

Updated Metro Roundtable Conservation Strategy

Purpose

The purpose of this memo is to present an estimation of potential future water demand reductions which the Metro Basin Roundtable can reasonably expect¹ by 2050 based on current and future water conservation programs and improved water use efficiencies. In keeping with SWSI and other state water conservation policy efforts, estimated demand reductions relate to three basic processes or influences on water use:

- Passive saving reductions related to the natural replacement of customer water using fixtures and appliances;
- Other changes in water use behaviors (e.g., state legislation, changes in land use, drought impacts, etc.); and
- Active water conservation program impacts related to implementation of water conservation programs sponsored by water utilities and special districts.

Noteworthy is that current water demand is trending downward due to a combination of these three influences. Similarly, future demand reductions will require that water utilities, NGOs, water customers, and state and local officials work together to support and ensure that meaningful, permanent water conservation programs are developed and implemented.

This shared responsibility for future water conservation does not dismiss the important role of water utilities to act as good stewards of the State's water resources. But the work of managing water in Colorado is not solely the responsibility of our water utilities. It requires the cooperation and collaboration between all members of the water community.

Estimations and Limitations

The estimated water demand reductions presented in this memo were developed in a manner consistent with the needs of the IBCC's Portfolio Tool. Additional analysis and evaluations of the estimates provided herein will be developed in the future as more data is collected characterizing the benefits and costs of water conservation. As economic and political climates change, the opportunities for conservation will change as well. Therefore, the Metro Basin water utilities will continually conduct monitoring and verification efforts, through data collection and analysis in the future, which will be used to inform and sharpen future programs and demand reduction estimates.

Water Demand Reductions since 2000

Since the first SWSI report in 2000, water demand in the Metro Basin has declined by approximately 100,000 acre feet.² During this time, the basin's daily per capita use (gpcd)

¹ These demand reductions are to be used to assist in characterizing future water supply needs in the Metro Basin using the IBCC portfolio tool and other statewide water supply planning models.

² State of Colorado 2050 Municipal & Industrial Water Use Projections, July 2010. Part of the change in per capita use could be errors in reporting, meteorological anomalies, lasting impacts of drought, impacts of utility water conservation programs, as well as temporary reductions in use due to the economic downturn.

has declined from 191 gpcd to 155 gpcd. The Metro basin supplies nearly half of the state's population and conservation has been an integral part of most water utilities water resource management programs as they serve an increasing population and growing economic base.

The 2010 SWSI conservation strategies report identified additional savings opportunities for the next 40 years. According to the study, the Metro basin may be able to save an additional 90,000–225,000 acre feet from the low to the high strategies.³ Noteworthy is that regardless of the water conservation strategy that is achieved, additional water supply will be needed to meet the 2050 projected water demand as demonstrated in the following table.

Table 1 – Summary of Future Total Water Use Based on Potential 2050 Water Conservation Strategies					
Year	2000	2010	2050		
			Low	Medium	High
GPCD	191	155	135	118	106
Total Use (AF) ⁴	556,691 ⁵	451,765 ⁶	626,653	547,741	492,039

These future water use estimates presented in the CWCB's SWSI 2010 Municipal and Industrial Water Conservation Strategies Report include the impacts and benefits from all three influences on future water demand including passive savings, state and local ordinances, and active water conservation programs conducted by water utilities. This memo attempts to identify water demand reductions that can be reasonably expected based on current trends and programs – independent of new future regulation, substantial changes in land use, and other influences beyond the control of our water providers.

Recommendation

The Metro Basin Roundtable recommends that it pursue conservation programs that would reduce per capita water use from a baseline of 191 gpcd in 2000 to 129 gpcd by 2050. This goal would require that savings achieved since 2000 be maintained and an additional 120,000 acre feet be saved by 2050 including the influences of passive savings.

From the baseline of 191 gpcd in the year 2000, this is a 32 percent reduction in water use for a total of 225,000 acre feet. Metro water providers will have to ensure that the savings achieved through behavioral changes during and after the 2002-2004 drought become permanent, help put regulations in place that will achieve future passive savings, and continue to offer programs to achieve active savings.

Table 2 – Estimate of Future Water Demand Reductions Associated with Active and Passive Water Conservation Impacts			
Year	2000	2010	2050
GPCD	191	155	129
Total Use (AF) (based on 2050 medium population)	886,598	719,491	597,758

³ SWSI 2010 Municipal and Industrial Water Conservation Strategies.

