



Department Source: City Utilities - Water and Light

To: City Council

From: City Manager & Staff

Council Meeting Date: February 3, 2020

Re: Ordinance to approve the water conservation program and appropriate funds

## Executive Summary

Staff has prepared for Council consideration an ordinance authorizing creation of water conservation programs. Using water more efficiently will ease demands on the drinking water system by reducing the amount of treated water used by the community. The 2017 Integrated Water Resource Plan (IWRP) identified water conservation as a key component to saving resources and money for the utility and customers alike. With this in mind, staff has developed comprehensive water conservation programs for residential, commercial, industrial, and institutional (CII) customers. This programming will include water conservation rebates for water-efficient products, contractor and builder training, supply-side water assessments, and will be supported by education and outreach strategies such as providing online resources and education programming for customers and K-12 students.

## Discussion

In 2016, Columbia Water & Light (CWL) started the process of developing a Water Resource Plan. This plan was designed as a guide for how to prudently develop reliable, cost-effective water supply for the next 30 years and beyond. The goals of this plan included: good stewardship of resources, preparation for potential challenges, meeting the demands for an ever growing and changing community, and determining the best combination of strategies for ensuring a sustainable and cost effective water supply.

In 2016, a survey of Columbia's water users was conducted to gauge resident's willingness to support the City's conservation initiatives. The survey revealed that customers are already active participants in water conservation and are willing to further their part to conserve water. The most common responses involved customers' willingness to upgrade toilets and improve outdoor watering efficiency.

Due to a number of boil advisories in the southwest area beginning summer of 2016, utility staff conducted door-to-door outreach in to educate homeowners about suggested irrigation schedules and how to reduce outdoor water usage. This customer engagement gave staff the opportunity to take stock of the irrigation systems being used in CWL territory.

In 2018, Columbia Water & Light made progress toward promoting water conservation by partnering with EPA's WaterSense program. WaterSense is a nationally recognized platform designed to promote efficient and "smart" water use. WaterSense is the equivalent of the Energy Star and Home Performance platforms used by the utility for the development of electric demand side management programs. EPA WaterSense makes it easy for consumers to compare the water efficiency of different appliances and fixtures. As a WaterSense



# City of Columbia

701 East Broadway, Columbia, Missouri 65201

promotional partner, CWL strives to be a leader in water-efficiency messaging, outreach, and education.

To further promote water efficiency, Columbia Water & Light implemented a conservation focused rate structure. These changes, including the addition of a third tier water rate for all customers and increased irrigation rate for irrigation customers, send clear pricing signals to customers encouraging conservation during times of peak demand. Notwithstanding pricing signals, additional work will need to be done to educate the customer base, encourage adoption of WaterSense products, and transform the marketplace to focus on efficiency first.

## **Programming**

Building on past successes in energy efficiency, Columbia Water & Light will use a three pronged approach to encouraging water efficiency through parallel channels. CWL will promote water efficiency programming through a variety of education and outreach strategies utilizing a comprehensive approach to reach all demographics of our community. Next, CWL will work with local installers and professionals to transform the local market, so that water efficient products may become the standard for installs and replacements. Finally, CWL will offer a suite of rebates for water efficient products to our residential, commercial, industrial, and institutional customers.

## **Education and Outreach**

After becoming a WaterSense partner in 2018, Columbia Water & Light staff made significant progress in promoting water efficiency. The Columbia Youth Teaching Efficiency program has been revamped to focus on water conservation, the website has been updated to reflect water conservation as a primary focus, and this year the A/C exchange program will include water efficiency kits for qualifying participants. New water conservation flyers and handouts are being created to educate the public on the rate changes and importance of conservation. CWL will continue to expand on water efficiency education and outreach as programming becomes available.

## **Contractor Training**

Establishing a local contractor base is vital to the success of our water conservation efforts. Contractors are looked to by homeowners as a trusted source for repairs and upgrades to their water systems. In order to integrate City water conservation goals into the local market, Columbia Water & Light staff will work to educate and train irrigation and landscape contractors on water efficient landscaping, irrigation and water use best practices.

In 2016, Water & Light established a group of local irrigation contractors to assist with irrigation system scheduling. Staff will work to build on these relationships to go beyond irrigation scheduling and incorporate smart irrigation technology that can recognize and respond to changes in weather patterns. Furthermore, certified staff members will work with landscaping professionals to promote water efficient landscaping practices.



Columbia Water & Light will use EPA's Irrigation Association Handbook as the foundation for developing a water-smart contractor training. This handbook covers qualifications for lawn professionals including: soil-plant-water relationships, irrigation scheduling, equipment and technology, and installation.

## **On-Site assessments**

EPA WaterSense Certified staff will work with residential and CII customers to identify water conservation opportunities. Staff will conduct water usage analyses, perform on-site water surveys, and develop conservation plans for customers.

