STATE OF COLORADO

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TO: Colorado Water Conservation Board Members

FROM: Veva Deheza, Section Chief
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Kevin Reidy, Water Conservation Technical Specialist
Office of Water Conservation & Drought Planning

DATE: July 6, 2010

SUBJECT: **Agenda Item 23, July 21, 2010 Board Meeting**
Office of Water Conservation & Drought Planning-Guidebook of Best Practices for Municipal Water Conservation in Colorado

Staff Recommendation

This is an *informational* item only and Board action is not required.

Background

In July, 2008, the CWCB awarded an efficiency grant to Colorado Water Wise, a water conservation non-profit group, to create a best management practices guidebook specific to Colorado. The guidebook will assist water providers with the selection and implementation of effective water conservation programs and measures. The BP Guidebook will also inform the update to SWSI by supplying the necessary best practices to develop various conservation strategies. At present time, the BP guidebook has been through two rounds of comments and is being finalized with a final Guidebook deliverable date of the end of July. Workshops will be held on the west slope and east slope in August and September to roll out the Guidebook and assist providers in using this tool.

Attachments

Chapters 1 and 2 of the *Guidebook of Best Practices for Municipal Water Conservation in Colorado*

CHAPTER 1. INTRODUCTION

Purpose of Guidebook

The Colorado WaterWise *Guidebook of Best Practices for Municipal Water Conservation in Colorado* is a planning tool prepared for the purpose of improving and enhancing water efficiency in Colorado. The *Best Practices Guidebook for Municipal Water Conservation in Colorado* (*Best Practices Guidebook* for short) offers a detailed description of specific water conservation measures, program elements, regulations, policies, and procedures that can be implemented by Colorado water providers to help ensure reliable and sustainable water supplies for future generations.

Colorado WaterWise (CWW) envisions that this *Best Practices Guidebook* will be used by water professionals including water providers, local governments, consultants, building managers, design engineers, irrigation professionals, and others throughout the state to help select the most sensible and cost effective water conservation measures and programs to implement. Utilities can use the Best Practices guide to help select water conservation program options to include in their conservation plans to be submitted to the Colorado Water Conservation Board (CWCB). Building trade professionals may use the *Best Practices Guidebook* to determine the most sensible water efficiency practices to implement in new construction projects and existing buildings. Others may find the *Best Practices Guidebook* a useful tool to increase water efficiency in their local community.

The *Guidebook of Best Practices for Municipal Water Conservation in Colorado* is an essential companion to the water conservation planning resources developed by the CWCB[1] and can be used by water providers big and small to help select appropriate, cost effective water conservation program measures.

What is a Best Practice?

Experience in developing and implementing water conservation programs over the past decades has resulted in a body of knowledge in Colorado and across the United States. This knowledge combined with experience, research, and analysis has resulted in the development of "best practices" (aka best management practices), which are water planning, management, and efficiency measures and policies designed to deliver proven water savings and improved water management.

In this guidebook, prepared specifically for Colorado, the best practices (BPs) are designed to assist water providers of all sizes to develop effective water conservation programs that deliver real demand reductions among existing customers and ensure new customers join the system with efficiency already "built in".

A best practice is intended to encompass a broader range of actions and activities than a best management practice, although at the end of the day it is only a relatively minor semantic distinction. The authors have chosen the term "best practice" or BP rather than "best

[1] Preparation of the *Best Practices Guidebook* was made possible through grant funding from the CWCB.

management practice" because not all of the best practices described in this guide are directly related to management of water. Some of the best practices included here describe methods to improve the efficiency of water use while others describe a regulatory framework that can be used to manage the demand of new and existing customers.

These Colorado-focused water conservation best practices were developed to fit into the Colorado Water Conservation Board's guidelines for preparing a water conservation plan.[2] Each best practice is structured similarly with a clear definition that describes the practice itself as well as implementation techniques, scope, potential water savings, water savings estimating procedures, cost effectiveness considerations, and references to assist in implementation.

What's Included in the Guidebook?

