



# INTRODUCTION TO THE AWE TRACKING TOOL



Alliance  
*for* Water  
Efficiency

# A VOICE FOR WATER EFFICIENCY IN NORTH AMERICA

- Our mission is to promote an efficient and sustainable water future
- Over 500 member organizations in 200 watersheds delivering water to 50 million water users
- Our network and research focus is on smart solutions and Efficiency First



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## ROADMAP FOR THIS SESSION

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- Overview and introduction to the Tracking Tool
- Walkthrough of Tracking Tool Version 3.0
- Sneak peak of Version 4.0
- Questions/Discussion, possible live demo of Tracking Tool Version 3.0



# WHAT IS THE TRACKING TOOL?

- An Excel-based model that can be used to evaluate the costs and benefits of water conservation programs
- Includes detailed User Guide
- Graphic model outputs which are usable for manager and board presentations
- A free resource for AWE and CalWEP members



# HOW DO I GET A FREE COPY OF THE TRACKING TOOL?



PROMOTING AN EFFICIENT & SUSTAINABLE WATER FUTURE

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## Water Conservation Tracking Tool

**Section: Water Conservation Programs, Planning, and Evaluation**

The Tracking Tool is an Excel-based model that can evaluate the water savings, costs, and benefits of conservation programs for a specific water utility, using either English or Metric units. Using information entered into the Tracking Tool from the utility's system, it provides a standardized methodology for water savings and benefit cost accounting, and includes a library of pre-defined conservation activities from which users can build conservation programs.

Water utility managers can use the Tracking Tool in a variety of ways to aid their water resource planning and operations:

- Develop long-range conservation plans. Construct conservation portfolios containing up to 50 separate conservation program activities.
- Quickly compare alternative conservation measures in terms of their water savings potential, impact on system costs, and potential benefits to utility customers.
- Track the implementation, water savings, costs, and benefits of actual conservation activities over time.
- Evaluate a utility's changing revenue requirement with conservation.
- Estimate the reduction in GHG emissions resulting from plumbing/energy codes and conservation program activity.

The Tracking Tool counts the savings achieved from national fixture and appliance standards. Due to differing standards among states, users can select from five options depending on their location: California, Colorado, Georgia, Texas, and all other states.

**How the Alliance Will Help**

The Alliance will provide a detailed user guide with the Tool, as well as one (1) hour of free technical assistance to any member using the Tool. Please let us know about your experiences with the Tool! We would like to feature successful examples of the Tool in use on our web site, so please let us know how it has worked for you.

**Member-Only Benefit**

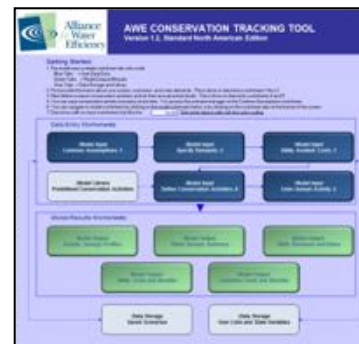
The Tool is available free of charge to AWE members, as a member-only benefit, but it is subject to your agreement to the Water Conservation Tracking Tool Terms of Use. If not already, sign-in below to gain access to the Terms of Use form. [Not a current member, join now!](#)





# HISTORY OF THE AWE TRACKING TOOL

- Version 1.0 first released in 2009
- Has been through a series of updates: Version 1.0, 1.1, 1.2, 2.0, 3.0... and 4.0 is on the way!
- Has had over 400 users
- AWE has worked directly with many of its members



# VERSION 4.0

- New separate California edition to address water conservation framework legislation with targets for utilities
- New water loss functionality
- New conservation activities in the resource library
- New interface
- Huge thank you to all of the PAC members!

**Enter Service Area Data**

**Instructions:**  
1. Set forecast period: First year must be 1995 or later. Last year must end in 0 or 5 and cannot be greater than 2040.  
2. Enter historical and projected population, service connections, and rate of housing units to service connections. Values for 1995, First Year, and Last Year are required. The model will interpolate the other values if you do not provide them. Model accuracy will be improved, however, if values for the interim years also are provided.

Worksheet ID: Sheet4

**Set Forecast Period**  
First Year: 2000 Last Year: 2040

**Population Served**

	Required	1995	2000	2005	2010	2015	Required	2020	2025	2030	2035	2040	Required
Service Area Population													
		56,741					57,630					63,394	
Population Shares (%)													
Single-Family	79%						80%					80%	
Multi-Family	21%						20%					20%	
Group Quarters	0%						0%					0%	
Total	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	
Population by Living Quarters													
Single-Family	45,000						46,004					50,716	
Multi-Family	9,741						11,626					12,678	
Group Quarters	0						0					0	
Total	56,741						57,630					63,394	

**Service Connections**

	Required	1995	2000	2005	2010	2015	Required	2020	2025	2030	2035	2040	Required
Number of Service Connections													
Single-Family	16,000						16,300					16,800	
Multi-Family	160						210					231	
CI Irrigation Meter	200						250					275	
CI Common Meter	1,000						1,100					1,210	
Other/Temporary/Ass Meter	25						40					44	
Total	18,485	0	0	0	0	0	18,900	0	0	0	0	19,550	

**Housing Units**

	Required	1995	2000	2005	2010	2015	Required	2020	2025	2030	2035	2040	Required
Mean Number of Housing Units/Connection													
Single-Family	10						10					10	
Multi-Family	27.0						25.0					25.0	
Number of Housing Units													
Single-Family	16,000						16,300					16,800	
Multi-Family	1,100						1,750					1,775	
Total	25,100	0	0	0	0	0	20,050	0	0	0	0	22,600	

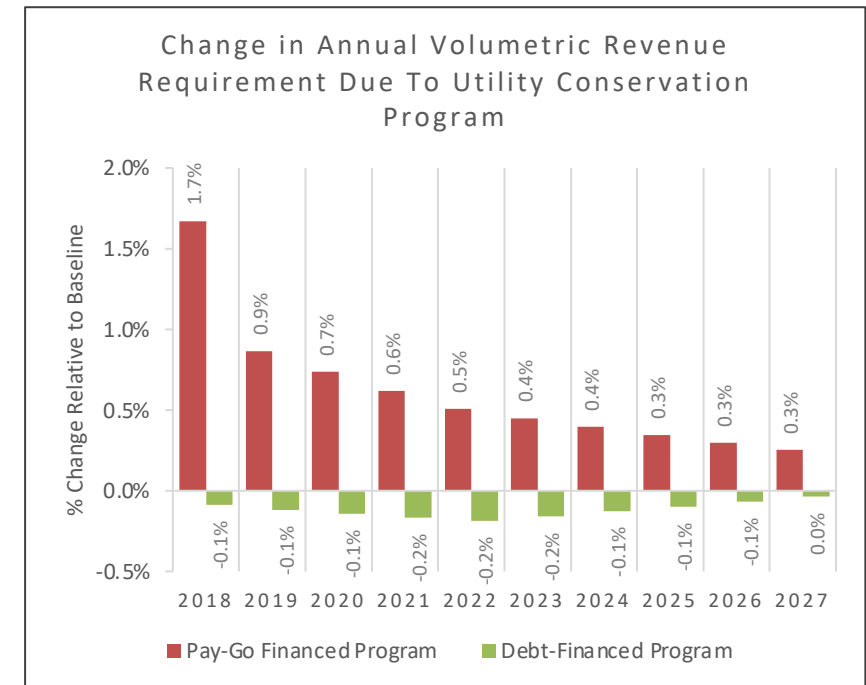
**Persons Per Household**

	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Single-Family	3.00					3.01				3.01
Multi-Family	2.25					2.20				2.20
Total	2.82					2.80				2.80

Start Enter Service Area Data Enter Base Year Demand Enter Avoided Costs Specify Water Loss Ma

# COOL THINGS TO KNOW ABOUT THE TRACKING TOOL

- Includes pre-defined conservation measures and provides flexibility for customization
- Estimates passive savings from plumbing code
- Estimates conservation impact on a utility's revenue requirement, bills and rates
- Estimates energy and GHG emission reductions from conservation for customer and utility perspective
- And more...





