

MEMORANDUM

DATE: July 11, 2017
TO: William Stowe, CEO and General Manager
FROM: Peggy Freese, CFO
SUBJECT: 2016 Cost of Service Study

The 2016 Cost of Service (COS) Study has been completed and the Executive Summary, Trends and Highlights, and Future Considerations are attached.

DMWW has been compiling COS studies annually since 1987. The COS is based on AWWA methodology outlined in the manual “Principles of Water Rates, Fees, and Charges,” also known as the “M1” manual. The M1 manual outlines two methodologies for calculating cost of service, base-extra capacity and the commodity-demand. We analyze costs using both methods. The attached report focuses on the base-extra capacity method as this is the method we use as the basis for setting rates. The complete COS contains the commodity-demand data in addition to the base-extra capacity data.

In the COS, the calculation of cost per 1,000 gallons is comprised of both operating and capital costs. Operating costs are actual expenditures. The capital cost component is a calculated amount based on the replacement cost depreciation of our assets. The replacement cost for each asset is calculated based on the original cost of the asset updated by the Engineering New Record (ENR) Construction Cost Index. The annual depreciation is calculated using the replacement cost and life expectancy of each asset. Collecting replacement cost depreciation through water rates allows DMWW to fund capital expenditures on a pay-as-we-go basis rather than incurring debt. For service areas outside the city of Des Moines, the cost calculation also includes a return on investment component.

Following two wet years, consumption rebounded in 2016. Consumption for 2016 increased 7.4% over 2015. As you may recall, 2015 consumption was the lowest total annual consumption since 2000. Consumption in the Des Moines Inside City service area increased 1.3%. Consumption by wholesale customers increased 11.4%. Sales to the aggregate areas outside Des

Moines were 60% of total consumption while sales to the Inside City service area were 40% of consumption.

Total costs increased 1% overall, compared to 2.6% in 2015. Operating and maintenance costs increased 0.2%, compared to 1.5% in 2015. Capital replacement costs increased 2.9%.

Replacement cost depreciation accounts for 31% of the total cost of service. For Des Moines Inside City, 34% of the cost per 1,000 gallons is due to replacement cost depreciation. For the Purchased Capacity rate class, 25% of the cost is replacement cost depreciation.

Both costs and consumption increased. The impact of the consumption increase outweighed the increase in costs resulting in a decrease in the cost per 1,000 gallons in most service areas. Page 6 shows a summary of costs per 1,000 gallons for the years 2012 through 2016. Total cost per 1,000 gallons for Des Moines Inside City step 1 decreased from \$4.04 to \$3.90. The Purchased Capacity cost decreased from \$1.81 to \$1.72 per 1,000 gallons.

Following our review with the Finance and Audit Committee, the Board will receive and file the COS report at the July Board meeting. We will forward the report to our full service and wholesale customers and schedule a review meeting with them. Staff will do additional analysis and develop preliminary rate recommendations for discussion at the September Finance and Audit Committee meeting. Action on water rates for 2018 will occur at the October Board meeting. Our wholesale contracts require a six-month notice before a water rate change can be made.

As you know, in February the Board approved our selection of Raftelis Financial Consultants (RFC) to review our Cost of Service methodology. To kick off the project, RFC met with several of our wholesale customers to solicit their opinions on our Cost of Service study. RFC has completed an initial review of our 2016 Cost of Service report and the underlying calculations. We are working with RFC to review their initial observations and identify next steps. As we indicated in February, any changes to our COS process or our rate structure will require a substantial amount of time to design and implement. Because of this, we will use this COS as the basis of our rate recommendations for 2018.

DES MOINES WATER WORKS

COST OF SERVICE STUDY

FOR THE YEAR ENDING

DECEMBER 31, 2016



This report has been prepared by:

Donna Heckman, and members
of the Des Moines Water Works
Finance Staff

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Des Moines Water Works performs an annual cost of service study to determine the cost of providing clean, safe drinking water to a variety of service areas and customer classes.¹ The study reviews costs for a one-year period in order to estimate the revenue required to fund future operating expenses and capital replacements. This analysis considers non-cash elements such as replacement cost depreciation and return on investment in addition to cash outlays. Des Moines Water Works uses the methodology developed in the American Water Works Association's "Principles of Water Rates, Fees, and Charges", commonly referred to as the M1 Manual. The base-extra capacity method and the commodity-demand method are two accepted approaches of analyzing the costs to serve various customer classes. Historically, the Des Moines Water Works has used the base-extra capacity method as the basis for setting rates.

In the base-extra capacity method, costs of service are separated into four primary cost components: (1) base costs, (2) extra-capacity costs, (3) customer costs, and (4) direct fire-protection costs. Base costs are those that vary with the total quantity of water produced plus operation and maintenance expenses and capital costs associated with average demand characteristics. Extra-capacity costs are the operation and maintenance expenses and capital costs for system capacity beyond the average rate of use. Extra capacity costs are further divided between maximum-day demand and maximum-hour demand. Customer-related costs stem from services to customers, regardless of the amount of water used or the demand on the system. They include meter reading, billing, and customer service activities. Finally, fire protection costs include the maintenance and replacement costs of public fire hydrants and the mains and valves that serve them. The allocation of replacement cost depreciation, within the above components, is based upon

¹ DMWW hired Raftelis Financial Consultants to evaluate all facets of our cost of service and rate making process. This analysis is still ongoing and may impact future rate recommendations.

a combination of percent of total consumption, percent of total customer accounts and percent of total hydrants, respectively.

In addition to the Des Moines service area, the Des Moines Water Works provides water to unincorporated Polk County, Windsor Heights, Warren County, Pleasant Hill, Runnells, Cumming, Alleman, Polk County Rural Water District #1(PCRWD#1) and the Berwick Water District service areas. The Des Moines service area is further divided into Inside City, Outside City (accounts outside Des Moines' city limits but not in one of the other eight service areas) and Wholesale (accounts that buy water on a wholesale basis and resell it to their own customers). The base-extra capacity method distributes costs to each service area and to three progressive rate steps in service areas with significant commercial and industrial consumption. The first and second rate steps have consumption thresholds that result in a tiered or step-like rate structure - when a customer's consumption exceeds the first step threshold, the customer progresses to the second step and so on. It is presumed that most residential customers will remain in the first step. While commercial and industrial customers have consumption in the first step, many also have consumption in the second and third steps.

Operating and maintenance costs increased 0.22% following 1.47% higher costs in 2015. Most operational areas saw an increase in expenses during 2016. Water Production saw a 4.47% increase in costs in 2016 over 2015. The Pipelines operational area had a cost increase in 2016 with costs increasing 4.74%. After a decrease of 0.20% in 2015, Customer Service costs again decreased 4.68% in 2016. General and Administrative costs decreased by 6.4% in 2016. There was an increase of 2.1% in the Consumer Price Index for 2016. A chart on page 15 in the Trends and Highlights section shows cost detail for the years 2016 thru 2016.

Capital replacement costs increased 2.89% from 2015 to 2016. Two factors contribute to the continued increases: the addition of assets and the increase in the *Engineering News*

Record Construction Cost Index (ENR CCI). The Construction Cost Index used to measure the relative change in cost increased 4.35% in 2016 after a 1.65% increase in 2015.

In the 2016 study, total costs (combined O&M and replacement cost depreciation) increased 1.03% over 2015.

For the first time since 2012, we saw an increase in overall consumption. Consumption was 7.37% more than consumption in 2015. Our two largest customers are Des Moines Inside City and Wholesale where consumption increased by 1.31% and 11.41% respectively. A more detailed analysis of trends in cost, revenue and consumption patterns over the past five years is presented in the following section.

The summary on page 5 compares the total costs for each service area and customer class. The results of the study show that after adjusting both cost and revenue for the effect of monthly availability charges, total costs exceeded revenue by 3.0% in 2016 compared to 2015 when costs exceeded revenue by 17.2% and 2014 when costs exceeded revenue by 19.2%.

The calculation of cost per 1,000 gallons is impacted by costs and consumption. In 2016, both costs and consumption increased. The impact of the consumption increase outweighed the increase in costs resulting in a reduction of cost per 1,000 gallons.