The *Guidebook of Best Practices for Municipal Water Conservation in Colorado* includes the following elements:

- Detailed information on 14 selected best practice options including: implementation approach and methods, likely costs, anticipated water savings, barriers and challenges.
- Guidance on prioritizing and selecting appropriate water conservation program tools and measures for different communities and situations.
- Descriptions of appropriate utility best practices for water management including conservation-oriented rate structures and utility water loss programs.
- Descriptions of appropriate end user (customer) indoor and outdoor best practice options for urban water conservation in Colorado.
- A resource guide for anyone seeking water conservation information, assistance, and financing in Colorado.
- A literature review of urban water conservation best management practices and best practice guidance documents developed in Colorado and elsewhere.

The best practices included in this guidebook were selected and carefully reviewed by a project advisory committee and a stakeholder committee each comprised of Colorado water conservation, water management, and landscape experts from all areas and sectors in the State. The authors and the review committees have worked to ensure that the descriptions, information, and data provided in this guidebook are as accurate and complete as possible. If we missed something or made a mistake, please let Colorado WaterWise know and we'll do our best to fix it in a future edition.

How to use this Guidebook

The *Guidebook of Best Practices for Municipal Water Conservation in Colorado* is intended to be a reference manual for water providers and others developing or seeking to improve their water conservation program. It is envisioned that the *Best Practices Guidebook* will be used by water professionals throughout the state including water providers, local governments, consultants, building managers, design engineers, etc. to help select the most sensible and cost effective water conservation measures and programs to implement. The *Best Practices*

[2] http://cwcb.state.co.us/NR/rdonlyres/D3A6FD70-47F2-4208-917B-0CC4A5BD77C1/0/GuidelinesToReviewEvaluateWCPlans.pdf

Guidebook emphasizes practicality, costs and benefits, water savings, implementation procedures, as well as evaluation methods.

Utilities can use the *Best Practices Guidebook* to help select water conservation program options to include in their conservation plans to be submitted to the CWCB. Building trade professionals may use the *Best Practices Guidebook* to determine the best water efficiency practices to implement in new construction projects and existing buildings. Others may find the *Best Practices Guidebook* a useful tool to increase water efficiency in their local community.

About Colorado WaterWise

The mission of Colorado WaterWise is to promote and facilitate the efficient use of Colorado's water.

CWW is the voice for water conservation in Colorado. In 2000, CWW was created by combining Metro Water Conservation, Inc. and Xeriscape Colorado, two non-profits formed in the mid-1980s to promote water wise practices among homeowners, businesses, and water providers.

Colorado WaterWise provides support to water professionals, water providers, and communities across Colorado empowering them to offer more responsive, and effective programs to their own customers, clients, and citizens.

Additional information about Colorado WaterWise can be found at www.coloradowaterwise.org.

CHAPTER 2. BEST PRACTICE SUMMARY

The *Guidebook of Best Practices for Municipal Water Conservation in Colorado* includes 14 best practices that impact all municipal water users and target indoor and outdoor use, and municipal water loss. Many of the best practices included in this guidebook are multi-faceted and include several related practices such as metering *and* rates.

Few water providers will have the time and money to implement all 14 best practices covered in this guidebook, although the authors encourage the effort. When developing a water conservation program tailored to the needs of the community, it is anticipated that a utility will start with the foundational best practices and add selected additional relevant best practices from among the best practices described here and from the list of practices not included in this guidebook. Chapter 3 provides "menus" of different best practices selected to meet different budgetary and demand reduction objectives.

Summary of Best Practices

A total of 14 best practices are discussed in this guidebook. For convenience they have been divided into four categories:

1. Water System and Utility Best Practices
2. Outdoor Landscape and Irrigation Best Practices
3. Indoor Residential (single-family and multi-family) Best Practices
4. Indoor Non-Residential Best Practices

Summaries of the best practices presented included in this guidebook are provided on the next four pages.

A listing of the conservation practices that were considered, but ultimately not selected for the guidebook is provided in Appendix A.