# LET'S TAKE A TOUR

The screenshot displays the 'AWE CONSERVATION TRACKING TOOL' interface, Version 1, Standard North American Edition. The tool is designed to help users track water conservation program activity and results, providing a clear, consistent framework for capturing the effects of plumbing/appliance standards and program conservation programs on future water use, utility costs, and other metrics, and to compare customer costs and benefits. It evaluates these effects in terms of costs and benefits from the perspective of the utility, water providers, and program participants. Costs and benefits are separately calculated for each conservation measure and can be used to help assess the costs and benefits of program portfolios.

The tracking tool is organized into a series of worksheets. There are three worksheet groups: (1) user input worksheets, (2) tracking tool input worksheets, (3) and background calculation and data storage worksheets. You have only one input worksheet with the first two groups. Worksheets in the third group are generated if you select them to build the conservation tracking tool. Tracking tool worksheets are not required to use the tracking tool.

User input worksheets will include both data and text input. From you as well as with that computer model. Changing the worksheets will change the way the tracking tool works and therefore is not recommended. Only input sheets are distinguished from all other sheets in the model by their [yellow](#) background. (Note: input sheets will not be saved.)

The first two user input worksheets should be completed sequentially: 1. Common Assumptions and 2. Specify Demands. This will ensure the tracking tool has the basic data it needs to get started. After that, the remaining user input worksheets can be completed in any order. The user input worksheets -- 4. Enter GHG Emission Factors -- is optional. You only need to complete it if you want the tracking tool to calculate GHG emission reductions from plumbing/appliance standards and program conservation. The user guide provides additional information and help for each sheet.

You can use the model sheets below to navigate to different parts of the model, or simply use Excel's standard worksheet navigation methods.

### User Input Sheets

1. Common Assumptions
2. Specify Demands
3. Enter Utility Avoided Costs
4. Define Activities
5. Enter Annual Activity
6. Enter GHG Emission Factors (Optional)

### Tracking Tool Output Sheets

- Activity Savings Profiles
- Water Savings Summary
- Utility Revenue and Water
- Utility Costs and Benefits
- Water Loss Comparison
- Customer Costs and Benefits
- GHG Reduction Benefits

The interface includes a navigation bar at the bottom with tabs for each worksheet: **Start**, **1. Common Assumptions**, **2. Specify Demands**, **3. Enter Utility Avoided Costs**, **4. Define Activities**, **5. Enter Annual Activity**, and **6. GHG**.

# AWE CONSERVATION TRACKING TOOL: COMMON ASSUMPTIONS WORKSHEET

**Getting Started:** On this worksheet you enter information the tracking tool needs to operate. This includes specifying whether to use English or Metric units, setting up customer classes, specifying the first year for forecasts, entering forecasted population, housing, and customer accounts, setting financial assumptions, providing information needed to calculate water and energy savings due to appliances and plumbing standards for toilets, coffee makers, and dishwashers, and providing information needed to calculate water savings for landscape conservation measures included in the conservation measure library. It sounds like a lot, but you probably have developed much of this data for other planning purposes.

Manage Scenarios

Scenario: "English Units Example" created 11/10/2016 11:17 AM

Click to Setup Customer Classes

State

CA

Model will use CA plumbing standards

Volume Units

Acres Feet (AF)

Flow Units (GPD) for

1000

## Population, Housing, and Account Forecasts

Enter Starting Year for Forecasts

2015

### Population & Housing

	2015	2020	2025	2030	2035	2040	2045	2050
Population	382,000	391,000	395,000	395,000	395,500	400,500	410,000	420,000
Single-Family Dwelling units	198,000	191,400	184,386	188,171	192,807	194,286	197,940	198,071
Multi-Family Dwelling units	17,300	16,100	15,107	16,714	17,307	17,807	18,500	18,999

### Number of Accounts

Single-Family	198,000	191,400	184,386	188,171	192,807	194,286	197,940	198,071
Multi-Family	1,300	1,150	1,007	1,114	1,007	1,007	1,000	1,000
CA	1,000	1,043	1,125	1,207	1,300	1,400	1,510	1,607
Appliances	200	200	200	200	200	200	200	200
Not in use								
Not in use								
Not in use								
Not in use								
Not in use								
Not in use								

## Financial Assumptions

These inputs are used by the tracking tool to standardize costs and benefits, calculate present values, and estimate utility and customer benefits of conservation.

Enter Base Year

2015

Annual Inflation Rate

1.0%

Normal Interest Rate

1.0%

Utility Rates in 2015

Average Clean Rate (2015 Dollars)

Average Rate of Increase

## Financial Assumptions

These inputs are used by the tracking tool to standardize costs and benefits, calculate present values, and estimate utility and customer benefits of conservation.

Order Book Year	2011
Annual Inflation Rate	1.2%
Nominal Interest Rate	1.2%

## Utility Rates in 2010

Customer Class	Average Class Rate (2011 Dollars)				Annual Rate of Increase			
	Water	Electricity	Gas	Rate	Water	Electricity	Gas	Rate
Single Family	\$2.14	\$0.75	\$0.15	\$1.00	1.0%	1.0%	1.2%	1.2%
Multi-Family	\$2.14	\$0.75	\$0.15	\$1.00	1.0%	1.0%	1.2%	1.2%
CA	\$2.14	\$0.75	\$0.15	\$1.00	1.0%	1.0%	1.2%	1.2%
Imperial	\$2.14	\$0.75	\$0.15	\$1.00	1.0%	1.0%	1.2%	1.2%
Not in use								
Not in use								
Not in use								
Not in use								
Not in use								

## Information Needed to Calculate Water/Energy Savings from Plumbing/Appliance Standards

These inputs are used by the tracking tool to estimate water and energy savings for national toilet and showerhead standards, which first took effect in 1994, and clothes washer and dishwasher appliance standards, which first included maximum allowable water factors in 2001 and 2005 respectively. Toilet standards took effect in 1992 in California and Texas.

	Single Family	Multi Family
Persons per household	1.25	1.50
Full Baths/Dwelling Unit	1.75	1.50
Half Baths/Dwelling Unit	4.75	2.25
Dwelling Units in 1990	15,000	25,000
Population in 1990	125,000	

Use  
National  
Average Rates

## Information Needed to Calculate Water Savings for Landscape Measures in Library

Average landscape water use for residential and non-residential sites is used by the model to calculate water savings for various landscape conservation measures included in the program library. Average landscape water use is calculated using the following equation. Alternatively, you can use your own landscape water use estimates by selecting the "Use My Own Estimates" option.

