

PROVISIONAL METHOD 4 FOR DETERMINING WATER USE TARGETS

February 16, 2011

DWR developed Provisional Method 4 in accordance with Water Code Section 10608.20(b)(4). Urban retail water suppliers that adopt Target Method 4 to determine their 2020 urban water use target must use the provisional procedures described in this document. This target method has been developed with the assistance of the California Urban Water Conservation Council, the California State Water Resources Control Board, and the Urban Stakeholder Committee, composed of technical experts and representatives of water suppliers and environmental and other organizations.

Section 10608.20(d) provides that DWR will update Target Method 4 by December 31, 2014. It is anticipated that improvements will be made to the target method based on new data and analytical techniques in the update. Provisional Target Method 4 described here will be in effect until the update by 2014.

A Target Method 4 Calculator (Calculator) using an Excel spreadsheet has been developed for use with Provisional Target Method 4. The Calculator will be required to accomplish some of the procedures for this method. Other procedures may be accomplished without use of the Calculator but have been incorporated into the Calculator to automate the calculation of the 2020 target.

Overview

The overall framework for Provisional Target Method 4 is described in this section. Details are presented in the Detailed Procedures section. For this target method, savings are assumed between the baseline period and 2020 due to metering of unmetered water connections and achieving water conservation measures in three water use sectors.

The 2020 water use target for individual urban water suppliers is determined by Equation 1 in units of gallons per capita per day (GPCD).

Equation 1

$$\boxed{\text{Urban Water Use Target}} = \boxed{\text{Base Daily per Capita Water Use}} - \boxed{\text{Total Savings}}$$

The base daily per capita water use is separated into three sectors for the purpose of Target Method 4:

1. Residential indoor
2. Commercial, Industrial, and Institutional (CII)
3. Landscape water use, water loss, and other unaccounted-for water

Because accurate methods are not generally available to estimate the water use in these three sectors, a standard of 70 GPCD is assumed for residential indoor water use. For the purpose of Target Method 4, CII water use does not include landscape irrigation use served by dedicated landscape irrigation meters. Dedicated landscape meters often serve large commercial or institutional irrigation sites such as golf courses, parks, or school grounds. CII water use includes irrigation water use served by mixed use water meters. Landscape irrigation water use in item 3 above is composed of residential irrigation and irrigation served by dedicated landscape irrigation meters or connections. Unaccounted for water is water that is lost in water distribution systems. Other unaccounted for water may include unmetered uses such as construction water or discrepancies in water meter accuracy. For simplification, water loss and other unaccounted for water are referred to as “water loss” in this document.

For the purpose of Target Method 4 it is necessary to calculate landscape water use and loss using Equation 2. The units for Equation 2 are GPCD.

Equation 2

$$\boxed{\begin{array}{l} \text{Landscape and} \\ \text{Water Loss per} \\ \text{Capita Use} \end{array}} = \boxed{\begin{array}{l} \text{Base Daily per} \\ \text{Capita Water} \\ \text{Use} \end{array}} - \boxed{\begin{array}{l} \text{Standard Indoor} \\ \text{Residential} \\ \text{70 gpcd} \end{array}} - \boxed{\begin{array}{l} \text{CII Water} \\ \text{Use} \end{array}}$$

Potential water savings are estimated for each of these water use sectors and for reduced water use due to installation of meters on unmetered connections, as shown in Equation 3. The units for Equation 3 are GPCD.

Equation 3

$$\boxed{\begin{array}{l} \text{Total} \\ \text{Savings} \end{array}} = \boxed{\begin{array}{l} \text{Metering} \\ \text{Savings} \end{array}} + \boxed{\begin{array}{l} \text{Indoor} \\ \text{Residential} \\ \text{Savings} \end{array}} + \boxed{\begin{array}{l} \text{CII} \\ \text{Savings} \end{array}} + \boxed{\begin{array}{l} \text{Landscape and} \\ \text{Water Loss} \\ \text{Savings} \end{array}}$$

Detailed Procedures

Step 1: Baseline Water Use and Midpoint Year

The Base Daily Per Capita Water Use is an average calculated for the base period selected by the urban retail water supplier, as described in Methodology 3.

The data required for some of the following steps of Target Method 4 must be provided for the midpoint year for the base period. For a base period with an even number of years, the midpoint year will be the 12 months preceding the midpoint date.

The Calculator has been designed for calendar years. For water suppliers that choose to use a fiscal year reporting basis, the Calculator can be adapted by providing the fiscal year period representing the year designated in the Calculator.

Step 2: Metering Savings

For service areas with water service connections without water meters, a water supplier must estimate the total amount of water delivered to unmetered connections during the midpoint year of the baseline period. The metering savings is calculated using Equation 4.