The best practices in this guidebook are organized using the following category labels:

- **Foundational** - best practices for water efficiency that are considered essential for all utilities to implement.
- **Informational** - best practices that offer useful information on water efficiency to utility customers to foster conservation actions and behavior.
- **Support** – best practices that provide technical information, data, and assistance on water efficiency to customers (closely related to informational best practices).
- **Management** - best practices that offer improved utility management procedures and actions to promote water conservation.
- **Understanding** - best practices that aim to improve knowledge and awareness of water use and efficiency.
- **Operational** - best practices that seek to improve water conservation in everyday utility functions.

Water System and Utility Best Practices

No.	Best Practice	Category	Overview	Estimated Savings Potential
1	Metering, conservation-oriented rates and tap fees, customer categorization within billing system	Foundational, Informational, Support, Management. Impacts utility operations and all customers directly.	Impacts the way utilities charge new customers when they join the system, bill their existing customers for the water they use, and understand who customers are and which customers might benefit from improved water efficiency. This category can also include advanced metering systems that provide leak detection and real time use data for customers.	• Metering: 10 – 40% reduction vs. un-metered. • Rate structure: Varies by structure and rates. Reduction range = 0 – 30%. • Tap fees: Varies by method. Efficient buildings have been shown to use 30-70% less water. Linking tap fees to demands will encourage conservation. • Customer categorization: None.
2	Integrated resources planning, goal setting, and demand monitoring	Foundational. Impacts utility operations and customers indirectly.	Integrated resources planning (IRP) is a comprehensive planning effort that incorporates water conservation programs as another option for meeting future needs. IRP encompasses least-cost analyses of demand and supply options that compares supply-side and demand-side measures on a level playing field and results in a water supply plan that keeps costs as low as possible while still meeting all essential planning objectives.	A plan by itself doesn't save water. A utility without a conservation plan doesn't save water either.
3	System water loss control	Foundational. Impacts utility operations only.	Water loss control is the practice of system auditing, loss tracking, infrastructure maintenance, leak detection and leak repair for water utilities. Leak detection and repair are familiar water agency practices, but true water loss control is more pragmatic than simply finding and fixing leaks. Auditing a water distribution system for real and apparent losses and evaluating the costs of those losses is the foundation of water loss control. Cost and benefit considerations drive implementation actions in the recommended methodology, described in detail in the American Water Works Association M36 Manual (2009).	Water savings from water loss management programs depend entirely on the on-going level of loss. It should be the goal of all water providers to limit real and apparent losses to economically efficient levels.

No.	Best Practice	Category	Overview	Estimated Savings Potential
4	Conservation coordinator	Foundational, Informational, Support, Management. Impacts utility operations and potentially all customers directly.	A conservation coordinator is critical for every utility aiming to reduce water demand. A "go to" person for water conservation is essential to the successful implementation and management of water conservation programs. For large water utilities, the job of water conservation coordinator is a full time job. Small utilities may not have sufficient resources to have a dedicated conservation coordinator. Small agencies should select a staff member who has other primary assignments to be the designated conservation coordinator – the person responsible planning and implementing water conservation efforts.	A conservation coordinator alone doesn't save water, but a coordinator (or someone filling that role) is essential to successful plan and program implementation.
5	Water waste ordinance	Foundational, Operations. Impacts customers directly.	A water waste ordinance is a local regulation that explicitly prohibits the waste of water. Waste includes things such as irrigation runoff, irrigation that occurs on a prohibited day and/or time, leaks, use of inefficient fixtures and appliances, or use of wasteful commercial or industrial processes (eg poorly controlled cooling towers).	Savings depend upon publicity and enforcement – much like traffic laws. Having an ordinance provides a legal basis for enforcement and drought management.
6	Public information and education	Foundational, Education, Support. Impacts customers directly.	Public information and education encompasses social marketing, school education, public outreach and education, and other information efforts aimed at raising awareness and fostering a culture of conservation and behavior change. An element of public information and education is required in nearly all other best practices in this guidebook. Central components of this best practice include effectively communicating the value of water, and delivering consistent and persistent messages. This best practice also includes measures to provide customers with timely information on their water consumption and alerts if unusual usage or leakage is detected.	Utilities should not rely on any water savings from a public outreach campaign alone. Conservation outreach programs help establish a culture of wise water stewardship which over time results in behavior change and effective action such as replacing inefficient fixtures and appliances. Conservation marketing efforts may also increase participation levels in other utility sponsored programs such as landscape audits or rebates.