For residential customers, staff will utilize a similar model for water assessments as is being implemented for Water & Light's free energy efficiency assessments. By increasing focus on outdoor water use, we will be able to target peak water consumption for conservation efforts. Assessments will be conservation based with a goal of educating customers on water use, rate impacts on bills, and rebate availability.

On a CII level, staff will evaluate onsite water-using fixtures, appliances, equipment, and practices through systematic water assessments based on the American Water Works Association (AWWA) guidelines. A thorough water use assessment is the foundation of a water improvement plan and lays the groundwork for conservation efforts. Lessons learned from a water assessment can provide CII facilities with options for improving water efficiency and lowering operating costs.

## **Indoor Water Conservation**

According to the 2017 IWRP, residential indoor water use in single-family homes has decreased 22 percent from 2005 through 2015. With this in mind, Utility Services' staff started including water use evaluations as part of free home assessments. This endeavor provided valuable insight into water consumption from both indoor and outdoor fixtures. During these assessments, staff found that the majority of indoor water fixtures meet the 1994 Energy Policy standard.

The single largest standout from the analysis was that although the majority of toilets met the 1994 standard, few toilets met the EPA WaterSense efficiency standard. Toilets are the largest single user of water within homes with the most potential for water savings – up to 13,000 gallons per year for an average family according to the EPA. Among potential water conservation options, customers are most likely to replace an older leaky toilet with a water efficient model according to the IWRP. According to the IWRP, WaterSense labeled toilets use 38% less water per day than toilets installed prior to 1995. With approximately half of the homes in Columbia being built prior to 1995 and WaterSense toilets not making up a significant portion of the market, toilet efficiency has considerable opportunity for water savings.



An analysis of the local market found a wide variability in the price point for both residential and commercial water efficient toilets depending on quality, location of purchase, and name brand. On average, however, residential WaterSense toilets were found to be 25% more expensive than standard toilets. The cost for a commercial high efficiency flushometer toilet was found to be considerably higher due to the added cost for valve controls.

## Recommendations

Staff recommends a water conservation program to include rebates for the following:

1. Installing replacement WaterSense qualifying toilets

<b>Conservation Method</b>	<b>Suggested Rebate</b>	<b>Maximum Allowable</b>	<b>Estimated 1<sup>st</sup> year Expense</b>
Residential Toilet	\$75	2 rebates per address	\$30,000
Commercial Toilet	\$100	4 rebates per address – Pre installation inspection required to do more	

## Low to Moderate Income Program

In order to offer programming that meets the needs of all residents of the City of Columbia, Columbia Water & Light will partner with local need-based organizations to administer low-to-moderate income water efficiency programming that will increase knowledge of efficient water usage and reduce water consumption.

The role of the need-based organizations will be to verify applicant financial qualifications, confirm each applicant's water utility provider, and provide the water efficiency benefit. Columbia Water & Light will expand our partnerships with the Community Development Office and Columbia Housing Authority to couple water efficiency with the energy efficiency offerings currently available.

In order to participate, recipients will qualify their income is less than 200% of the Federal Poverty level or 80% of the Area Median Income. This will keep our LMI water efficiency programming consistent with our requirements for our energy programming.

In addition to qualifying for an increased toilet rebate, participants will receive a water efficiency kit that will offer additional opportunities for water savings.

Kits will consist of:

1. Low flow shower head
2. Faucet aerators
3. Garden water timer
4. Toilet leak detection dye



Staff recommends an LMI water conservation program to include the following:

1. Installing WaterSense qualifying toilets – For replacing existing or new construction fixtures
2. Water Efficiency Kits

<b>Conservation Method</b>	<b>Suggested Rebate</b>	<b>Maximum Allowable</b>	<b>Estimated 1<sup>st</sup> year Expense</b>
LMI Residential Toilet	\$200	2 rebates per address	\$20,000
Residential Water Kits	\$65/kit	1 kit per qualifying address	

### **Outdoor Water Conservation**

By updating its rate structure, Columbia Water & Light has set pricing signals that encourage water conservation. Peak demand, typically occurring between June and October of each year, is driven by irrigation and other outdoor water uses. Irrigation systems based on timing devices can lead to over-watering and impose concurrent water demand during peak usage periods. Peak occurrences can strain the water infrastructure and create pressure drops that lead to boil advisories.

In order to identify target areas for peak water conservation efforts, staff worked with the IT/GIS Department to identify areas of high density water usage. All residential accounts using more than 15 CCF of water in either July or August of 2017 were identified and mapped. The map below shows high peak usage in the south and west of Columbia. The increased water usage in these areas is largely attributed to properties with irrigation systems.

A typical irrigation system in Columbia utilizes an open control loop where the operator determines the time and run time at which water is applied to each section or zone of a landscape. These programs require external intervention in order to make changes to the operation of the system. However, in a closed loop system, a control system makes decisions on where, when, and how much to water, based on environmental feedback.