Total Cost and Revenue Comparison
(Availability charge revenue and corresponding costs are excluded)
2014 Through 2016

	2014				2015				2016			
	Consumption (1,000 gallons)	Base-Extra Cap. Costs	TOTAL REVENUE	% Variance	Consumption (1,000 gallons)	Base-Extra Cap. Costs	TOTAL REVENUE	% Variance	Consumption (1,000 gallons)	Base-Extra Cap. Costs	TOTAL REVENUE	% Variance
Inside City												
Step 1 (Residential)		\$17,401,338	\$14,266,150			\$18,032,831	\$14,745,635			\$17,635,515	\$17,809,348	
Step 2 (Commercial)		1,565,294	1,279,255			1,604,905	1,330,718			1,554,411	1,354,132	
Step 3 (Industrial)		2,053,716	1,674,098			2,075,848	1,738,146			2,039,127	1,776,942	
Subtotal	6,194,045	\$21,020,348	\$17,219,503	22.07%	6,074,557	\$21,713,584	\$17,814,499	21.89%	6,154,274	\$21,229,053	\$20,940,422	1.38%
Outside City												
Step 1 (Residential)		\$303,071	\$250,995			\$315,414	\$263,989			\$313,386	\$260,436	
Step 2 (Commercial)		17,154	14,680			24,000	21,320			32,622	30,752	
Step 3 (Industrial)		1,169	968			2,794	2,422			304,778	290,110	
Subtotal	79,808	\$321,394	\$266,643	20.53%	81,674	\$342,208	\$287,731	18.93%	229,413	\$650,786	\$581,298	11.95%
Wholesale												
Purchased Capacity		\$11,161,866	\$9,226,000			\$11,472,001	\$9,596,778			\$12,261,531	\$10,806,510	
With Storage		2,299,163	2,079,866			2,397,329	2,223,131			2,639,253	2,498,941	
Off Peak		81,834	68,618			132,767	113,336			0	0	
Subtotal	7,080,854	\$13,542,863	\$11,374,484	19.06%	7,077,582	\$14,002,097	\$11,933,245	17.34%	7,885,030	\$14,900,784	\$13,305,451	11.99%
Polk County												
Step 1 (Residential)		\$2,788,341	\$2,554,705			\$2,783,076	\$2,858,562			\$2,598,516	\$3,142,594	
Step 2 (Commercial)		152,068	164,279			150,459	167,703			142,301	172,910	
Step 3 (Industrial)		535,051	512,287			533,793	531,571			450,975	464,016	
Subtotal	640,679	\$3,475,460	\$3,231,271	7.56%	629,931	\$3,467,328	\$3,557,836	-2.54%	624,038	\$3,191,792	\$3,779,520	-15.55%
Pleasant Hill												
Step 1 (Residential)		\$1,002,385	\$910,791			\$1,037,135	\$975,717			\$995,849	\$1,124,829	
Step 2 (Commercial)		466,731	400,686			432,854	385,692			465,518	434,674	
Subtotal	242,041	\$1,469,116	\$1,311,477	12.02%	231,150	\$1,469,989	\$1,361,409	7.98%	247,098	\$1,461,367	\$1,559,503	-6.29%
Windsor Heights	114,520	\$487,855	\$371,647	31.27%	113,912	\$437,422	\$398,635	9.73%	117,311	\$445,782	\$444,285	0.34%
PCRWD#1	24,141	\$89,080	\$93,591	-4.82%	23,747	\$107,811	\$95,207	13.24%	24,573	\$80,845	\$98,413	-17.85%
Berwick	32,930	\$171,236	\$132,056	29.67%	32,698	\$122,291	\$130,060	-5.97%	36,238	\$145,677	\$144,942	0.51%
Runnells												
Water		\$42,061	\$49,102			\$48,568	\$49,440			\$45,299	\$55,871	
Waste Water		38,631	49,268			57,579	50,246			72,391	56,381	
Subtotal	9,026	\$80,692	\$98,370	-17.97%	8,581	\$106,147	\$99,686	6.48%	8,796	\$117,690	\$112,252	4.84%
Alleman	9,108	\$80,241	\$55,839	43.70%	8,923	\$81,913	\$58,450	40.14%	9,257	\$76,185	\$65,566	16.20%
Cumming	10,049	\$54,265	\$53,987	0.51%	9,780	\$54,572	\$56,531	-3.47%	11,043	\$44,835	\$69,575	-35.56%
Warren County												
Step 1 (Residential)		\$46,234	\$41,873			\$46,606	\$47,192			\$46,812	\$46,214	
Step 2 (Commercial)		11,071	8,664			13,096	11,615			11,952	10,491	
Subtotal	4,624	\$57,305	\$50,537	13.39%	5,086	\$59,702	\$58,807	1.52%	4,887	\$58,774	\$56,705	3.65%
TOTAL	14,441,825	\$40,849,855	\$34,259,405		14,297,621	\$41,965,064	\$35,852,096		15,351,958	\$42,403,570	\$41,157,932	

Costs were 19.2% > revenue in 2014

Costs were 17.2% > revenue in 2015

Costs were 3.0% > revenue in 2016

The table below shows the previous four years' costs compared with the 2016 cost per thousand gallons.

COSTS PER 1,000 GALLONS
Base-Extra Capacity Method

	Number of Accounts	2012	2013	2014	2015	2016	% Inc/(Dec) 15 to 16	Average Annual Increase	2016 Rate
Des Moines Inside	67,303								
Residential (Step 1)		3.01	3.32	3.82	4.04	3.90	-3.47%	7.39%	3.74
Commercial (Step 2)		1.92	2.18	2.58	2.71	2.58	-4.80%	8.59%	2.51
Industrial (Step 3)		1.45	1.63	1.99	2.06	1.98	-3.88%	9.14%	1.93
Des Moines Outside	1,185								
Residential (Step 1)		3.16	3.53	4.12	4.34	4.37	0.69%	9.57%	4.06
Commercial (Step 2)		2.22	2.50	3.00	3.09	2.92	-5.50%	7.88%	3.05
Industrial (Step 3)		1.57	1.79	2.21	2.27	2.08	-8.37%	8.12%	2.18
Wholesale	47								
Purchased Capacity		1.27	1.43	1.75	1.81	1.72	-4.97%	8.86%	1.68
With Storage		2.82	3.03	3.48	3.56	3.49	-1.97%	5.94%	3.66
Polk County	6,999								
Residential (Step 1)		5.11	5.85	6.58	6.64	6.00	-9.64%	4.35%	7.36
Commercial (Step 2)		2.92	3.03	3.52	3.64	3.34	-8.24%	3.60%	4.51
Industrial (Step 3)		2.35	2.59	3.08	3.15	3.04	-3.49%	7.34%	3.52
Pleasant Hill	3,080								
Residential (Step 1)		4.66	5.40	6.33	6.61	6.09	-7.87%	7.67%	6.85
Commercial (Step 2)		4.31	4.82	5.74	5.83	5.57	-4.46%	7.31%	5.78
Windsor Heights	2,081	2.88	3.38	4.26	3.84	3.80	-1.04%	7.99%	3.81
PCRWD#1	464		3.33	3.69	4.54	3.29	-27.53%	-0.40%	4.00
Berwick	220			5.20	3.74	4.02	7.49%	-11.35%	4.00
Runnells	182								
Water		4.25	5.21	4.66	5.66	5.15	-9.01%	5.29%	6.50
Sewer		3.84	5.22	4.28	6.71	8.23	22.65%	28.58%	7.05
Alleman	156	4.35	6.95	8.81	9.18	8.23	-10.35%	22.30%	7.25
Cumming	141	2.04	3.12	5.40	5.58	4.06	-27.24%	24.75%	6.39
Warren County	79								
Residential (Step 1)		10.96	11.07	12.80	12.21	12.52	2.54%	3.56%	13.79
Commercial (Step 2)		9.32	9.42	10.94	10.32	10.42	0.97%	2.95%	10.13

