Water Efficiency for Instream Flow:

Making the Link in Practice

Page	Topic

Resource Section 2

Sample Colorado River Basin Community

AWE Water Conservation Tracking Tool Run

In order to demonstrate the water efficiency program planning process, the Alliance for Water Efficiency used its Water Conservation Tracking Tool to estimate the costs and benefits for a hypothetical community in the Colorado River Basin.

This community has a population of 95,255 in 2011 with weather and demographic characteristics that could be found in the Colorado River Basin and steady population growth predicted that will result in a population of 210,556 by 2050.

October 2011

The housing stock contains over 15,000 single-family housing units and over 12,000 multifamily units, most of which were built before 1994. This is important because of the Energy Policy Act of 1992 and the plumbing codes that took effect in 1994. Housing constructed prior to 1994 offers greater savings potential due the inefficient water using fixtures likely installed in those homes. The peak water use season is estimated to be from April 15 through October 15. The area was estimated to receive an average of 9.3 inches of rain per year and have a reference evapotranspiration rate of 34.53 inches per year.

The AWE Water Conservation Tracking Tool contains worksheets that ask users to input demographic data, utility service area details, avoided cost information, and planned water efficiency program information. When these inputs are filled in, the Tracking Tool creates output sheets containing savings information, benefit-cost analysis, and revenue and rate impacts. The latest edition of the Tracking Tool (Version 2.0) also includes greenhouse gas reduction estimates. Learn more about this tool at **www.allianceforwaterefficiency.org/Tracking-Tool.aspx**.

For this Colorado River Basin example, 14 water efficiency programs were analyzed for the hypothetical community. They are listed in Table 1 below. These programs target indoor and outdoor water use in the residential, commercial, and industrial sectors. Outdoor programs help shave the peak water demand that occurs when the air is hot and dry and rainfall is lacking. During these times river and stream flows are also naturally low, and have added stress due to the increase in water demand. Thus, outdoor water efficiency programs can be good candidates for enhancing real time stream flows.

Table 1

Selected Water Efficiency Programs

Residential HE Toilets, SF
Residential HE Washer, SF
Indoor Commercial Water Efficiency Audits
Large Landscape Surveys
Residential LF Showerhead, SF
Residential LF Showerhead, MF
CII Laundromat
CII Spray Rinse Valve
CII Cooling Tower
Residential Irrigation Controller, SF
Large Land. Irrigation Controller
Large Land. Turf Replacement
Residential Turf Replacement
Residential Efficient Irrigation Nozzles, SF

Table 2 shows a breakdown of the service area water demand from 2011 to 2020 under three different conditions. It shows the baseline demand forecast, the baseline forecast less savings resulting from the plumbing code, and the baseline forecast less savings from both the plumbing code and planned water efficiency programs. Following this are estimates for per capita demands, service area water savings, and customer class water savings. Lastly, Table 2 highlights the reduction in water demands resulting from both plumbing code savings and water efficiency programs.

Table 2

Water Demand Summary

Service Area Demands	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline demands	AF	27,579	28,339	29,121	29,924	30,748	31,596	32,467	33,362	34,282	35,227
Baseline–code savings	AF	27,579	28,274	28,993	29,737	30,505	31,299	32,118	32,963	33,836	34,735
Baseline–code savings –program savings	AF	27,284	27,718	28,222	28,763	29,331	29,952	30,824	31,719	32,638	33,584

Per Capita Demands	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Baseline demands	GPD	258	258	258	258	258	258	258	258	258	258
Baseline–code savings	GPD	258	258	257	257	256	256	256	255	255	255
Baseline–code savings –program savings	GPD	256	253	250	248	247	245	245	246	246	246