Outdoor Landscape and Irrigation Best Practices

No.	Best Practice	Category	Overview	Estimated Savings Potential
7	Landscape water budgets, information, and customer feedback	Foundational, Programmatic, Understanding, Informational, Support, and Control. Impacts all customers depending upon implementation.	Landscape water budgets address landscape water use and encourage efficiency. Comparing actual metered consumption against the legitimate outdoor water needs of the customer based on landscape area, plant materials, and climate conditions. The customer is provided powerful information about the irrigation practices and efficiency at the property.	Varies. Many landscapes are already irrigated at an efficient level. Efficient irrigation practices have the capability of reducing landscape water by up to 35% in some cases. Water budgets, particularly when linked with an increasing block rate structure, can lead to significant reductions in water use. After implementing budget-based rates, Centennial Water and Sanitation District reported a 25% reduction in demand.
8	Rules and regulations for landscape design and installation and certification of landscape professionals	Programmatic and Control. Impacts all new customers and those who use professionals to re-develop existing landscapes.	This best practice supports sustainable and water efficient landscaping design, installation, and maintenance practices. Creating rules for new landscape and irrigation system design and installation is a relatively inexpensive way to affect landscape water use. Proper installation and maintenance are needed to create and maintain water-efficient irrigation. A second powerful tool is minimum training requirements and certification for landscape irrigation professionals. These requirements can function in concert as trained and certified professionals are in the best position to design, install, and maintain water efficient landscapes and irrigation systems that meet mandated standards.	A 2002 study in Colorado Springs compared water use between a traditional landscape and two landscapes developed using the principles of xeriscape. The study found water savings ranging from 22% to 63% after implementing the rules and regulations set forth in the 1998 Colorado Springs Landscape Code and Design Manual. Typical savings from landscape regulations range from 15 - 35%. Contractor certification has unmeasured water saving benefits.
9	Water efficient design, installation, and maintenance practices for new and existing landscapes	Programmatic and Support. Impacts new and existing customers who install new landscaping.	Design, installation, and maintenance of landscapes and irrigation systems can greatly impact water use. This best practice maximizes water efficiency through water budgeting and the proper design, installation, and maintenance of new and existing landscapes and irrigation systems. This BP is largely based on the work of the Green Industries of Colorado (GreenCO) published in their 2008 BMP guide (GreenCO 2008).	Applies to new and existing landscapes. Savings potential of a landscape designed, installed, and maintained for water efficiency vs. standard can be a 35% reduction in annual irrigation use or more according to GreenCO. Designing the landscape to meet a water budget target can establish a savings level. Many landscapes are already irrigated at an efficient level. Proper on-going maintenance helps preserve water efficiency of the original design.

No.	Best Practice	Category	Overview	Estimated Savings Potential
10	Irrigation efficiency evaluations	Foundational, Programmatic, Understanding, Informational, and Support. Impacts participating customers.	The efficiency of an irrigation system can greatly impact the amount of water that is used in the landscape. Over time, even a well designed and properly installed irrigation system becomes less efficient unless it is well maintained and operated for maximum efficiency. This best practice describes key considerations for maximizing water efficiency through the use of regular irrigation efficiency evaluations.	If recommendations are implemented, savings can range from 5 - 40%. Savings depend upon the severity of problems at each site, the level of over-irrigation prior to the evaluation, and implementation of recommendations.