TRENDS AND HIGHLIGHTS

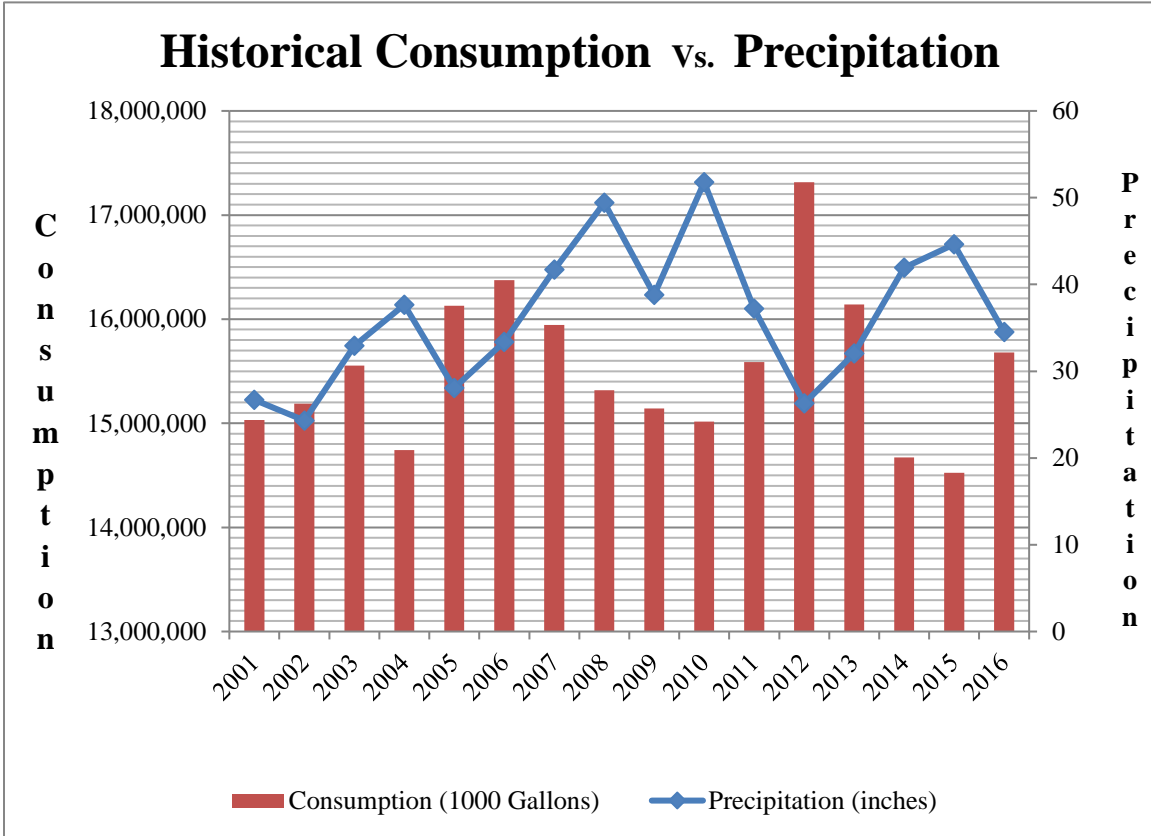
TRENDS AND HIGHLIGHTS

The two main components evaluated in Trends and Highlights are 1) consumption and 2) total costs. While consumption is important in evaluating a per thousand-gallon cost, it is the total cost components that are our main focus in trending. Total costs are further broken down into 1) operating & maintenance and 2) replacement cost depreciation.

Consumption

Consumption increased (7.37%) over the previous year for the first time since 2012. Because of their small relative size, statistics for the Warren County, Runnells, Cumming, Alleman, PCRWD#1 and Berwick Water District service areas are included with Outside City in these illustrations unless noted otherwise. Generally speaking, pumpage refers to the total amount of water that left the treatment plants; whereas consumption refers to the amount of water billed to our customers. The difference between the two is often referred to as lost water.

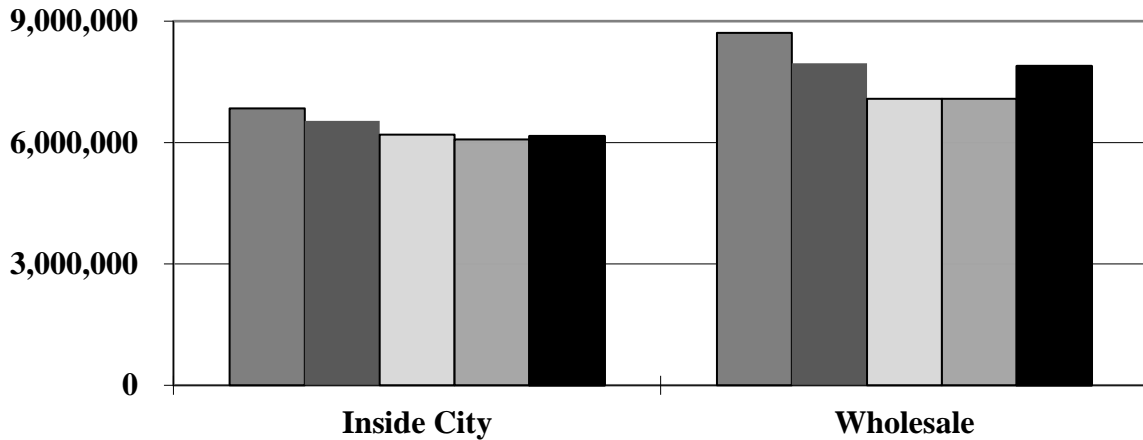
The chart on page 9 shows the historical billed consumption versus the amount of precipitation recorded in the Des Moines Metro area. Consumption rebounded a little in 2016, with total consumption being 15.7 billion gallons. Wide availability of water efficient appliances has likely reduced per capita water used over time. However, it is still clear that we have a large volume of irrigation usage that is directly impacted by precipitation. While rain patterns can be different month to month in any given year, this chart shows a correlation between years with high precipitation patterns and low water consumption.

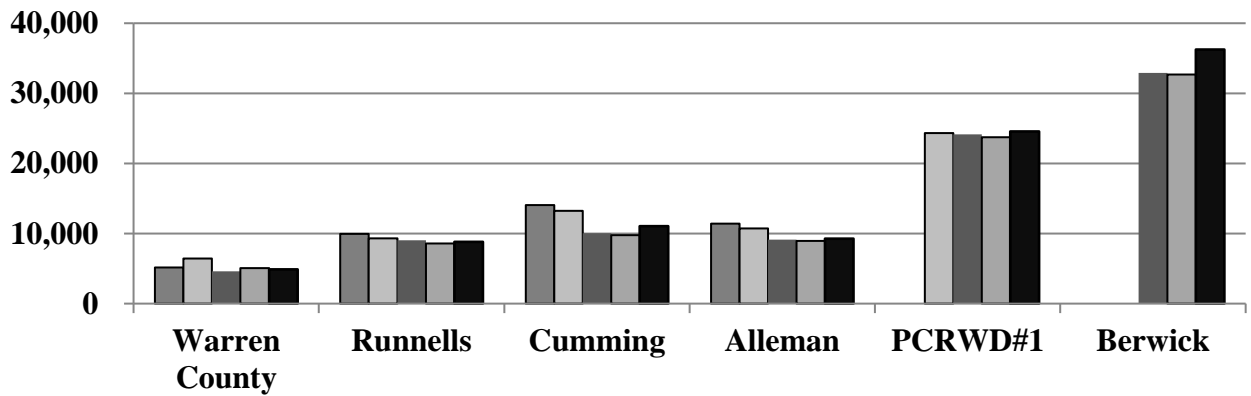
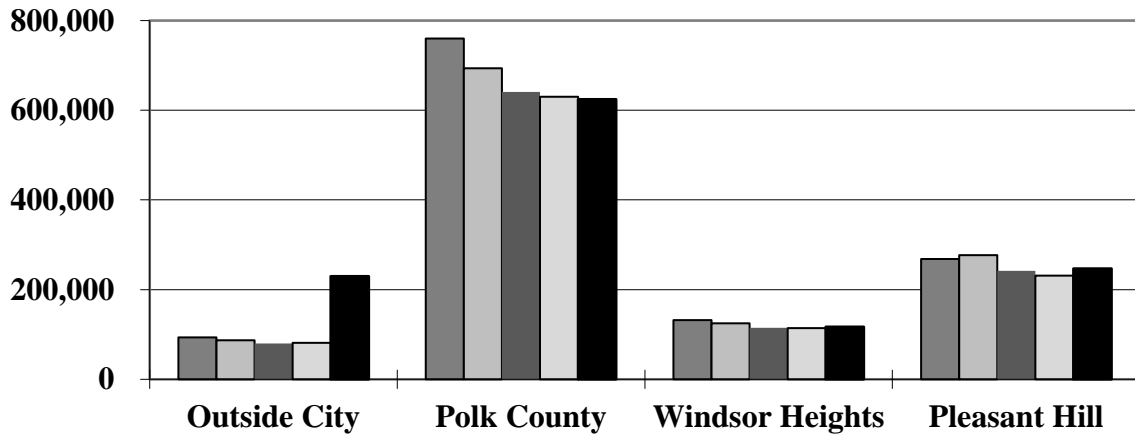