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$$\text{use per acre} = \left( \frac{1}{\text{eff}} \right) \times (ET_0 \times K_c - R_e) \times \text{area} \times C_u \text{ where}$$

$\text{eff}$  = typical irrigation efficiency

$ET_0$  = reference evapotranspiration

$K_c$  = landscape coefficient (% of  $ET_0$  needed by crop)

$R_e$  = effective rainfall (% of annual rainfall contributing to plant water requirements)

$C_u$  = coefficient that converts water use to appropriate volume units (gal for English units,  $M^3$  for metric units)

☐ Use my own estimate

☒ Use model's average water use estimate

Reference ET	in/yr	33.38
Avg Annual Rainfall	in/yr	35.38
Effective Rainfall	%	30%

Landscape Water Requirement Coefficient ( $K_c$ )		
Turf	% of $ET_0$	90%
Other than turf	% of $ET_0$	50%

		Residential	Non-Residential
Avg Landscape Area Per Site	$M^2$	1,191	16,154
Avg Turf Area (% of Total)	%	30%	70%
Avg Irrigation Efficiency (%)	%	60%	70%

		Residential	Non-Residential
Irrigation Requirement			
Turf Area	$M^2/yr$	50	10
Other	$M^2/yr$	36	36

		Residential	Non-Residential
Avg Landscape Water Use Per Site			
Turf Area	Gal/yr	15,361	175,368
Other	Gal/yr	22,642	47,106
Total	Gal/yr	37,994	344,176



# ARE CONSERVATION TRACKING TOOL: SPECIFY DEMANDS WORKSHEET

**Specify Demands:** On this worksheet you specify your baseline demand forecast. This is forecasted demand before any adjustment for planned conservation activities. This forecast is important because it provides the reference for calculating the percentage change in demand from planned conservation, as well as benefits of planned conservation and the impact of conservation on rates and revenue requirements.

Manage Scenarios

Scenario: "Original Land Use" created on 10/2/2016 1:00:00 PM

## Peak Demand Season

Most utilities have low and high demand seasons. The high demand season typically correlates with the summer months. The tracking tool is setup to calculate the fraction of water savings occurring in each season, which can affect the overall value of the water savings.

	Begin Date	End Date	Peak Days	% of Year
Peak Demand Season	1-May	30-Sep	152	42%

## Baseline Demand Forecast

The baseline demand forecast is the projection of demand before any adjustments for planned conservation activities. Use the following table to enter the baseline demand forecast for each customer class. Also enter the forecast of baseline system loss (do not adjust system loss for future leak detection if leak detection will be included as a planned conservation activity in the model. Doing so will result in double counting savings from leak detection).

Options for generating the baseline demand forecast:

1. Enter your own forecast values (recommended)
2. Enter values for first year and extrapolate future values using population forecast (use only if Option 1 not possible)
3. Enter values for first year and extrapolate future values using economic forecast (use only if Option 1 not possible)

**Peak season % of Annual:** In the column to the right of the table, enter the percentage of annual demand occurring in the peak season.

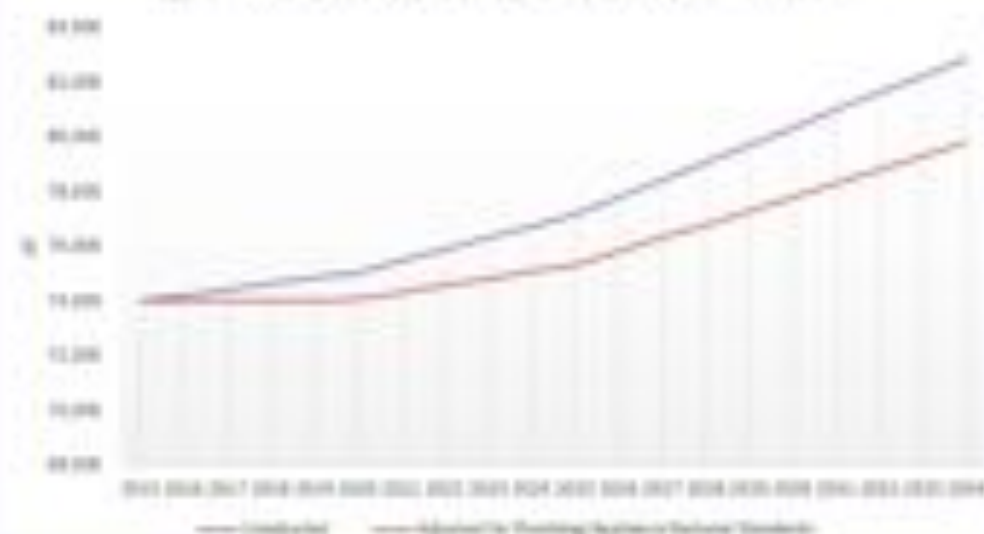
☐ Enter my own forecast ☐ Extrapolate using population forecast ☒ Extrapolate using economic forecast

Annual Sales	Units	2011	2020	2025	2030	2035	2040	2045	2050	Peak Season % of Annual
Single Family	AF	43,775	44,894	46,013	47,131	48,250	49,369	50,488	51,606	40%
Multi Family	AF	3,338	3,371	3,404	3,438	3,471	3,504	3,538	3,571	50%
CR	AF	11,618	11,618	11,618	11,618	11,618	11,618	11,618	11,618	40%
Apartment	AF	6,726	6,801	6,877	6,952	7,027	7,102	7,177	7,252	50%
Not in use	AF									
Not in use	AF									
Not in use	AF									
Not in use	AF									
Not in use	AF									
Not in use	AF									
Total Sales	AF	65,457	66,684	67,911	69,138	70,365	71,592	72,819	74,046	40%

Number of years to display in chart

20

System Production Forecast Before Planned Conservation



System Production Forecast Before Planned Conservation  
(AF)

Which year? 2050



## Adjust Baseline Demand Forecast for Future Effects of Plumbing/Appliance Standards

Plumbing/appliance standards for toilets, clothes washers, and dishwashers will affect future water use. The tracking tool includes models that calculate the magnitude of these effects. You can have the tracking tool adjust your baseline demand forecast for these effects by selecting "Yes" from the drop-down list. If your baseline demand forecast already adjusts for these effects, or you do not want the tracking tool to make this adjustment, select "No."

Adjust demand forecast for future effects of plumbing/appliance standards?