Indoor Residential Best Practices[3]

No.	Best Practice	Category	Overview	Estimated Savings Potential
11a	Rules for new construction	Programmatic and Control. Impacts new residential construction.	Water conservation measures that are "built in" to new buildings can help slow the growth of new water demands. This best practice describes water efficiency specifications that water utilities can make voluntary or mandatory for new residential development within their service areas.	High efficiency homes are expected to use approximately 15 - 30% less indoors than standard new homes. Similar reductions are expected for multi-family properties.
12a	High-efficiency fixture and appliance replacement for residential sector	Programmatic, Support, and Control. Incentive program impacts participants only. Retrofit on reconnect impacts anyone transacting real estate.	The goal of this best practice is to increase the installation rate of water efficient fixtures and appliances and to remove inefficient and wasteful devices from the service area in favor of efficient products. Various means are used to spur customers into replacing products. In some programs, customers are simply given hardware that is more water efficient. Faucet and showerhead replacement programs often take this tact. Rebates and vouchers are also important tools for coaxing customers to replace devices with more water efficient models. A low cost alternative is a requirement for retrofit on reconnect where fixtures and appliances must be upgraded as a condition for re-joining the water system after a real estate transaction.	HET vs. 3.5 gpf toilet = saves approx. 8,000 - 20,000 gallons per household per year. HET vs. 1.6 ULF = approx. 1,500 gallons per year. HE CW vs. standard top loader = saves approx. 5,000 - 20,000 gallons per household per year. 1 gpm faucets vs. 2.2 gpm faucets saves 2,000 - 10,000 gallons per household per year. 2.0 gpm showerhead vs. 2.5 gpm showerhead saves approximately 0 - 5,000 gallons per household per year.
13	Residential water surveys and evaluations, targeted at high demand customers	Programmatic and Support. Impacts participants only.	Water surveys and evaluations (frequently referred to as "audits") that identify water savings opportunities and educate customers are a fundamental component of residential water conservation programs. Although often offered to all customers, high volume customers should be targeted first to maximize water savings and minimize program expenses.	Surveys by themselves don't save water, but they often spur savings. Consider impacts to wastewater flow too. Eliminating inefficient water uses should be able to reduce annual consumption by 10 – 20% *after implementing the recommendations* of a carefully conducted site audit.

[3] Applies to both single-family (SF) and multi-family (MF) residences.

Indoor Non-Residential Best Practices

No.	Best Practice	Category	Overview	Estimated Savings Potential
11b	Rules for new construction	Programmatic and Control. Impacts new non-residential construction.	Water conservation measures that are "built in" to new buildings can help slow the growth of new water demands. This best practice describes water efficiency specifications that water utilities can make voluntary or mandatory for new non-residential developments within their service areas.	High efficiency non-residential buildings are expected to use approximately 15 - 25% less indoors than standard buildings.
12b	High-efficiency fixture and appliance replacement for non-residential sector	Programmatic and Support. Incentive program impacts participants only. Retrofit on reconnect impacts anyone transacting real estate.	The goal of this best practice is to increase the installation rate of water efficient fixtures and appliances and to remove inefficient and wasteful devices from the service area in favor of efficient products. Various means are used to spur customers into replacing products. In some programs, customers are simply given hardware that is more water efficient. For the commercial sector more generalized incentives may be appropriate as fixtures and equipment vary from site to site. A low cost alternative is a requirement for retrofit on reconnect where fixtures and appliances must be upgraded as a condition for re-joining the water system after a real estate transaction.	The savings that can be achieved in the non-residential sector through the replacement of domestic fixtures and through specialized equipment (described in more detail in Best Practice 14) are substantial, but less definitively quantified because of the variability inherent in non-residential demand. The *Watersmart Guidebook – A Water Use Efficiency Plan Review Guide for New Businesses* offers reasonable estimates of water savings that can be achieved in a wide variety of non-residential settings.
14	Specialized non-residential surveys, audits, and equipment efficiency improvements	Programmatic and Support. Impacts participants only.	Specialized non-residential surveys and equipment efficiency improvements reduce water demands in the commercial, institutional and industrial (CII) sector. This best practice specifically *excludes* toilets, showers, and faucets (i.e. fixtures found in residential and non-residential accounts); however part of the survey process involves identifying all domestic fixtures that should be upgraded to improve efficiency.	The range of savings will vary greatly and depend entirely on the measures implemented at the site. As part of the 2000 AWWA Commercial and Institutional End Uses of Water study it was estimated that many non-residential sites have the potential to conserve between 15 and 50% of their current demand (Dziegielewski et. al. 2000).