The charts below illustrate the consumption patterns from 2012 thru 2016 for the various service areas:

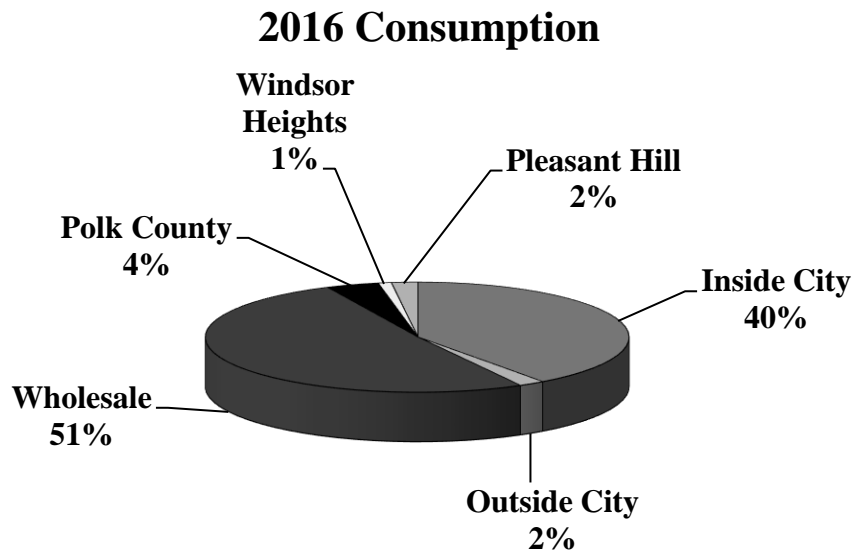
Service Area Consumption (in 1000 Gallons)

2012
 2013
 2014
 2015
 2016

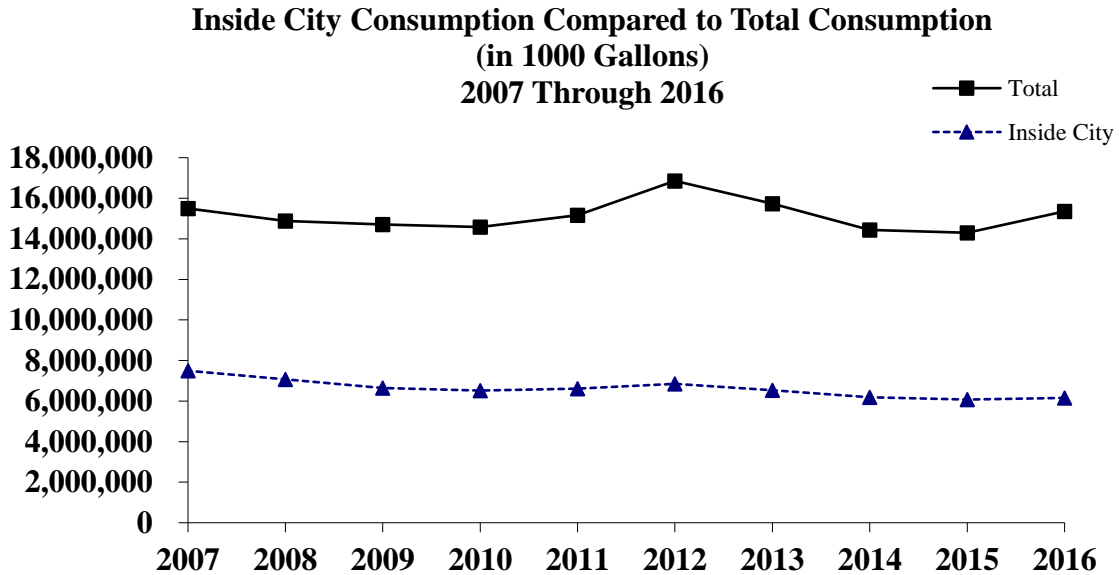




The percentage of water billed to Wholesale customers increased slightly to 51% of total water billed.

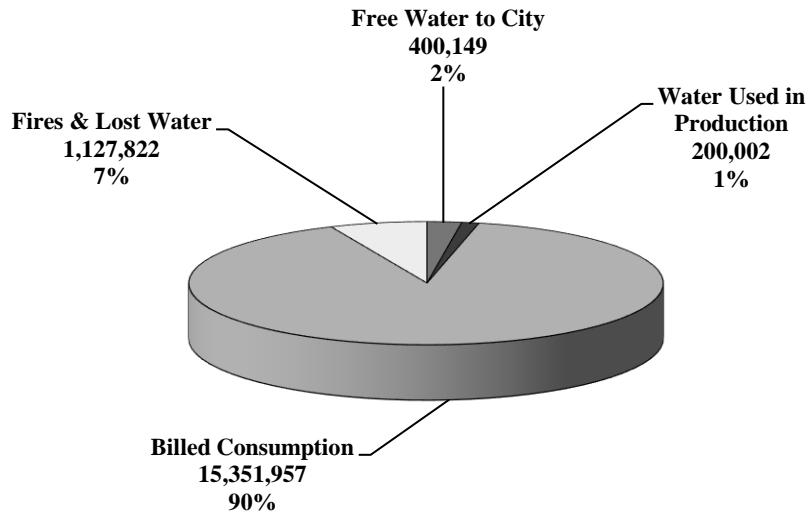


At 60%, sales to the aggregate of all areas outside Des Moines exceeded Inside City billed consumption which was 40% of the total. In comparison, 2015 consumption was comprised of 58% to Outside City and 42% of consumption was Des Moines Inside City. The chart below illustrates that Des Moines Inside City consumption is relatively flat, even in years of high pumpage.



The chart on the next page shows that a total of 90% of water produced and pumped from the three treatment plants was billed to customers. Free water supplied to the City of Des Moines was 2% of the total and water used in production was 1% of the total. The remaining unbilled water (7%) was used in fighting fires or lost to main breaks and other leakage. This percentage is kept to a minimum by leak detection efforts. The average annual fire/lost water percentage from 2012 thru 2016 has been 6% of the total pumpage.

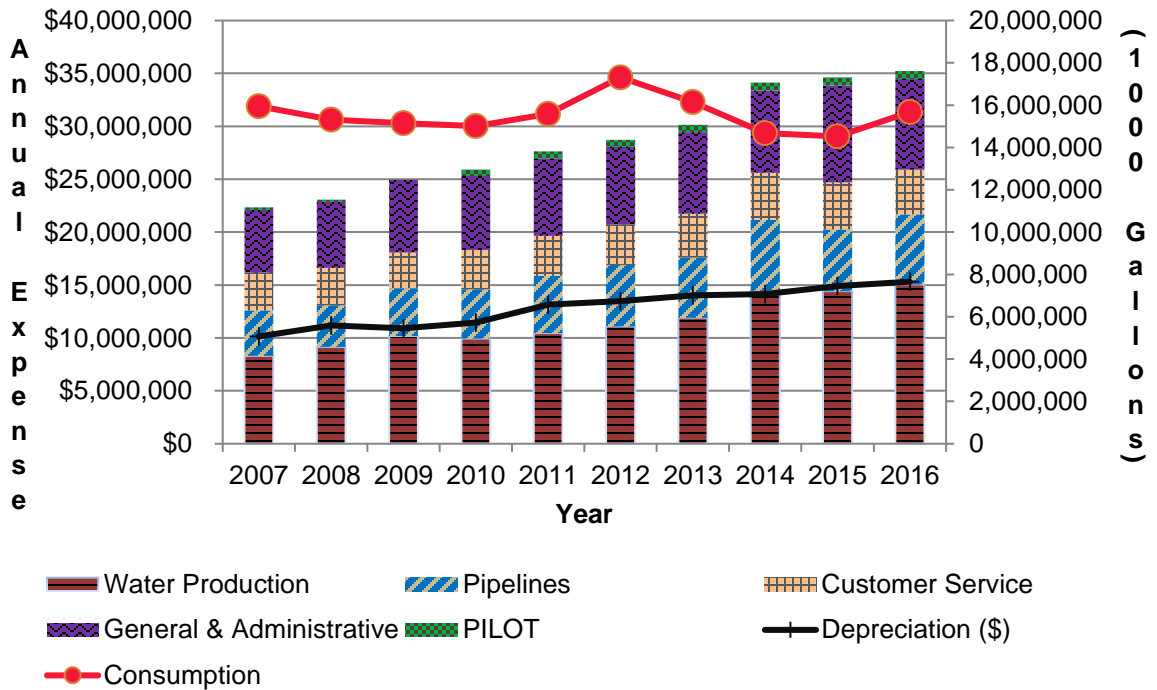
Distribution of Water Produced in 2016 (in 1000 Gallons)



Costs

There are two main types of costs in this study; operating & maintenance and replacement cost depreciation. The chart below illustrates how these costs increase yearly and how this increase is not entirely correlated to consumption.