⁴ Total water use estimates in 2050 are based on using the medium population estimate of 4,144,000 for the Metro Basin predicted by CWCB for 2050.

⁵ Based on 2010 Metro Basin population

⁶ Based on 2010 Metro Basin population

Water providers will have to take an active role in continued water savings. Recommended measures include:

- Continue educational, marketing and advertising programs to ensure recent savings become permanent;
- Pursue statewide legislation to require only high-efficient indoor water fixtures can be sold;
- Provide audits and incentives to residential, commercial, industrial and institutional customers to replace inefficient fixture and improve processes;
- Provide targeted audits for inefficient use, both indoors and out;
- Capitalize on an assist with customer's willingness to change landscapes;
- Prepare financially for the future investment by water utilities and their customers to maintain distribution systems and hold water loss rates down as much as practically possible;
- Continually monitor and evaluate conservation programs and pursue new conservation opportunities.

Ultimately, the success in achieving higher levels of conservation will rest on improving technology of water using fixtures and landscapes; the political will to encourage greater efficiency in water use through codes and regulations; and seizing new opportunities to save water as they emerge leveraging partnerships between water utilities, state and local officials, NGOs and our citizenry.

Detailed Estimates

Residential Indoor

Currently the Metro basin is among the lowest in indoor residential use at 44 gpcd; the statewide average is 51 gpcd. The low, medium and high strategies from the 2010 SWSI report are shown in the table below.

Residential Indoor Use (gpcd)

2050			
Baseline	Low	Medium	High
43.7	40	35	30
	- 8%	- 20%	- 31%

According to the SWSI 2010 reports, 100,000 acre feet could be saved through indoor use from residential and non-residential customers. The estimates suggest that indoor residential use could be driven down to nearly 30 gpcd (the high scenario) through the passive replacement of water fixtures. This is an aggressive projection that will likely need active participation among water providers to be successful.

To illustrate this point, the assumption in the passive savings report is that in 2050 the average flush volume of toilets will be 1.0 gallons per flush (gpf). In 2005 Denver studied its residential customer's use and found that the average flush

volume was 3.14 gpf. There are very few 1.0 gpf toilets in the residential sector right now, and they are not yet widely available at “big box” retailers. This means that a high percentage of toilets would have to be replaced with 1.0 gpf toilets within 40 years. With a replacement rate of 1-4 percent per year, new regulations would have to be put into place within the next five years to reach the projected flush volume.

Recommendation: Medium strategy 20 to 25% savings

Given the aggressive projections of passive savings and the need to enact regulations quickly in order to meet the high strategy, a more realistic goal is the medium strategy. This will still require water providers to actively pursue new ordinances or legislation.

Residential Indoor Use

Measure	Baseline 2010	2050	Reduction
Gpcd	43.7	34.0	9.7
Total AF	202,850	157,824	45,026
% Reduction			- 22%

Non-residential Indoor

Non-Residential Indoor Use (gpcd)

Baseline	2050		
	Low	Medium	High
37.5	31.9	28.1	26.3
	- 15%	- 25%	- 30%

There may be fewer opportunities to save water in non-residential indoor use. As the Metro area continues to grow its economy water needs will grow as well. The non-residential customer base is a diverse group of customers that have had varying degrees of success reducing water use. Less is known about this group of customers, as the last Water Research Foundation study was done in the early 1990s.

Many Metro water providers offer programs to improve efficiency in commercial, industrial and institutional water uses. In our experience, increasing business productivity and economic growth can mask achieved efficiencies. As an example, Denver Water’s industrial class of customers has reduced their use by only 2 percent since 2000, while the residential class has reduced their use by more than 20 percent. Denver Water has entered into several contracts with industrial customers to improve efficiency. The results have shown the companies using

water more efficiently and productively, but corresponding increases in production have diminished the total water savings.

Recommendation: Low Strategy 15 to 20% savings

Economic growth will continue to be promoted and water use will increase to meet those growing needs. Efficiencies will be gained through replacing bathroom fixtures, changing industrial processes and reducing cycle concentrations on cooling towers. Water providers can offer a variety of programs from audits, education and incentives. Additionally, rules for new developments are being implemented in more and more Metro communities.