Service Area Water Savings	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Code water savings	AF	0	65	127	187	243	297	349	399	446	492
Program water savings	AF	296	556	772	974	1,174	1,347	1,294	1,245	1,198	1,151
Total water savings	AF	296	621	899	1,161	1,417	1,644	1,643	1,643	1,644	1,643
% of baseline demands	%	1.1%	2.2%	3.1%	3.9%	4.6%	5.2%	5.1%	4.9%	4.8%	4.7%

Class Water Savings	Units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Single family	AF	97	219	306	389	470	547	565	583	600	616
Multi family	AF	19	51	75	97	119	139	152	165	177	190
Commercial	AF	168	327	482	625	768	886	852	821	792	761
Industrial	AF	11	23	35	46	58	69	70	70	70	70
Non revenue water	AF	–	–	–	–	–	–	–	–	–	–
Total	AF	296	620	897	1,158	1,415	1,641	1,639	1,639	1,639	1,637

Table 3

Utility Conservation Program B/C Ratio

Class	Activity Name	B/C Ratio
Single family	Residential HE Toilets, SF	4.74
Single family	Residential HE Washer, SF	1.33
Commercial	Indoor Commercial Water Efficiency Audits	0.21
Commercial	Large Landscape Surveys	1.52
Multi Family	Residential LF Showerhead, SF	1.99
Commercial	Residential LF Showerhead, MF	1.84
Commercial	CII Laundromat	0.83
Commercial	CII Spray Rinse Valve	2.39
Industrial	CII Cooling Tower	3.77
Single family	Residential Irrigation Controller, SF	0.28
Commercial	Large Land. Irrigation Controller	1.28
Commercial	Large Land. Turf Replacement	0.93
Single family	Residential Turf Replacement	0.46
Single family	Residential Efficient Irrigation Nozzles, SF	0.23
Subtotal conservation activities		1.48
Total with overhead and public information		1.48

Table 3 illustrates the cost effectiveness of the scripted water efficiency programs. Benefit cost (B/C) ratios of 1 or greater are desirable, as they indicate that the benefits are equal to or greater than the cost. These B/C ratios represent the default model assumptions. The residential high-efficiency toilet program has a B/C ratio of 4.74. The rebate amount for this program could be increased and it would still be cost effective. It is not necessary to increase the rebate, but doing so may improve customer participation.

The Tracking Tool allows users the flexibility to adjust cost and savings parameters for the efficiency programs and the B/C ratio is then recalculated on the fly. Therefore initial B/C ratio outputs serve as a great starting point for fine-tuning the efficiency programs. For example, the commercial large landscape turf replacement program is currently not cost effective. The incentive amount could be adjusted until it becomes cost effective. Because the B/C ratio is very close to 1, it would likely take only a minor adjustment. Moreover, while this portfolio contains some programs that are not cost effective, a utility may decide to include them all as the complete portfolio B/C ratio is well above 1. A community wishing to shave peak demand might be particularly interested in keeping the outdoor water efficiency programs.