Historical Expenses vs. Consumption

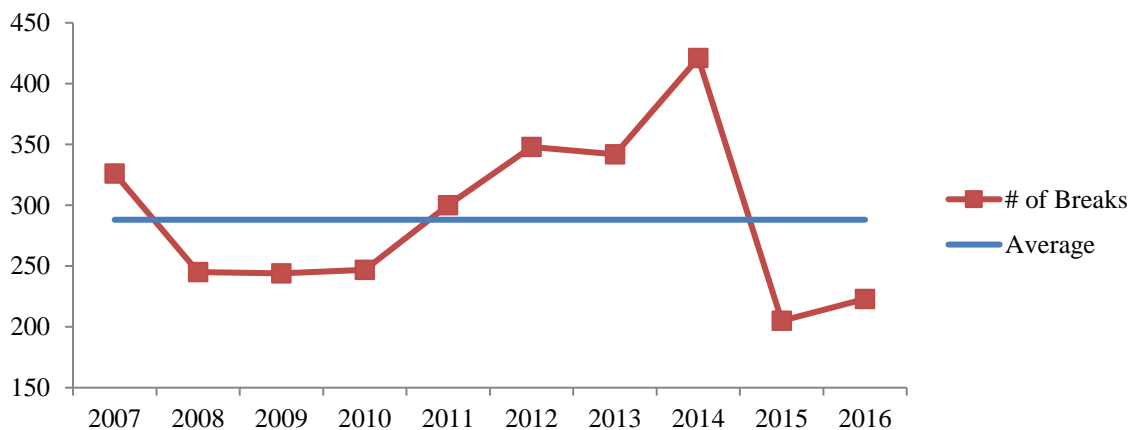


Operating and Maintenance Costs

Annual operating and maintenance costs increased 0.22% in 2016 compared with an increase of 1.47% seen in 2015. All operating and maintenance costs are allocated to four operational areas of cost of service, including Water Production, Pipelines, Customer Service and Administrative.

Water Production costs increased 4.47% in 2016. In 2016, we saw an increase (\$987K) in residuals expense at the Fleur Drive plant. We expect these hauling expenses to stabilize at approximately this level in future years. We operated the Nitrate Removal Facility for 65 days in 2016 at a cost of approximately \$630K. While some overtime labor was incurred in dealing with nitrate concentration levels, labor hours were also diverted from other maintenance projects in order to facilitate the nitrate issue. DMWW also incurred over \$400K in legal fees associated with nitrate litigation in an effort to protect DMWW source waters. Pipeline costs increased 4.74% during 2016. This was partially due to an increase in main breaks from 205 breaks in 2015 to 223 in 2016. Below is a chart showing the historical number of main breaks compared to the average.

Historical # of Main Breaks



Customer Related costs decreased 4.68% over 2015. Administrative costs decreased over 2015, with a 6.40% decrease. Corporate Insurance decreased \$220K from 2015 to 2016. This is primarily due to a reduction related to workers' compensation. Another area of decrease in Administrative costs was in the Grounds Maintenance area as we saw less flooding in 2016.

The Consumer Price Index increased an average of 2.1% yearly over the same period. The table on the next page shows annual operating and maintenance costs by function from 2013 through 2016.

OPERATING & MAINTENANCE COST ALLOCATION

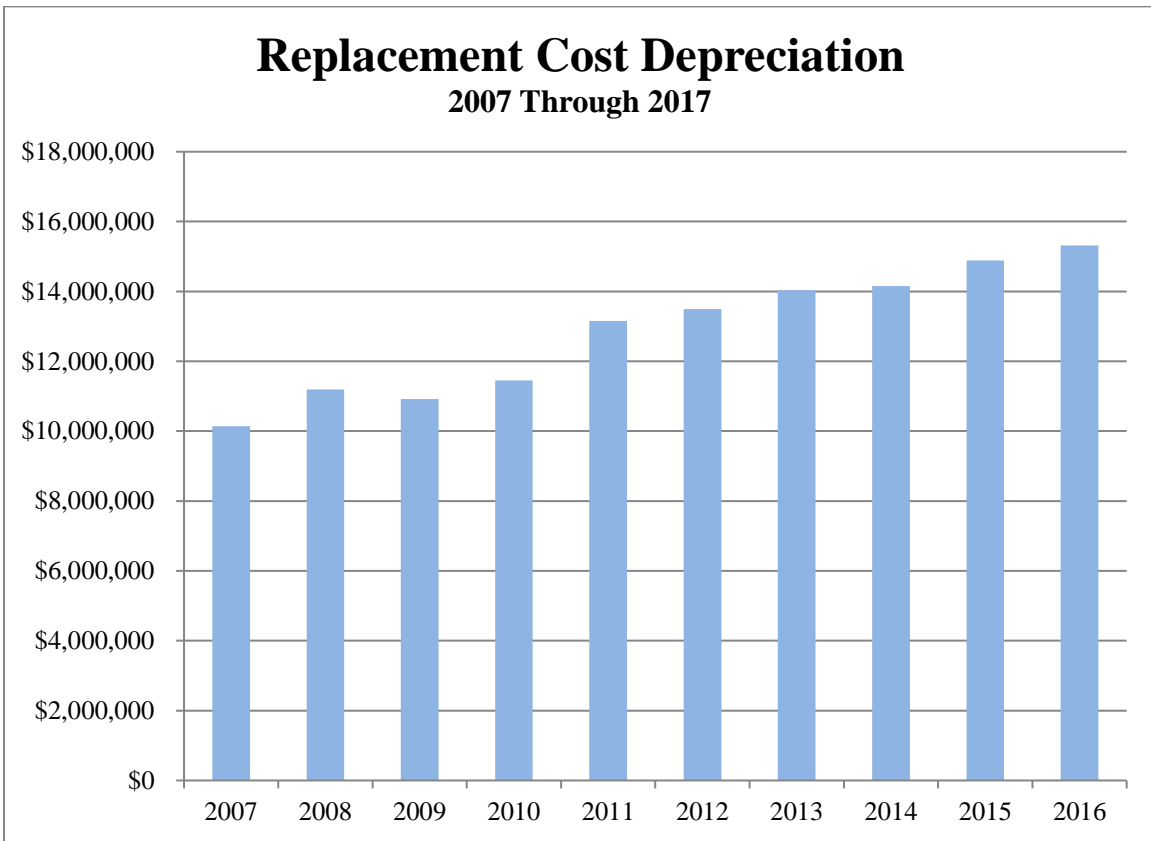
	2013	2014	2015	2016	% Increase 13 - 16	% Increase 15 - 16
Water Production						
Power	\$1,569,748	\$1,627,288	\$1,571,776	\$1,707,878	8.80%	8.66%
Chemicals	4,006,073	4,257,573	4,680,707	4,474,041	11.68%	-4.42%
Ops, Maint.	6,344,557	8,565,803	8,166,499	8,882,161	40.00%	8.76%
Total	\$11,920,378	\$14,450,664	\$14,418,982	\$15,064,080	26.37%	4.47%
Pipelines						
Des Moines	\$5,056,416	\$5,970,215	\$5,271,868	\$5,566,151	10.08%	5.58%
Polk County	415,373	451,377	356,067	329,731	-20.62%	-7.40%
Windsor Heights	53,032	78,257	26,463	51,700	-2.51%	95.37%
Pleasant Hill	75,982	71,759	85,596	70,463	-7.26%	-17.68%
Runnells	49,300	39,394	51,449	61,720	25.19%	19.96%
Cumming	3,798	12,215	8,707	3,126	-17.69%	-64.10%
Alleman	5,460	5,481	4,890	2,963	-45.73%	-39.41%
PCRWD#1	14,489	12,474	17,746	5,301	-57.50%	-70.13%
Berwick		44,251	4,458	12,508	180.57%	180.57%
Total	\$5,673,850	\$6,685,423	\$5,827,244	\$6,103,663	7.58%	4.74%
Customer Service						
Des Moines	\$3,481,866	\$3,777,838	\$3,787,172	\$3,602,297	3.46%	-4.88%
Polk County	361,733	359,975	369,014	362,103	0.10%	-1.87%
Windsor Heights	83,877	91,211	89,375	83,645	-0.28%	-6.41%
Pleasant Hill	176,558	172,725	145,766	144,490	-18.16%	-0.88%
Runnells	8,431	7,759	7,704	6,894	-18.23%	-10.51%
Cumming	6,497	5,941	6,237	4,582	-29.48%	-26.54%
Alleman	7,032	6,675	6,976	5,850	-16.81%	-16.14%
PCRWD#1	23,352	24,539	24,678	20,581	-16.13%	-16.60%
Berwick		9,921	10,969	9,060	-17.40%	-17.40%
Total	\$4,149,346	\$4,456,584	\$4,447,891	\$4,239,502	2.17%	-4.69%
General & Admin	\$7,715,901	\$7,774,791	\$9,176,481	\$8,540,530	10.61%	-6.40%
PILOT	\$688,445	\$755,340	\$755,340	\$755,340	9.72%	0.00%
TOTAL	\$30,147,920	\$34,122,802	\$34,625,938	\$34,703,115	15.11%	0.22%