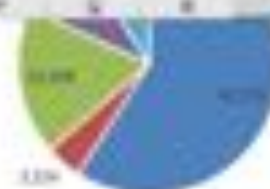
Yes

### Adjustment for Plumbing/Appliance Standards

Annual Adjustment	Units	2011	2020	2025	2030	2035	2040	2045	2050
Single Family	AF	0	-174	-1,347	-1,730	-2,125	-2,407	-2,565	-2,567
Multi Family	AF	0	-153	-302	-433	-519	-586	-640	-639
CI	AF	0	-148	-300	-401	-466	-525	-566	-590
Ingestion	AF	0	0	0	0	0	0	0	0
Not in use	AF								
Not in use	AF								
Not in use	AF								
Not in use	AF								
Not in use	AF								
Not in use	AF								
Total	AF	0	-688	-3,049	-3,565	-3,640	-3,590	-3,854	-4,326

### Demand Forecasts with Plumbing/Appliance Standards Adjustment

Annual Sales	Units	2011	2020	2025	2030	2035	2040	2045	2050
Single Family	AF	41,775	41,175	34,448	31,301	27,762	24,625	21,524	19,381
Multi Family	AF	3,326	3,268	3,190	3,136	3,076	3,012	2,946	2,883
CI	AF	13,644	13,102	12,753	12,270	11,802	11,354	10,919	10,501
Ingestion	AF	4,775	4,875	7,407	7,506	7,604	7,699	7,792	7,875
Not in use	AF								
Not in use	AF								
Not in use	AF								
Not in use	AF								
Not in use	AF								
Total Sales	AF	63,520	61,420	58,405	53,547	50,768	47,133	43,281	40,647
System Loss	AF	4,775	4,875	7,407	7,506	7,604	7,699	7,792	7,875
System Production	AF	74,898	71,698	65,812	57,041	48,888	41,434	35,489	32,772
% Adjustment	%	0%	-1%	-5%	-10%	-15%	-18%	-20%	-22%



40.0%  
33.3%  
11.1%  
15.6%

System loss includes apparent losses, and real losses.

The American Water Works Association (AWWA) Water Loss Control Committee encourages the characterization of non-revenue water, and water loss, as a percentage of total system input volume. The AWWA Water Loss Committee has developed a suite of performance indicators that go beyond water loss being portrayed as a percentage. These performance indicators include:

1. Apparent Losses per service connection per day (gal/service/day)
2. Real Losses per service connection per day (gal/service/day)
3. Real Losses per length of main per day (gal/mile/day)
4. Real Losses per service connection per day per psi pressure
5. Unaccounted Annual Real Losses
6. Infrastructure Leakage Index

There are a variety of helpful resources related to water loss control:

- AWWA Mini Water Audit and Loss Control Programs, fourth edition  
<http://www.awwa.org/technicalresources/technicalresources/miniwateraudit>
- AWWA Free Water Audit Software  
<http://www.awwa.org/technicalresources/miniwateraudit/awwa-free-water-audit-software-version-5-0-now-available.aspx>
- Water Research Foundation/U.S. Environmental Protection Agency Water Audits and Real Loss Component Analysis Project  
<http://www.wrf.org/Programs/Programs/7700-4000>
  - Real Loss Component Analysis: A Tool for Economic Water Loss Control (Report, Excel Model, User Guide)
  - Water Audits in the United States: A Review of Water Losses and Data Reliability (Report)

The AWWA Water Conservation Tracking Tool User Guide contains guidance on including a water loss control activity using results from the Water Research Foundation Real Loss Component Analysis Model.

# AWE CONSERVATION TRACKING TOOL: ENTER UTILITY AVOIDED COSTS WORKSHEET

**Enter utility avoided costs:** The primary benefit of conservation is the utility and its ratepayers avoiding future water supply and wastewater costs. A utility avoids cost by not having to purchase (or otherwise acquire, transport, treat and distribute water supply, and by not having to collect, treat, and deposit of wastewater. The variable costs of these activities are major components of avoided cost. Conservation, if done at sufficient scale, may also allow the utility to defer or even entirely avoid future expansion of system capacity. This can be a major source of benefit in some cases.

The tracking tool comes with a calculator you can use to estimate your avoided costs. Alternatively, you can enter your own avoided cost estimates by selecting the "Use My Own Estimates" option.

[Click to use avoided cost estimates](#) [or use model's avoided cost calculator](#)

What if my utility does not provide wastewater service?

[Manage Scenario](#)

Scenario "Single-A Costs Worksheet" loaded from workspace 12/15/2022 2:28:40 PM

[Download COWCC Avoided Cost & Environmental Benefits Manual](#)

## Tracking Tool Utility Avoided Cost Calculator

### Water and Wastewater System Variable Costs (2014 Dollars)

	Water		Wastewater	
	Unit	Variable	Unit	Variable
Water purchase	MGD	1.75	MGD	1.75
WTP	MGD	1.75	MGD	1.75
Wastewater	MGD	1.75	MGD	1.75
Water variable cost	MGD	1.75	MGD	1.75
Total	MGD	1.75	MGD	1.75

### Variable Cost Forecast

Variable Cost	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009	3010	3011	3012	3013	3014	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Define conservation activities: Click the Define/Edit/Delete button to setup and edit conservation activities. You can use the form to define your own activities or import activities from the tracking tool's library. Once imported, library activities can be customized. Conservation activity specifications are stored in a table on this worksheet. This table is hidden by default. You can unhide the table by clicking the "Show Activities Table" button. You can edit activities directly in the table if you find this easier than using the form. **HOWEVER, DO NOT DELETE TABLE ROWS. ONLY USE THE FORM TO DELETE CONSERVATION ACTIVITIES.**

Manage Scenarios

Scenario: "Single Family Lowlight" loaded into model on 12/22/2020 10:00 AM PST

Define/Edit/Delete  
Conservation Activities

Show Activities Table

NOTE: You can define activities in the table rather than using the form, BUT DON'T USE THE FORM TO DELETE ACTIVITIES.

Activity ID	Activity Name	Type	Savings, Peak	Savings, Annual	Savings, Participant Free	Utility Costs, Participant	Utility Costs, Customer	Utility Costs, Community	Hours of	Utility Costs, Customer	Utility Costs, Community	Participant Free, Year	Participant Costs, Initial	Participant Costs, Yearly
1	Residential Surveys, SF	Single Family												
2	Residential Surveys, MF	Multi-Family												
3	Residential A/P Toilets, SF	Single Family												
4	Residential A/P Toilets, MF	Multi-Family												
5	Residential H/T Toilets, SF	Single Family												
6	Residential H/T Toilets, MF	Multi-Family												
7	Residential H/T Toilets Direct Install, MF	Multi-Family												
8	Residential I/P Showerheads, SF	Single Family												
9	Residential I/P Showerheads, MF	Multi-Family												
10	Residential A/P Shower, SF	Single Family												
11	Residential A/P Shower, MF Common Area	Multi-Family												
12	Residential Ingestion Control, SF	Single Family												
13	Res. In. Control, MF Customer Payment	Multi-Family												
14	Residential Turn-Suppressors	Single Family												
15	Residential Efficient Ingestion Fixtures, SF	Single Family												
16	Residential Meter Installation	Single Family												
17	On Tap, Galen, Joint	On Tap												
18	On Tap, Type A/P, Private	On Tap												
19	On Tap, Type A/P, Private	On Tap												
20	On Tap, Type H/T, Toilet	On Tap												
21	On Tap, Type H/T, Toilet	On Tap												
22	On Landscaping	On Landscaping												
23	On Detouring	On Detouring												
24	On Sprinkler, Flow Valve	On Sprinkler												
25	On Frost, Sprinkler	On Frost												
26	On Cooling, Tower	On Cooling												
27	Large Landscaping, Property	Large Landscaping												
28	Large Landscaping, Water Budgets	Large Landscaping												
29	Large Land. Ingestion Control	Large Land.												