Figure 1

Peak Season Capacity

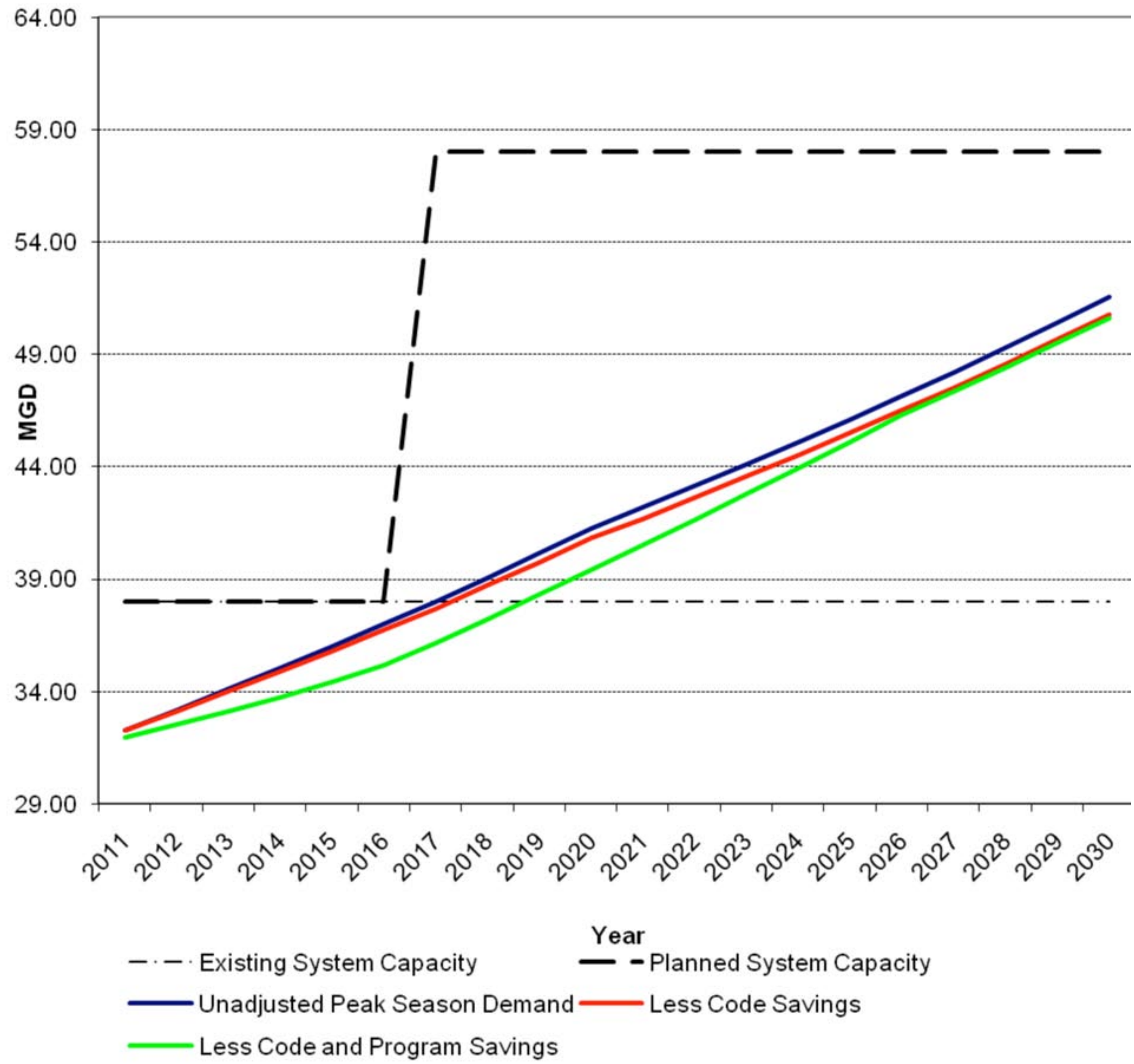

Figure 1 illustrates the demand projections that are reported in Table 2 for the years 2011 through 2030, and compares them to the current peak system capacity. In this example water efficiency programs will allow the water utility to defer expansion projects because it will take longer for the demand to reach the limitations of the current capacity.

Around year 2025 the demand projection with water efficiency (green line) begins to revert back to demand projection with only code savings factored in (red line). This is due to the decay of the savings from the water efficiency programs. In this example activity was stopped in year 2016. In order to sustain future savings beyond the code, additional water efficiency program activity would need to be added.

Figure 2 is very similar to Figure 1. It does not contain the comparison to current capacity and is a shorter time frame. Tightening the time scale allows a different view of the impact of water efficiency programs. While the plumbing code provides savings on its own, it is clear here that water efficiency programs allow water utilities to achieve far greater savings. These savings can have multiple benefits—including reduction of energy related to water supply and wastewater pumping and treatment. Another benefit can certainly be enhancement of stream flow, either by direct return of water to rivers or the prevention of its removal in the first place.

Figure 2

Service Area Demands