Equation 4

$$\begin{array}{c} \boxed{\text{Metering Savings, GPCD}} \end{array} = \frac{\begin{array}{c} \boxed{\text{Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons}} \end{array} \times \begin{array}{c} \boxed{0.20} \end{array}}{\begin{array}{c} \boxed{\text{Service Area Population in Midpoint Baseline Year}} \end{array} \times \begin{array}{c} \boxed{365 \text{ days}} \end{array}}$$

Step 3: Indoor Residential Savings

Indoor residential water savings are estimated based upon anticipated increases in the installation of more efficient toilets, residential clothes washers, and showerheads. The savings estimates are based on a comparison of saturation levels of fixtures, at certain water use efficiencies, during the midpoint year of the baseline period and with saturation goals in 2020. Separating toilets in single-family and multi-family dwellings, the 2020 saturation goals for the four plumbing fixtures categories are listed in Table 1.

Table 1. Saturation Goals for Indoor Residential Fixtures

Fixture Type	2020 Saturation Goals
Single-family Toilets	85% 1.28 gal/flush toilets 15% average flush volume at midpoint baseline year

Multi-family Toilets	85% 1.28 gal toilets 15% average flush volume at midpoint baseline year
Residential Washers	85% Water Factor (WF) of 6 15% average WF at midpoint baseline year
Residential Showerheads	95% low flow showerheads 5% non-low flow showerheads

There are two alternatives for calculating indoor residential water savings, one using the Target Method 4 Calculator based on historic data for a water supplier and the other using a default savings of 15 GPCD.

Alternative 1:

To calculate indoor residential savings using the historic data of an individual water supplier the following types of data may be required to enter into the Calculator:

- Persons per household
- Toilets per household
- Showers per household
- Numbers of single- and multi-family dwelling units for years 1991 through the midpoint of baseline period
- Population residing in group quarters in the midpoint year of baseline period
- Either (1) numbers of efficient toilets, showerheads, and clothes washers either distributed, installed, or credited through incentives, such as rebates for years 1991 through the midpoint of baseline period or (2) saturation levels of fixtures at various efficiencies at the midpoint year of the baseline period

After entry of the required data, the Calculator will determine the indoor residential savings in terms of GPCD.

Alternative 2:

If a water supplier does not have historic data for the midpoint baseline and prior years, the supplier can use a default indoor residential water savings of 15 GPCD. While the Calculator allows Alternative 2 for the convenience of calculating the target, if this alternative is chosen, the Calculator is unnecessary.

Determining whether to use the default value, the following information may be helpful. In developing the Provisional Target Method 4, a random sample of 52 water suppliers were selected to test the Calculator. The sample represented a variety of climatic and demographic characteristics. An analysis of this random sample developed a statewide average savings from the four indoor residential elements was 14.1 GPCD, with a range of 7.9 to 16.8 GPCD. Sixty percent of the suppliers fell within the range of 13.1 to 15.1 GPCD and 15 percent exceeded 15.1 GPCD.

Step 4: CII Savings

CII water savings is assumed to be 10 percent of baseline CII water use, which is an average for the baseline period calculated following procedures in Methodology 7. For the purpose of Target Method 4, CII water use does not include landscape irrigation served by dedicated landscape irrigation meters. CII savings is calculated using Equation 5.

Equation 5

$$\boxed{\text{CII Savings, GPCD}} = \boxed{\text{Average baseline CII Water Use, GPCD}} \times \boxed{0.10}$$

Step 5: Landscape Irrigation and Water Loss Savings

Landscape water use and water loss savings are based on a 21.6 percent reduction in that sector for all suppliers. The 21.6 percent reduction was derived from an analysis of 52 sample water suppliers and was calculated so that the average water use target for the 52 sample suppliers would meet the overall goal of a cumulative 20% percent savings.. Landscape water use and water loss use is calculated using Equation 2 and represents irrigation water use, water loss and other unaccounted-for water uses. The savings is calculated using Equation 6.

Equation 6

$$\boxed{\text{Landscape water use and Water Loss Savings, GPCD}} = \boxed{\text{Landscape Irrigation and Water Loss Sector Use per Eq. 2, GPCD}} \times \boxed{0.216}$$

Step 6: Total Savings

The total savings required using Target Method 4 is calculated using Equation 3, entering results from Steps 2 through 5.

Step 7: 2020 Urban Water Use Target

The 2020 urban water use target in GPCD is calculated using Equation 1.

Example

To illustrate the procedures for the Provisional Target Method 4, calculations for the fictional Whispering Glen Water District are shown below.