### Define Conservation Activities

Activity Name: Residential Surveys, SF

Affected Customer Class: Single Family

Unit Water Savings | Utility Costs | Participant Costs | Participant Non Water Benefits | Plumbing Code

Unit Water Savings (Gal/Yr): 12,173.4

Annual Rate of Savings Decay (%/Year): 20.00%

Peak Period Savings (% of Annual): 68.00% Peak days = 42% of days in a year.

Useful Life (Years): 5

Participant Free/enders (% of Participants): 0.00%

Import an  
Activity from  
the Library

Close Form

Previous Activity

Next Activity

New Activity

Delete Activity

1 of 31

# AIRB CONSERVATION TRACKING TOOL: ENTER ANNUAL CONSERVATION ACTIVITY WORKSHEET

**Enter annual conservation activity:** Use this worksheet to enter the annual activity levels for the conservation activities you defined on the 4. Define Activities worksheet. You can enter activity through the end of your forecast period, but this is not required. It is okay to enter activity for shorter periods. You also can start an activity in any year in the forecast period. You do not have to start it at the beginning. It is also okay to skip years, for example if an activity is operated every other year, or every third year. If you have annual conservation program costs that are not accounted for in your activity definitions, you can enter these costs in the Annual Program Overhead Cost table. Any overhead cost you enter will be incorporated into the utility benefit cost analysis.

[Manage Scenarios](#)

Scenario: "Single-Family (Average)" based on weather 2022-2050 & 2021-2050

## Enter Annual Conservation Activity

Activity ID/Class	Activity Name	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Single Family	Residential HE Toilets, SP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
1	Multi Family	Residential HE Toilets, MP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
1	Multi Family	Residential HE Toilet (Direct Input), MP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Single Family	Residential LF Showerhead, SP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Multi Family	Residential LF Showerhead, MP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Single Family	Residential x 1 HP Washer, SP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Multi Family	Residential x 1 Washer, MP (Common Area)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Single Family	Residential Irrigation Controller, SP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
4	Single Family	Residential Turf Replacement	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
10	Single Family	Residential Efficient Irrigation System, SP	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
11	CA	CA TIC (Water Issue)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
12	CA	CA Water Type HE Toilet	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
13	CA	CA Landscaping	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
14	CA	CA Dishwasher	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
15	CA	CA Food Processor	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
16	CA	CA Cooling Tower	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
17	Irrigation	Large Landscape Water Budgets	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
18	Irrigation	Large Land Irrigation Controller	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
19	Irrigation	Large Land Turf Replacement	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

## Annual Program Overhead Cost (2018 dollars)

Enter additional program cost not included in activity definitions	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000

Model calculations follow this line. Do not delete or modify.

## Effective Conservation Activity

Activity ID/Class	Activity Name	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Single Family	Residential HE Toilets, SP	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	Multi Family	Residential HE Toilets, MP	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
1	Multi Family	Residential HE Toilet (Direct Input), MP	500	500	500	500	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
4	Single Family	Residential LF Showerhead, SP	1,000	1,000	1,000	4,000	4,000	4,000	7,000	8,000	8,000	10,000	11,000	12,000	13,000	14,000	15,000
4	Multi Family	Residential LF Showerhead, MP	500	400	400	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000
4	Single Family	Residential x 1 HP Washer, SP	500	500	500	400	500	500	500	500	500	1,000	1,000	1,000	1,000	1,000	1,000



# AWE CONSERVATION TRACKING TOOL: GHG MODULE INPUTS WORKSHEET

**Enter GHG inputs:** If you want the tracking tool to estimate the GHG reduction benefits from plumbing/appliance standards and planned conservation, you need to complete this worksheet. This worksheet tells the model what emission factors to use and how much energy your utility uses to produce and deliver a unit of water supply and treat and dispose of a unit of wastewater.

Manage Scenarios

Scenario: "Single-family Household" created and loaded on 12/15/2020 at 10:40 AM

## Select eGRID Region or Enter Your Own Emission Factors

You can enter your own emission factors if you have them. Otherwise, the model will use the average emission factors for the eGRID region in which your utility is located.

Which eGRID Region are you located? (See map)

CHS

Average Generation Emission Factors	eGRID Factors (lb/MWh)	User Entered Factors (lb/MWh)
CO <sub>2</sub>	1.219	
CH <sub>4</sub>	0.0001	
N <sub>2</sub> O	0.0004	

## Energy Used for Water Supply and Wastewater Treatment

You can enter your own energy intensity factors if you have them. Otherwise, you can use the model's energy intensity calculator to estimate them.

Enter the average rate (¢/kWh) your utility pays for electricity

\$0.10/kWh

☐ Use my own energy intensity estimates

☒ Use model's energy intensity calculator

## AWE Water and Wastewater Energy Intensity Calculator

### Water Supply, Treatment, and Distribution Energy Intensity Default Values

Local Water Supply Source	¢/unit-ft <sup>3</sup>	% of Local Supply
Local Surface Water	0.00	0%
Groundwater	0.00	0%
Surface Wastewater	0.00	0%
Recycled Water	0.00	0%
Wastewater Disposal	0.00	0%
Total	0.00	0%

