30	\$133.90	48.3%
Very Large Residential (Annual)			\$768.88	\$983.44	27.9%
Average Multi-Family	5/8	40,000	\$99.60	\$113.82	14.3%
Large Multi-Family	1	500,000	\$964.04	\$1,339.40	38.9%
Commercial	5/8	8,000	\$24.72	\$30.06	21.6%
Commercial	1	32,000	\$92.13	\$110.16	19.6%
Commercial	1 1/2	100,000	\$244.79	\$310.40	26.8%
Commercial	2	250,000	\$545.29	\$748.20	37.2%
Commercial	6	4,600,000	\$9,027.29	\$13,121.90	45.4%
Industrial	1	65,000	\$167.99	\$188.85	12.4%
Industrial	4	900,000	\$1,998.79	\$2,717.20	35.9%
Industrial	6	7,000,000	\$13,419.29	\$18,503.90	37.9%
Industrial	6	17,000,000	\$31,719.29	\$43,803.90	38.1%
Public Authority	1	125,000	\$277.79	\$444.40	60.0%
Public Authority	4	4,500,000	\$8,586.79	\$15,560.20	81.2%
Public Authority	8	6,000,000	\$12,131.79	\$21,696.40	78.8%
Public Authority	10	18,000,000	\$34,897.79	\$63,118.70	80.9%

Bill impacts were also calculated under a scenario in which the basic rate structure remained the same as current rates (uniform residential, 2-tiered declining for all non-residential, including multi-family). Under that scenario for comparison, most non-residential and multi-family customers would see bill increases of between 36 and 37 percent. For residential customers, on an annual basis, the small customers would see an increase of 29.6 percent (24.4 proposed above), average customers would see an increase of 24.2 percent (18.0 proposed above), large customers would see an increase of 18.6 percent (22.1 proposed above), and very large customers would see an increase of only 16.5 percent (27.9 proposed above).