Non-residential Indoor Use

Measure	Baseline 2010	2050	Reduction
Gpcd	37.5	31.9	5.6
Total AF	174,070	147,960	26,111
% Reduction			- 15%

Outdoor Use

Outdoor Use (gpcd)

Baseline	2050		
	Low	Medium	High
62.8	53.5	48	43.3
	- 15%	- 24%	- 31%

Outdoor use has changed dramatically over the last ten years. The 2002-2004 drought gave a new appreciation for using water for lawns. Many customers have lowered their water use to at or below efficient levels for bluegrass. The Metro area is seeing more and more conversions from bluegrass to low water using landscapes.

There are still opportunities to save water by targeting inefficient users and capitalizing on a willingness to change landscapes. Approximately 20 percent of Denver Water customers use more than 18 gallons per square foot, which is the efficient level of watering bluegrass in our climate. The average use in the Denver Water service area, however, is approximately 16 gallons per square foot. This means that some customers are deficit irrigating and others have converted their landscapes to need less water.

There is some risk of losing outdoor savings. Many Metro providers have seen a sharp decline in outdoor use in the past three years, particularly in its residential sector. Some of this could be due to the economic decline and as it turns around in the coming years, water use could rebound as homeowners recover lawns and landscapes.

Recommendation: Low Strategy 15% savings

There are opportunities in outdoor water use from inefficient watering and conversions to lower water using landscapes. Water providers will have to offer audits, incentives and substantial education to continue to gain savings.

Outdoor Use

Measure	Baseline 2010	2050	Reduction
Gpcd	62.8	53.5	9.3
Total AF	291,510	248,340	43,169
% Reduction			- 15%

Water Loss

In the next 40 years, water providers will incur enormous costs to repair and maintain the water infrastructure that currently provides reliable tap water to their customers. The vast majority of water infrastructure in the Metro basin has been built since the 1950s and no water provider has been faced with large replacement and upgrade needs to this point; however as water infrastructure ages, it is likely to require increasingly large repair and maintenance costs.

In addition, water distribution leaks and other water loss (both real and apparent) are expected to increase if proper best management practices are not implemented. Currently, system water loss for water providers in the Metro Basin range from 3 to 15%, averaging about 10%.

Recommendation: Low Strategy – 0 to 15% Savings

Any goal to improve water loss, given what water providers are facing in maintenance costs will involve better management practices, system wide water audits and other third party water accounting reviews. Currently, few water providers utilize these practices; however, it is unlikely that overall systemwide water loss management can reduce losses to less than 7% on average based on the current state of the industry based on joint-industry research. The goal presented below assumes a reduction in the baseline water loss of 10.9% to 8.5 % (or potential demand reduction of 11,140 AF).

Water Loss

Measure	Baseline 2010	2050	Reduction
Gpcd	10.9	9.4	1.5
Total AF	50,596	43,634	6,963
% Reduction			- 14%

Historic Savings Calculation

Historic savings from 2000 to 2010 in the Metro basin were calculated using SWSI per capita use figures and population estimates. The 2010 SWSI study shows that daily per capita use went down from 191 to 155⁷ in the ten-year period. The SWSI report states that the change could be due to a number of “factors including conservation efforts, behavioral changes from 2002 drought (i.e., a ‘drought shadow’), changes in a community’s socio-economic conditions, and / or better data.

Denver Water and Aurora have verified with their demand figures that the SWSI demand figures from 2010 look relatively accurate. It may be true that some of the reductions may be temporary for a number of reasons cited above; however, the SWSI portfolio tool is treating all of the changes in demand in the last ten years as permanent savings that will be used to meet the gap in water supply.

The calculation below using SWSI 2010 figures shows that the Metro basin has reduced its use by over 100,000 AF. It is debatable that all of these savings are permanent, but the SWSI portfolio tool is treating them as permanent and applying all of the savings to meeting the supply gap; therefore, this must be included in the calculation of how much of the conservation savings will be used to meet the future supply gap.

Metro Basin 2000-2010 Conservation	2000	2010	Difference
Population		2,602,000	
Daily per capita use	191	155	36
Total annual demand (af)	556,691	451,765	104,926

⁷ State of Colorado 2050 Municipal & Industrial Water Use Projections, July 2010, Figure 5-1.