Average Energy Intensity of Local Water Supply

\$0.00/unit-ft<sup>3</sup>

eGRID Subregion Representational Map



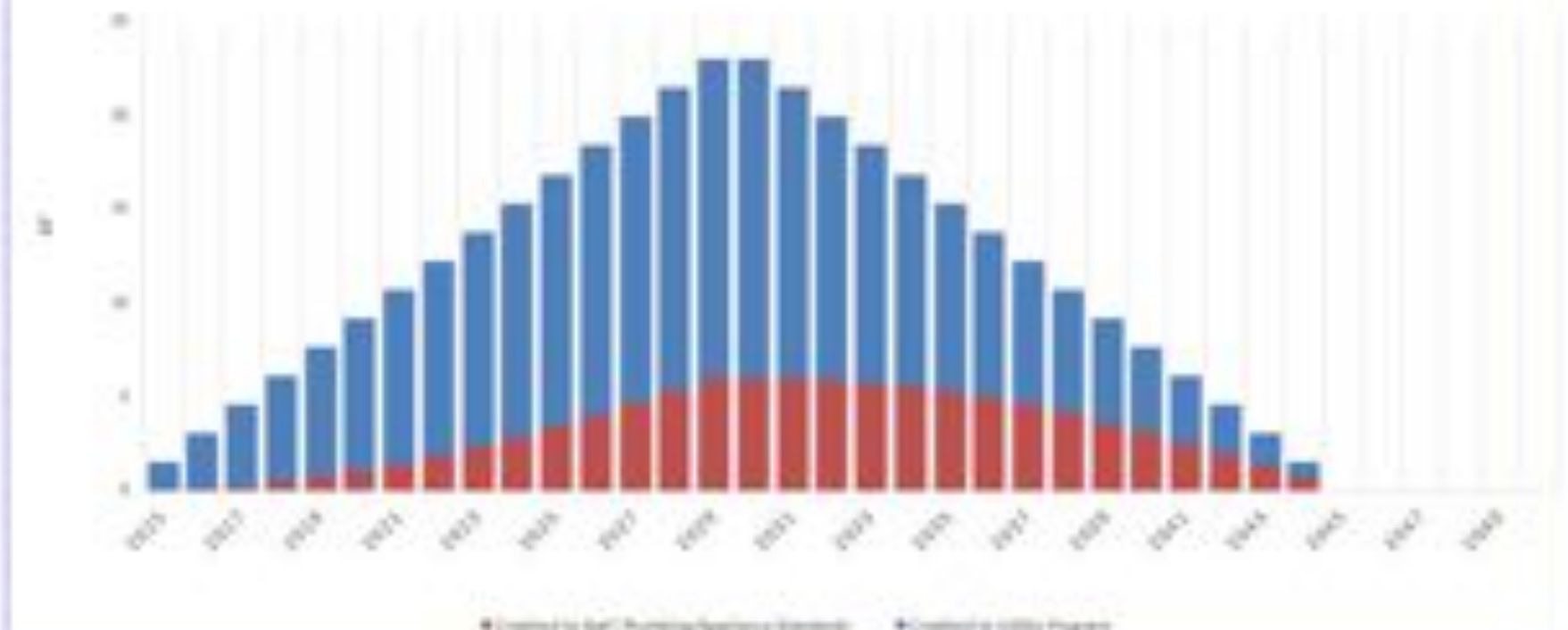


# AWE CONSERVATION TRACKING TOOL: ACTIVITY SAVINGS PROFILES WORKSHEET

**View activity savings profile:** Use the drop-down list to view the water savings profile of an activity. The chart will show the calculated annual water savings for the activity based on the water savings specification and the activity levels you entered. If the water savings specification included plumbing/appliance standard interactions, the chart will divide the savings between the portion that is credited to the utility program versus the portion that is credited to the plumbing/appliance standard.

Activity Name: Residential 4.0 WF Washer, SF

Residential 4.0 WF Washer, SF Annual Water Savings



Residential 4.0 WF Washer, SF	Units	Cost	Utility	Net Savings
Active Water Savings	40	36	27	3
Average Annual Water Savings	40	4	1	1

**Model calculations below line. Do not delete or modify.**

Attribution to Utility Water Savings

Source: SF

Activity Savings Profile

Water Savings Summary

Utility Revenue and Costs

Utility Costs and Benefits

Water Loss Calculations

Customer Costs and Benefits

2025 Reduction Summary

Scenario

Activity Library

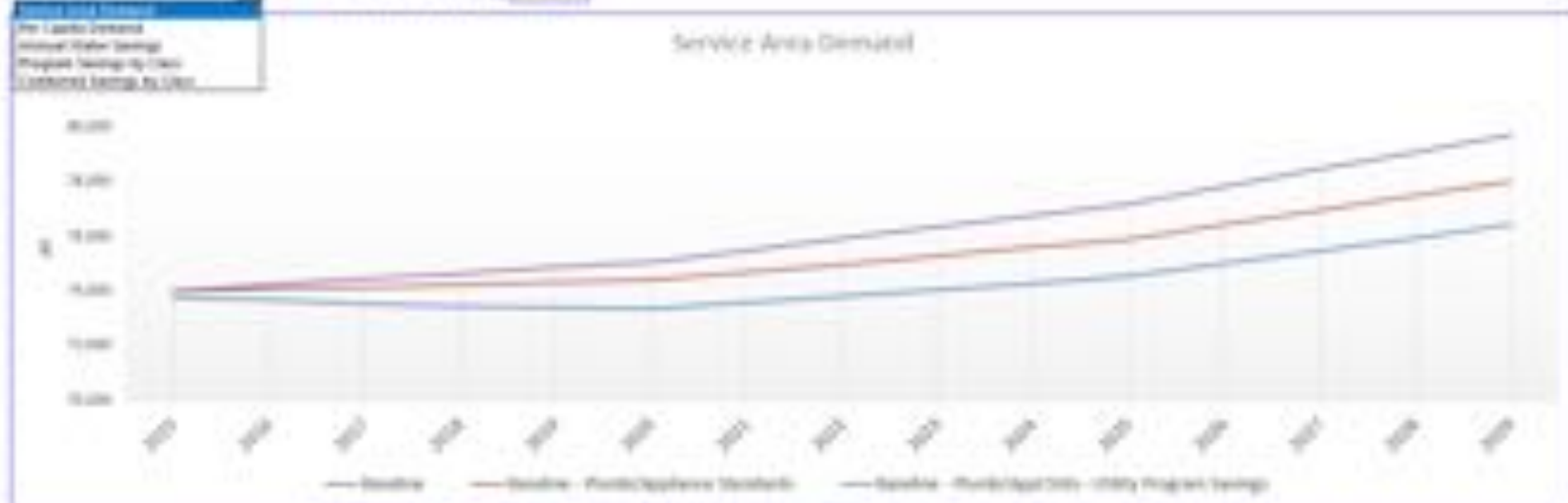
Activity Library

# AWE CONSERVATION TRACKING TOOL: WATER SAVINGS SUMMARY WORKSHEET

## Select Chart to View

- Service Area Demand
- Per Capita Demand
- Water Savings
- Program Savings by Year
- Conserved Savings by Year

No. of Years to Display: 15



Service Area Demand	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Baseline	AF	14,810	15,210	15,610	16,010	16,410	16,810	17,210	17,610	18,010	18,410	18,810	19,210	19,610	20,010	20,410	20,810	21,210	21,610	22,010	22,410	22,810
Baseline - Plumbing Appliance Standards	AF	14,810	15,000	15,190	15,380	15,570	15,760	15,950	16,140	16,330	16,520	16,710	16,900	17,090	17,280	17,470	17,660	17,850	18,040	18,230	18,420	18,610
Baseline - Plumbing Appliance Standards - Utility Program Savings	AF	11,750	11,900	12,050	12,200	12,350	12,500	12,650	12,800	12,950	13,100	13,250	13,400	13,550	13,700	13,850	14,000	14,150	14,300	14,450	14,600	14,750
Per Capita Demand	People	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Baseline	OPCO	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Baseline - Plumbing Appliance Standards	OPCO	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Baseline - Plumbing Appliance Standards - Utility Program Savings	OPCO	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Water Savings	AF	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Plumbing Appliance Standards	AF	0	143	286	429	572	715	858	1,001	1,144	1,287	1,430	1,573	1,716	1,859	2,002	2,145	2,288	2,431	2,574	2,717	2,860
Utility Program Savings	AF	0	411	822	1,233	1,644	2,055	2,466	2,877	3,288	3,699	4,110	4,521	4,932	5,343	5,754	6,165	6,576	6,987	7,398	7,809	8,220
Total Water Savings	AF	0	554	1,107	1,662	2,217	2,772	3,327	3,882	4,437	4,992	5,547	6,102	6,657	7,212	7,767	8,322	8,877	9,432	9,987	10,542	11,097
% of Baseline Demand	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

## Water Savings Breakdown

# AWE CONSERVATION TRACKING TOOL: UTILITY REVENUES & RATES WORKSHEET

**Revenue-revenue requirement and rate impacts:** This worksheet calculates the impact of planned conservation on annual revenue requirement, average rates, and average bills. It assumes the volumetric revenues generated by the baseline demand and rate forecasts correspond to the utility's volumetric revenue requirement. It then adjusts forecasted annual water sales and revenue requirement using the water savings, conservation program cost, and utility avoided cost estimates calculated earlier. The adjusted revenue requirement equals the baseline revenue requirement plus annual conservation program cost minus annual avoided water supply cost. The adjusted average volumetric rate equals adjusted revenue requirement divided by adjusted annual water sales. The adjusted average monthly volumetric bill equals adjusted revenue requirement divided by number of accounts divided by 12. Calculations are done for two alternative financing strategies for planned conservation. The first strategy treats planned conservation as an operating expense. The model assumes planned conservation is paid for in the year it occurs (pay-as-you-go). The second strategy treats planned conservation as a capital expense. The model assumes planned conservation is debt-financed. You can set the debt-financing term using the drop-down box.