Total costs increased during the three-year period by \$4.5 million and, as stated above, were an average 5.1% higher annually. Water Production costs averaged 8.8% higher than at the beginning of the three-year period, a \$3.1 million increase. Administrative costs, including finance, insurance, information services, human resources, engineering and executive management averaged 3.6% higher, an increase of \$0.8 million from 2013 to 2016. Pipelines costs averaged a 2.5% increase annually, an increase of \$0.4 million from 2013 to 2016. Customer Service costs were relatively flat increasing at an average rate of 0.7% annually, an increase of \$0.1 million from 2013 to 2016.

Replacement Cost Depreciation

Historically the largest component of the costs to provide water to our customers has been replacement cost depreciation. In 2016, replacement cost depreciation is 30.62% of our total overall costs. DMWW includes replacement cost depreciation in our rate structure to collect funds on an ongoing basis to replace assets as opposed to borrowing money to pay for asset replacement.

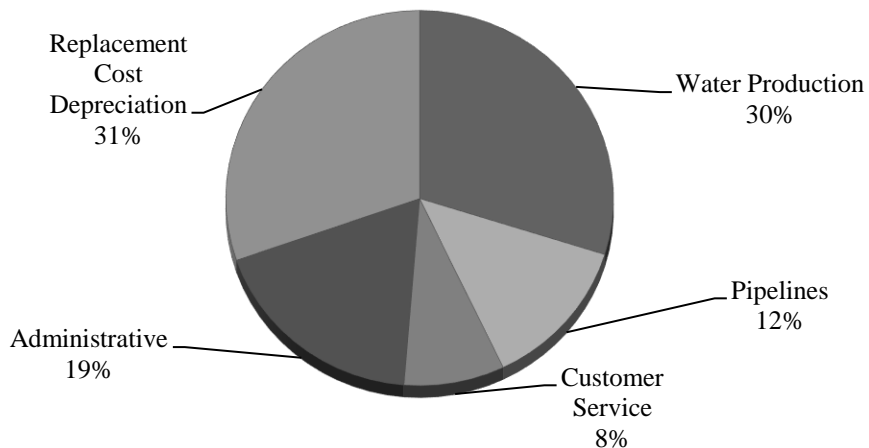
The chart on the following page shows replacement cost depreciation for the years 2007 through 2016. Over this period, replacement cost depreciation has grown from \$10.2 million to approximately \$15.3 million and it will likely continue to grow as new assets are capitalized and construction costs rise (as measured by the *Engineering News Record* Construction Cost Index). Over the last 10 years, we have capitalized over \$173 million in asset additions. The water industry relies heavily on infrastructure and keeping the infrastructure in good condition requires ongoing reinvestment.



Overall Cost Analysis

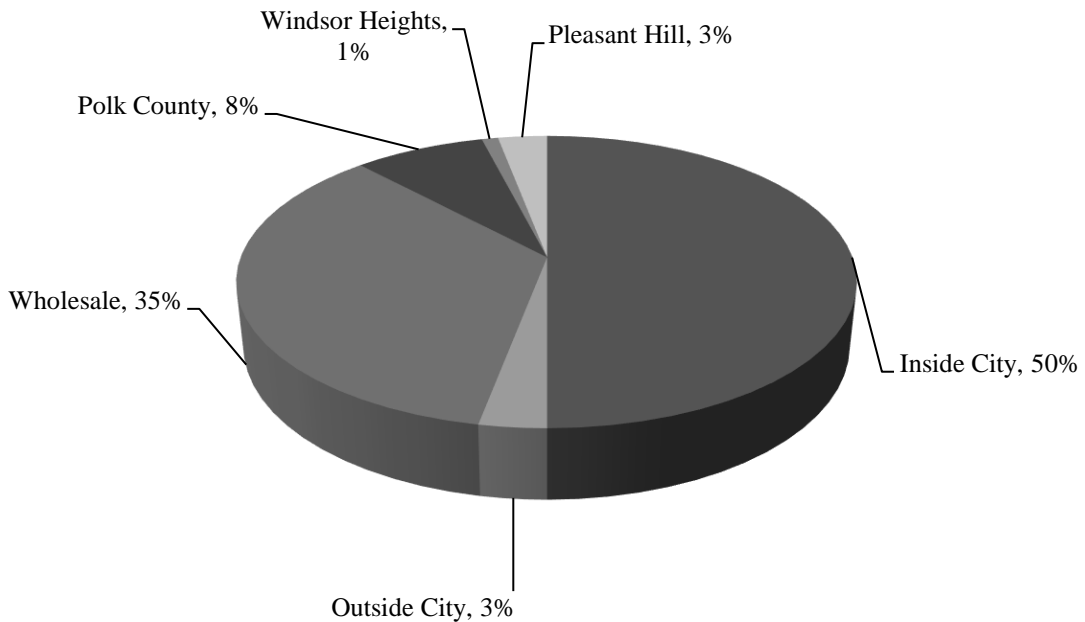
The total distribution of costs in 2016 changed slightly, with an increase in production costs up 1% to 30% of total. Pipeline costs remained flat at 12% of total costs. Both Customer Service and Administrative decreased by 1% to 8% and 19% of total costs, respectively. Replacement Cost Depreciation increased by 1% to 31% of the total.

2016 Total Costs



The following chart shows the 2016 Total Costs allocated to the various service areas. This chart is similar to the 2016 Revenue chart on page 21. This is to be expected as rates are established based on costs.