As most irrigation systems in Columbia are open loop and timer based, as much as half the water that is used on lawns and gardens is wasted. Alternatives to these basic systems offer a more water-efficient choice. Three primary alternatives to improve from a standard irrigation system are: rain sensors, weather-based irrigation controls, and high efficiency nozzle heads.

According to a U.S. Environmental Protection Agency study, advanced irrigation controllers on average can capture substantial water savings –21 percent for rain sensors and 15 percent for weather-based irrigation controllers. These savings taking effect during the Utilities peak times and may conserve an average family 7,600 gallons per year.



Type	Description
Rain Sensor	Devices tied to automatic irrigation systems that prevent watering during or soon after rain.
Weather-based Irrigation Controllers (WBIC)	Stand-alone controllers or plug-in/add-on devices that schedule irrigation to meet plants' water need-based on current weather data (e.g., solar radiation, humidity, temperature) gathered either via on-site weather sensors or a local weather station.

Williams, Fuchs, Whitehead (2014). Estimates of Savings Achievable from Irrigation Controller <https://eta.lbl.gov>

In contrast to controls that determine when and how much water to use, the sprinkler head or nozzle can have a significant impact on where and how accurately the water is applied. Instead of a fixed stream of water, rotary/high-efficiency sprinkler nozzles slowly deliver multiple rotating streams of water, reducing water waste. High efficiency sprinkler heads apply water more slowly than standard sprinkler nozzles allowing water ample time to soak into the soil.

For our customers that have larger irrigation systems, these improvements will be particularly helpful in curbing over watering. Commercial and industrial customers show the largest peak month factors for water consumption in our territory. A recent analysis of the top 25 water users in Columbia showed summertime water use to be a significant portion of seasonal billing. Based on an analysis of summer usage in 2018, the average cost for a commercial irrigation account will have increased by 50% with the new rate pricing if a change in usage is not made.

Addressing irrigation usage, especially large scale where we may see upwards of 500 CCF used per month, can have a compounded impact for the utility by reducing stress on water facilities through lowering demand during peak usage months.

### **Recommendation**

Staff recommends a water conservation program for upgrading existing and installing new irrigation systems to include rebates for the following:

1. Rain Sensors
2. Weather-Based Irrigation Controls
3. High Efficiency sprinkler nozzles



Conservation Method	Average market Price	Suggested Rebate	Projected Savings for Customer**	Estimated 1 <sup>st</sup> Year Expense
Rain Sensor	\$165	\$50	Up to 21%	\$25,000
Weather-Based Irrigation Controls*	\$225 and up	\$150 or \$25 per zone	14%-21%	
Rotary/High Efficiency Nozzles*	Varies	\$5/nozzle	Up to 5,600 gal per year	

\*Only offered through professional installers

\*\*Savings estimates from: Williams, Fuchs, Whitehead (2014). Estimates of Savings Achievable from Irrigation Controller <https://eta.lbl.gov> and [www.epa.gov/watersense](http://www.epa.gov/watersense)

### **Water Systems Assessment**

Although conservation efforts have typically focused on end users, efficiencies in the supply and delivery of water can have significant cost savings for utilities. A water loss assessment provides a framework for gathering and understanding the accuracy of measured data, calculating performance measures, and identifying costs of water losses. Effective water loss control offers many benefits including: preserving water resources, better energy management, and improving longevity of water supply infrastructure.

Utility Services staff will conduct an annual water loss study seeking to identify where water loss is occurring whether from main breaks, hydrant flushing, unauthorized consumption, or general leakage. Staff will utilize the AWWA standard water balance model to perform this assessment. AWWA's water audit methodology is the best practice approach recommended for North American water utilities and is utilized nationwide.

As part of the IWRP, Black & Veatch provided a preliminary supply side water audit which was developed using 2014 data. Although it is necessary to conduct several years' worth of water assessments to generate a high level of confidence in the reporting, the results were used to estimate efficiency savings related to water losses from the distribution system. At that time, real losses were estimated to be at 24.96 gallons per day per service connection which equates to approximately 13% non-revenue water as a percentage of water supplied. This study will verify past results and help determine if further investment in leak loss is warranted.

An interested parties meeting was held on June 12, 2019 with the community regarding these new programs and was also presented to City Council during a pre-council meeting on October 21, 2019.

**Fiscal Impact**

Short-Term Impact: \$75,000 for the program rebates  
 Long-Term Impact: N/A



## Strategic & Comprehensive Plan Impact

### Strategic Plan Impacts:

Primary Impact: Primary, Secondary Impact: Secondary, Tertiary Impact: Tertiary

### Comprehensive Plan Impacts:

Primary Impact: Primary, Secondary Impact: Secondary, Tertiary Impact: Tertiary

## Legislative History

Date	Action

## Suggested Council Action

Approval of the water conservation program ordinance and appropriation of funds.