## Select Chart to View

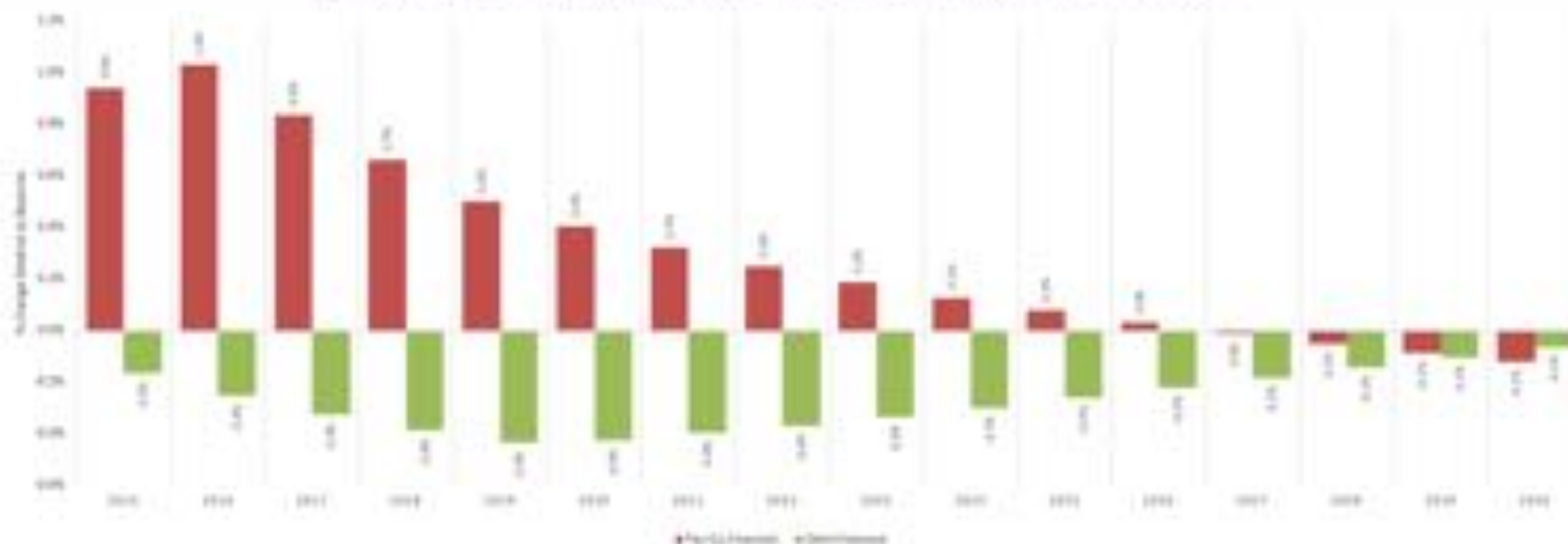
Change in Average Bill

Debt Financing Term (Yrs)

Years to Display in Chart

Chart Explorations

Change in Average Monthly Volumetric Bill Due To Utility Conservation Program



## Baseline Volumetric Revenue Requirement, Average Rate, & Average Bill

Baseline Volumetric Revenue Requirement, Average Rate, & Average Bill



Utility Conservation Program NPV and B/C Ratio (2014 Dollars)

Class	Activity Name	MPH (\$)	Est. Budget
Single Family	Residential RE Toilet, SF	3	311,111
Multi Family	Residential RE Toilet, MF	3	342,421
Multi Family	Residential RE Toilet (Joint Rental), MF	3	1,349,321
Single Family	Residential LP Showerhead, SF	3	336,335
Multi Family	Residential LP Showerhead, MF	3	114,114
Single Family	Residential 4.0 HP Water, SF	3	243,243
Multi Family	Residential 4.0 HP Water, MF (Common Area)	3	44,444
Single Family	Residential Ingestion Controller, SF	3	1,437
Single Family	Residential Toile Replacement	3	239,331
Single Family	Residential Efficient Ingestion Replaces, SF	3	2,381,381
CA	CA 1.0 Carbon Strip	3	239,333
CA	CA Valve Type RE Toilet	3	339,339
CA	CA Lavatory	3	137,139
CA	CA Dishwasher	3	339,339
CA	CA Food Disposer	3	39,211
CA	CA Cooling Tower	3	49,252
Ingestion	Large Lavatory, Water Budgets	3	11,333
Ingestion	Large Land, Ingestion Controller	3	232,434
Ingestion	Large Land, Toile Replacement	3	239,333
Subtotal Conservation Activities		3	5,391,344
Total With Program Overhead		3	5,391,361