2016 Total Costs by Service Area



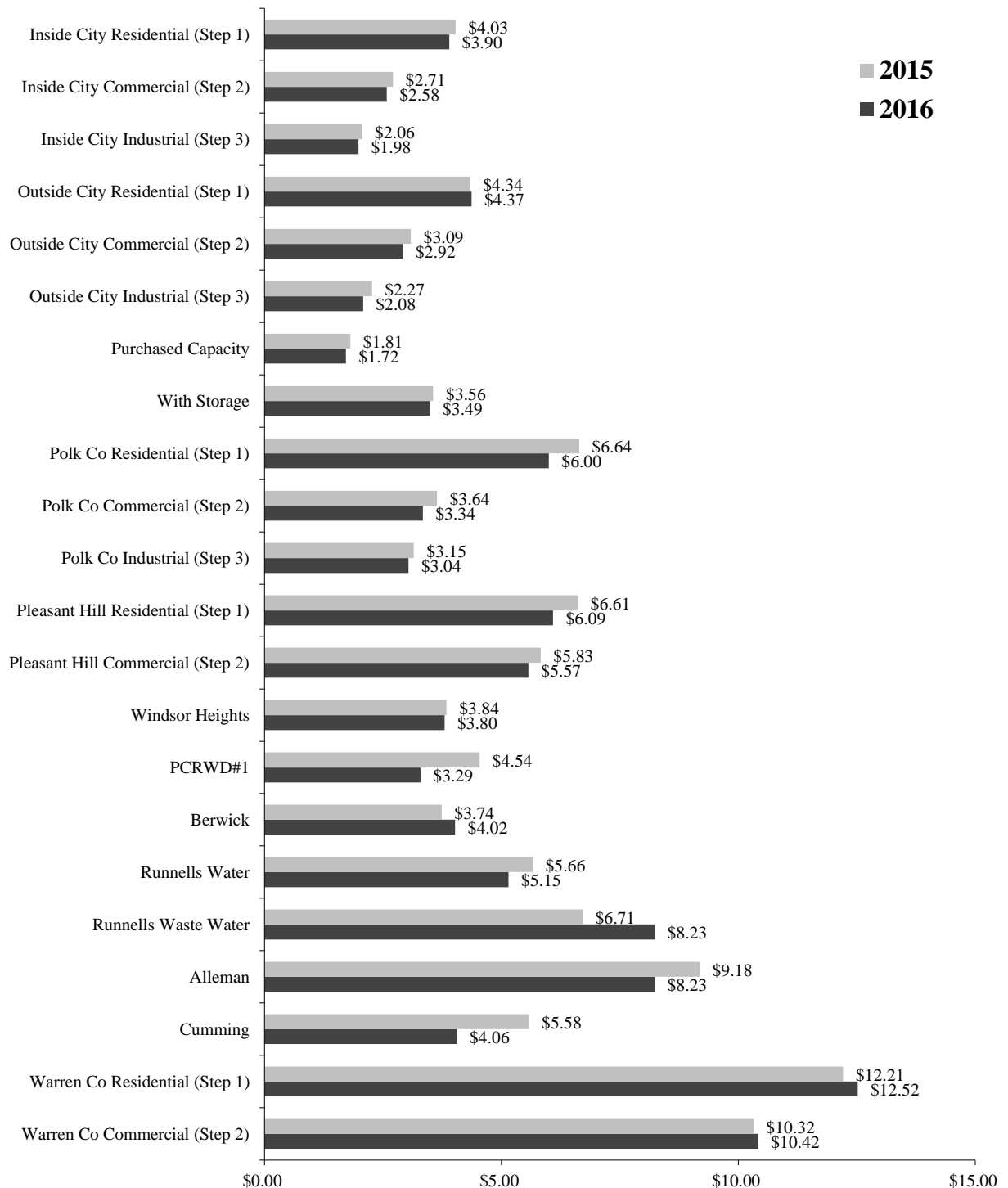
Costs per 1,000 Gallons

Total costs, including operating and maintenance and capital replacement, increased 1.03%. The Construction Cost Index used to measure the relative change in capital replacement costs increased 4.35% in 2016. The rate of return on original assets in this study is calculated at 5.00%.

The chart (on page 19) of costs per 1,000 gallons compares the complete results of the base extra capacity allocation method from the 2016 Study with the corresponding results from the 2015 Study. As previously stated, costs per 1,000 gallons were lower across the

board because of increased consumption. Because of their smaller size, entities such as PCRWD#1 and Cumming can have costs that vary significantly from year to year.

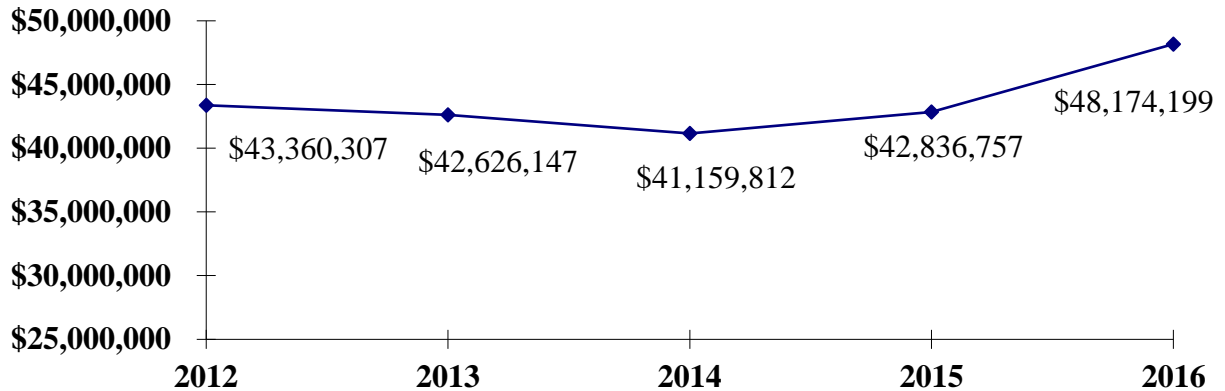
**Base-Extra Capacity
Costs per 1,000 Gallons
(Costs Exclude Availability Charges)**



Revenue

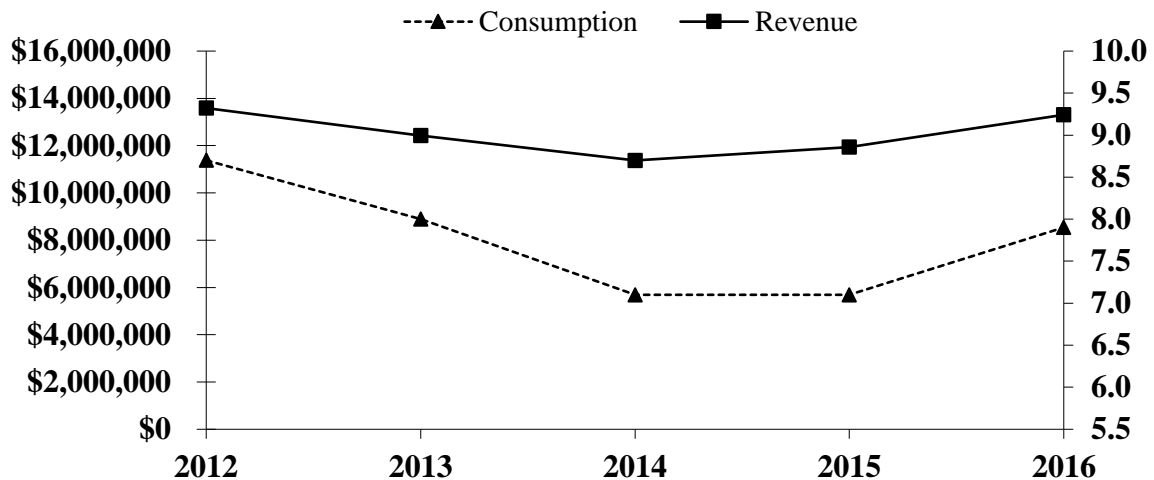
An increase in consumption along with across the board rate increases resulted in an overall revenue increase in 2016.

Total Revenue 2012 Through 2016



Revenue patterns generally follow consumption, deviating only due to changes in rates and in the relative mix of sales to each service area and rate class.

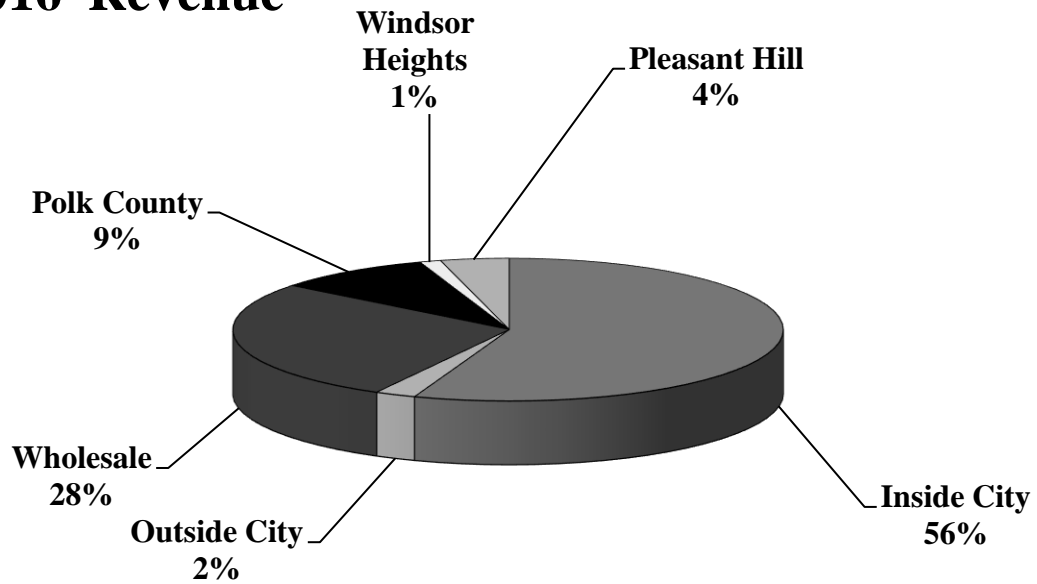
Wholesale Revenue and Consumption (billion gallons) 2012 Through 2016



Inside City revenue, at 56%, still dominated the revenue picture in 2016. Although volume is higher outside the city (primarily in Wholesale), revenue is higher Inside City. For customers inside the City of Des Moines, as well as our other full service customers,

the revenue collected is intended to cover expenses related to providing all services to these areas. This includes water production, customer service, distribution services, and administrative services. Political Subdivisions are charged a wholesale rate that includes an appropriate allocation of costs based upon the lesser level of service we provide to them. For example, we do not maintain the distribution system inside the city limits of wholesale customers and we do not provide direct customer service (such as reading meters and billing) to their customers.