Step 1. Baseline Water Use and Midpoint Year

Whispering Glen Water District selected a 10-year baseline period of 1996-2005. The average base daily per capita water use for this period was calculated to be 228 GPCD. The savings are calculated based on water deliveries in the midpoint year of the baseline period, which is 2000.

Step 2. Metering Savings (Equation 4)

Metering Savings, GPCD	=	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons</td> <td style="width: 5%; text-align: center;">X</td> <td style="width: 10%; padding: 10px;">0.20</td> </tr> <tr> <td style="padding: 5px;">2,541,637,800</td> <td></td> <td></td> </tr> </table>	Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons	X	0.20	2,541,637,800			=	8.3 GPCD
	Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons	X	0.20							
2,541,637,800										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Service Area Population in Midpoint Baseline Year</td> <td style="width: 5%; text-align: center;">X</td> <td style="width: 10%; padding: 10px;">365 days</td> </tr> <tr> <td style="padding: 5px;">168,118</td> <td></td> <td></td> </tr> </table>	Service Area Population in Midpoint Baseline Year	X	365 days	168,118						
Service Area Population in Midpoint Baseline Year	X	365 days								
168,118										

Step 3. Indoor Residential Savings

Alternative 1, Target Method 4 Calculator:

Total Indoor Residential Savings, GPCD	=	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Single-family Toilets Savings, GPCD</td> </tr> <tr> <td style="padding: 5px;">7.6</td> </tr> </table>	Single-family Toilets Savings, GPCD	7.6	+	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Multi-family Toilets Savings, GPCD</td> </tr> <tr> <td style="padding: 5px;">1.6</td> </tr> </table>	Multi-family Toilets Savings, GPCD	1.6	+	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Residential Washers Savings, GPCD</td> </tr> <tr> <td style="padding: 5px;">6.0</td> </tr> </table>	Residential Washers Savings, GPCD	6.0	+	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Residential Showers Savings, GPCD</td> </tr> <tr> <td style="padding: 5px;">1.3</td> </tr> </table>	Residential Showers Savings, GPCD	1.3	=	16.5 GPCD
Single-family Toilets Savings, GPCD																		
7.6																		
Multi-family Toilets Savings, GPCD																		
1.6																		
Residential Washers Savings, GPCD																		
6.0																		
Residential Showers Savings, GPCD																		
1.3																		

Alternative 2, Default:

Total Indoor Residential Savings, GPCD	=	15.0 GPCD
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Step 4. CII Savings (Equation 5) CII Savings, GPCD	=	Average baseline CII Water Use, GPCD	X	0.10	=	6.9 GPCD
		69.0				

Step 5. Landscape Irrigation and Water Loss Savings (Equations 2 and 6)

Landscape Irrigation and Water Loss Sector Use, GPCD	=	2000 Base Daily per Capita Water Use	-	Standard Indoor Residential Use, GPCD	-	CII Water Deliveries in Midpoint Baseline Year, GPCD	=	89.0 GPCD
		227.7		70.0		68.7		

Landscape Irrigation and Water Loss Savings, GPCD	=	Landscape Irrigation and Water Loss Sector Use, GPCD	X	0.216	=	19.2 GPCD
		89.0				

Step 6. Total Savings

Because there are two alternative methods to calculate indoor residential savings, there are two alternatives for total savings, calculated using Equation 3.

Alternative 1 (based on Target Method 4 Calculator for Indoor Residential Savings):

Total Savings, GPCD	=	Metering Savings, GPCD	+	Indoor Residential Savings, GPCD	+	CII Savings, GPCD	+	Landscape Irrigation and Water Loss Savings, GPCD	=	50.9 GPCD
		8.3		16.5		6.9		19.2		

Alternative 2 (based on default for Indoor Residential Savings):

Total Savings, GPCD	=	Metering Savings, GPCD	+	Indoor Residential Savings, GPCD	+	CII Savings, GPCD	+	Landscape Irrigation and Water Loss Savings, GPCD	=	49.4 GPCD
		8.3		15.0		6.9		19.2		

Step 7. 2020 Urban Water Use Target (Equation 1)

Alternative 1 (based on Target Method 4 Calculator for Indoor Residential Savings):

Urban Water Use Target, GPCD	=	Base Daily per Capita Water Use, GPCD	-	Total Savings, GPCD	=	176.8 GPCD
		227.7		50.9		

Alternative 2 (based on default for Indoor Residential Savings):

Urban Water Use Target, GPCD	=	Base Daily per Capita Water Use, GPCD	-	Total Savings, GPCD	=	178.3 GPCD
		227.7		49.4		