Select Chart to View

1994 Study Series 19

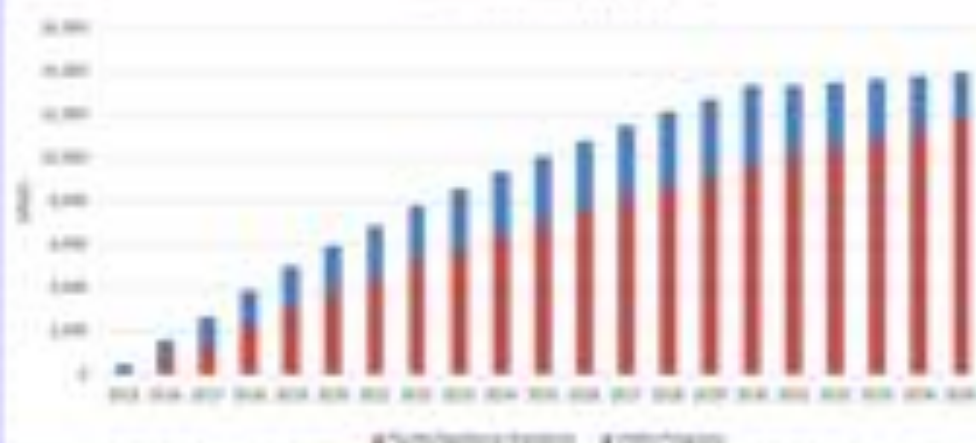


# AWE CONSERVATION TRACKING TOOL: GAS REDUCTION BENEFITS WORKSHEET

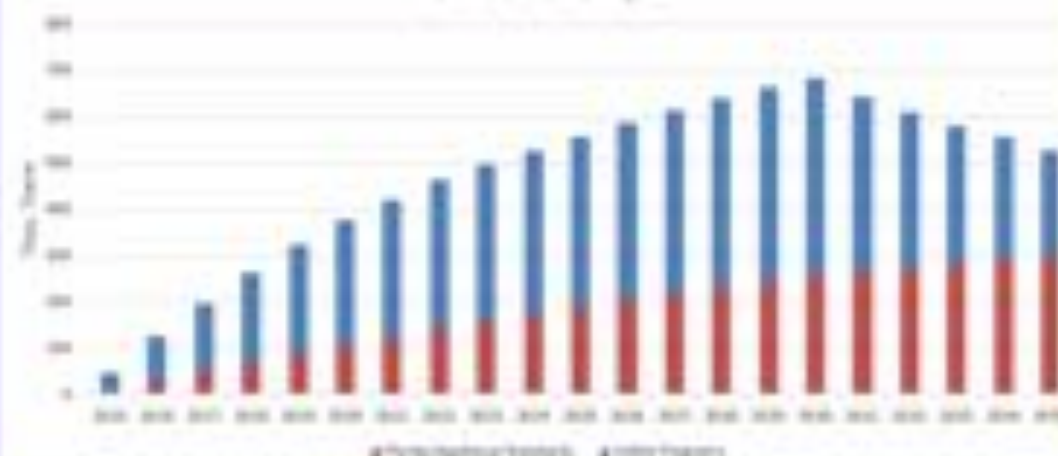
**NOTE:** The worksheet summarizes the calculated reduction in CO<sub>2</sub>-equivalent emissions for a planning business scenario and planned conservation. Before the charts are better that looking at the results in the year and annual reports.

Year 6 Data

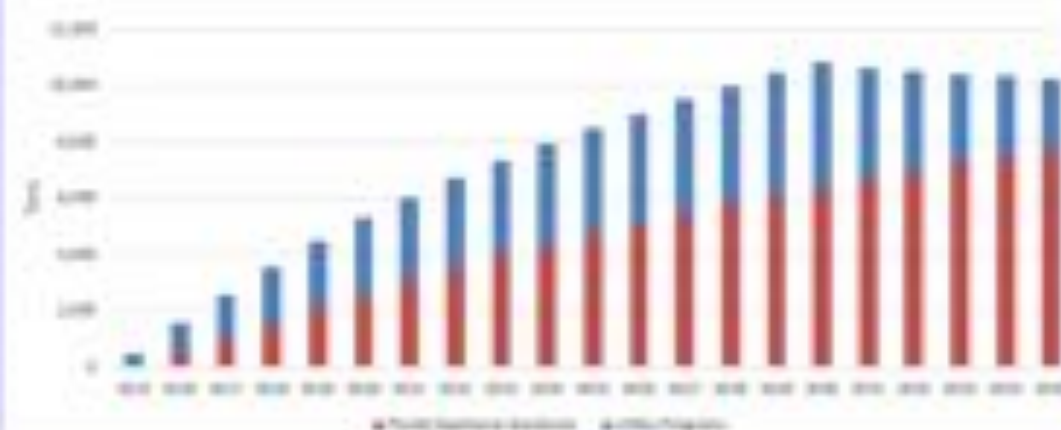
Annual Electricity Savings



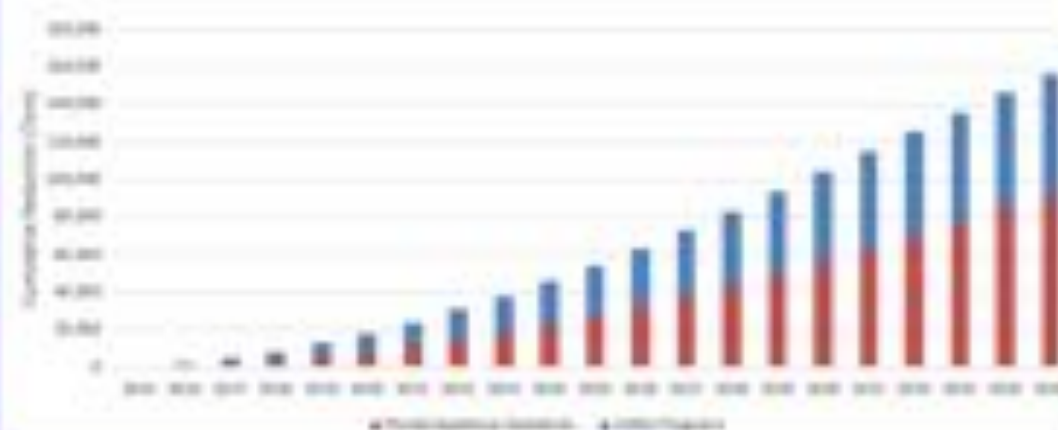
Annual Gas Savings



Annual CO<sub>2</sub>-Equivalent Emission Reduction



Cumulative CO<sub>2</sub>-Equivalent Emission Reduction



## Summary Calculated Energy Savings

Electric Savings Summary

Gas Savings Summary

CO<sub>2</sub> Savings Summary

Water Savings Summary

Customer Costs and Benefits

CO<sub>2</sub> Reduction Summary

Summary

Summary

Summary



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## WHAT ABOUT VERSION 4.0?

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- National version likely available Q1 2021
- California version also likely available in early 2021 prior to release of water use standards
- Both versions will have a newly integrated water loss management model
- Both versions will have new functionality for fixture stocks

# FRAMEWORK TARGETS

- Water Use Objective Calculator
- Compare to Projected Water Use
- Determine if Over/Under Objective
  - Residential
  - CII Landscape
  - System Water Loss
  - Overall
- Identify Least-Cost Path to Compliance
- Impact to Utility Revenue Requirements and Rates

	A	B	C	D	E	F	G	H	I
4		<b>Select Compliance Year</b>							
5		Compliance Year							
6				2025					
7									
8									
9		<b>Residential Indoor Budget</b>							
10		Per Capita Standard		52.5 gallons/person/day					
11		x							
12		Residential Population		59,464					
13		x							
14		Days/Year		365					
15		/							
16		Gallons/AF		325,851					
17		=							
18		Residential Indoor Budget		3,497 AF					
19									
20									
21									
22		<b>Residential Outdoor Budget</b>							
23		Irrigable Area		1,875 acres					
24		x							
25		Annual ETo		39.0 inches					
26		x							
27		ETo Factor		0.55					
28		/							
29		Inches/Foot		12					
30		=							
31		Residential Outdoor Budget		3,352 AF					
32									
33									
34									
35		<b>Commercial Landscape Budget</b>							
36		Irrigable Area Served by Dedicated Meters	CII	125 acres	Recycled	0 acres	Special Area	50 acres	
37		x							
38		Annual ETo		39.0 inches		39.0 inches		39.0 inches	
39		x							
40		ETo Factor		0.45		1.00		1.00	
41		/							
42		Inches/Foot		12		12		12	
43		=							
44		Commercial Landscape Budget		475 AF		0 AF		163 AF	
45									
46									
47									

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