2016 Revenue

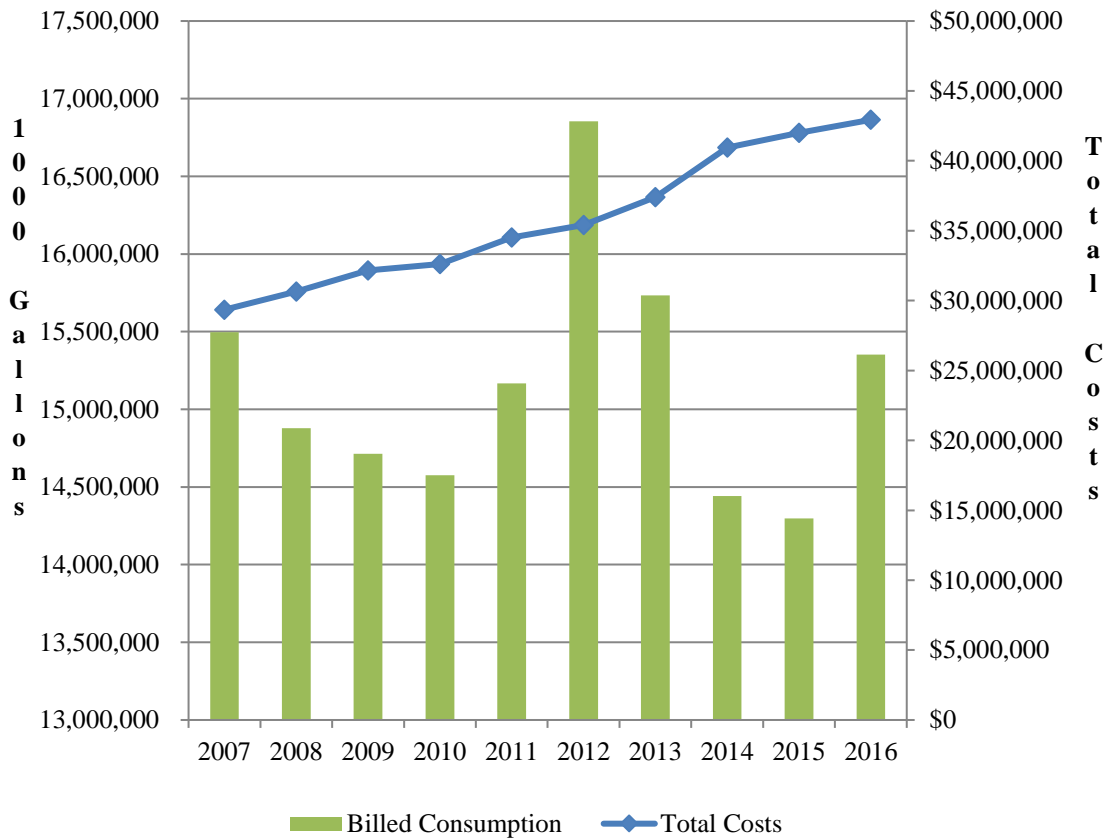


FUTURE CONSIDERATIONS

FUTURE CONSIDERATIONS

The calculation of cost per 1,000 gallons is impacted by costs and consumption. In 2016, costs increased as expected and consumption increased slightly. The chart below illustrates that regardless of the amount of billed consumption, costs are continuing to rise.

Billed Consumption (in 1000 Gallons) vs Total Costs



To look ahead at estimated 2017 cost of service, we took the 2016 numbers and multiplied them by the average yearly increase over the 3 last years. This is simply an estimate based on recent history. The chart on the following page shows the comparison of estimated 2017 costs with the 2017 rates.

	Number of Accounts	2016 COS	Estimated 2017 COS	2017 Rate
Des Moines Inside	66,724			
Residential (Step 1)		\$3.90	\$4.13	\$4.11
Commercial (Step 2)		2.58	2.74	2.76
Industrial (Step 3)		1.98	2.12	2.12
Des Moines Outside	1,258			
Residential (Step 1)		4.37	4.70	4.47
Commercial (Step 2)		2.92	3.09	3.36
Industrial (Step 3)		2.08	2.20	2.40
Wholesale	39			
Purchased Capacity		1.72	1.84	1.85
With Storage		3.49	3.67	3.84
Polk County	6,765			
Residential (Step 1)		6.00	6.08	8.10
Commercial (Step 2)		3.34	3.47	4.96
Industrial (Step 3)		3.04	3.22	3.87
Capital Improvement Fee				1.50
Pleasant Hill	2,960			
Residential (Step 1)		6.09	6.37	7.54
Commercial (Step 2)		5.57	5.87	6.36
Windsor Heights	2,002	3.80	3.99	4.19
Capital Improvement Fee				2.00
PCRWD#1	467	3.29	3.36	4.00
Berwick	218	4.02	4.24	4.00
Runnells	182			
Water		5.15	5.18	7.15
Sewer		8.23	9.91	7.76
Alleman	150	8.23	8.80	8.34
Cumming	140	4.06	4.71	7.03
Warren County	77			
Residential (Step 1)		12.52	13.21	15.17
Commercial (Step 2)		10.42	10.99	11.14

In certain areas, DMWW has specifically increased rates to capture an extra capital replacement component.

Another component to anticipated costs is the availability costs and their associated charges to customers. The chart below illustrates the variances between the Availability Charges and Availability Costs for 5/8" meters. The difference between the charge and cost are allocated in the per thousand-gallon rate to the individual service areas.

**Comparison of Availability Charges to
Availability Costs
5/8" Meters**

Service Area	Current Availability Charge*	2016 Availability Cost
Des Moines Inside City	\$6.00	\$9.68
Des Moines Outside City	8.00	19.41
Polk County	7.00	13.57
Windsor Heights	6.00	8.64
Warren County	8.00	12.01
Pleasant Hill	10.00	8.28
Runnells	6.00	17.76
Cumming	9.00	11.77
Alleman	6.00	12.72
PCRWD#1	4.00	4.18
Berwick	3.00	6.39

*Last increased 4/1/2011

Conclusion

A cost of service study is an analysis of costs at a fixed point in time. Many factors impact the results of the study, some of them significantly. Because of this, the results of any one year should not be weighed too heavily. The true value of the data is the highlighting of trends revealed in comparing multiple years of data.

Costs continue to increase, both O & M costs and capital replacement costs. DMWW continues to explore efficiencies to keep our operational costs in check. However, a water utility is a labor-intensive business. That labor need does not vary in proportion to the amount of water produced. We will continue this level of effort to protect our ability

to produce clean, safe drinking water and our ability to react to ever-changing factors such as raw water quality. Costs of goods and services such as chemicals and energy also continue to increase. As noted in this report, in 2016, we faced additional costs for nitrate removal as well as additional costs associated with removal of residuals at the Fleur Drive Treatment Plant.

Several factors make rate setting a challenge. As noted, rate increases are implemented more than a year after a cost of service study. Our costs are primarily fixed; most do not vary proportionally with consumption. While there is a baseline of consumption that remains stable, a significant amount of consumption is from irrigation which is driven by precipitation. This causes consumption to be volatile, with no way to predict in advance what it will be. While cost per thousand gallons will fluctuate from year to year with the volatility of consumption, increases in total costs point us towards rate increases. Rate increases are never eagerly anticipated. However, to provide clean, safe drinking water, we must keep pace with our increasing costs. While we have a long history of investing in our asset infrastructure, we need to increase our level of capital investment to improve overall condition of our assets, particularly the distribution system. Additionally, poor source water quality will force us to invest in expanded denitrification capabilities.