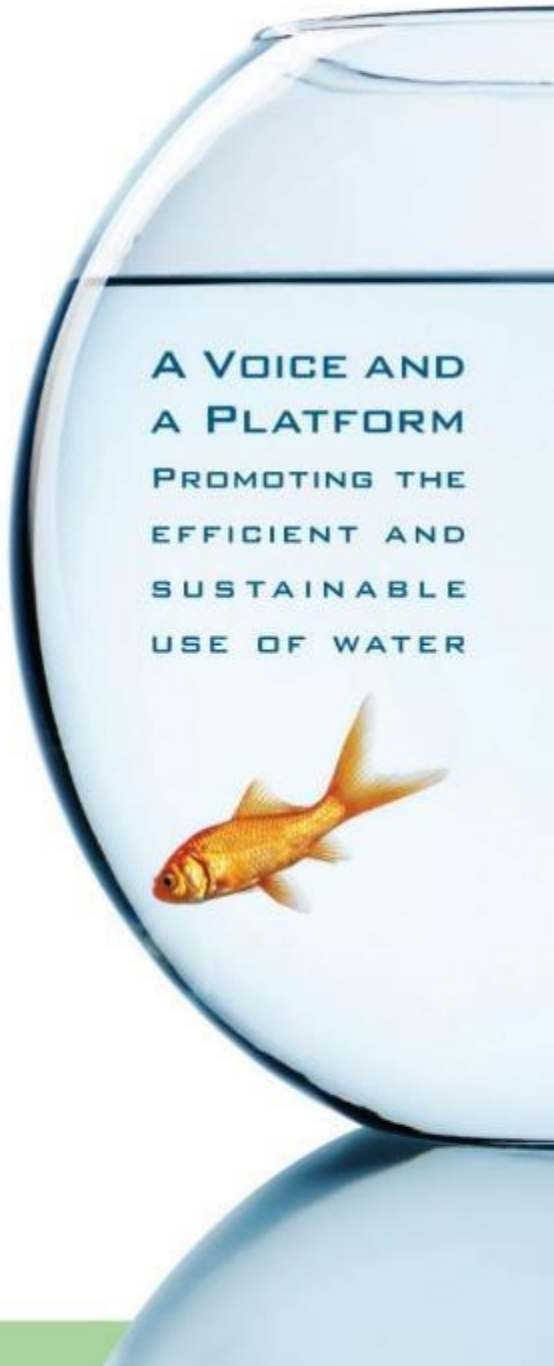
Water Efficiency as a Partner to Energy Efficiency

Mary Ann Dickinson
President and CEO
November 19, 2019

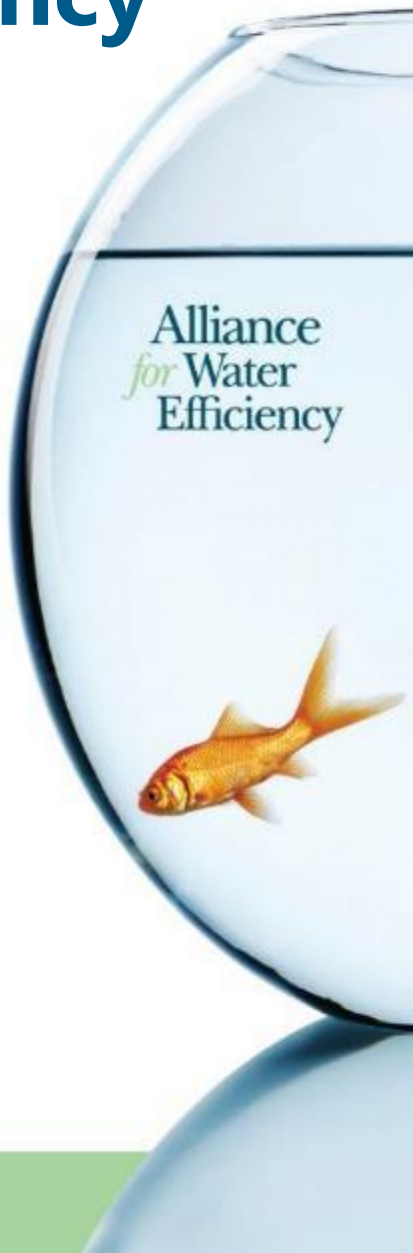


Alliance *for* Water Efficiency

AWE: A Voice for Water Efficiency

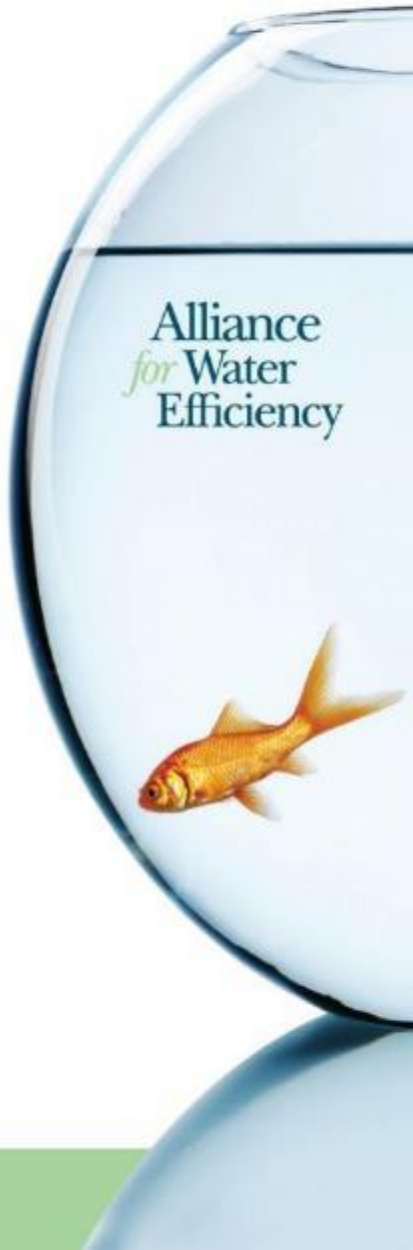
- Our mission is to promote an **efficient** and **sustainable** water future
- A unique network and forum for collaboration around research, policy, information sharing, education, and stakeholder engagement

450+ member organizations in
200 watersheds delivering water to
50 million water users



We Bring Together

- **Innovative resources** to facilitate investments in water efficiency and conservation.
- **Cutting-edge research** to address pressing challenges.
- **A collaborative approach** to program development and advocacy efforts.
- **High quality expertise** delivered to professionals and consumers.
- **Interactive dialogue** amongst diverse groups that enables real progress.



Who We Bring Together

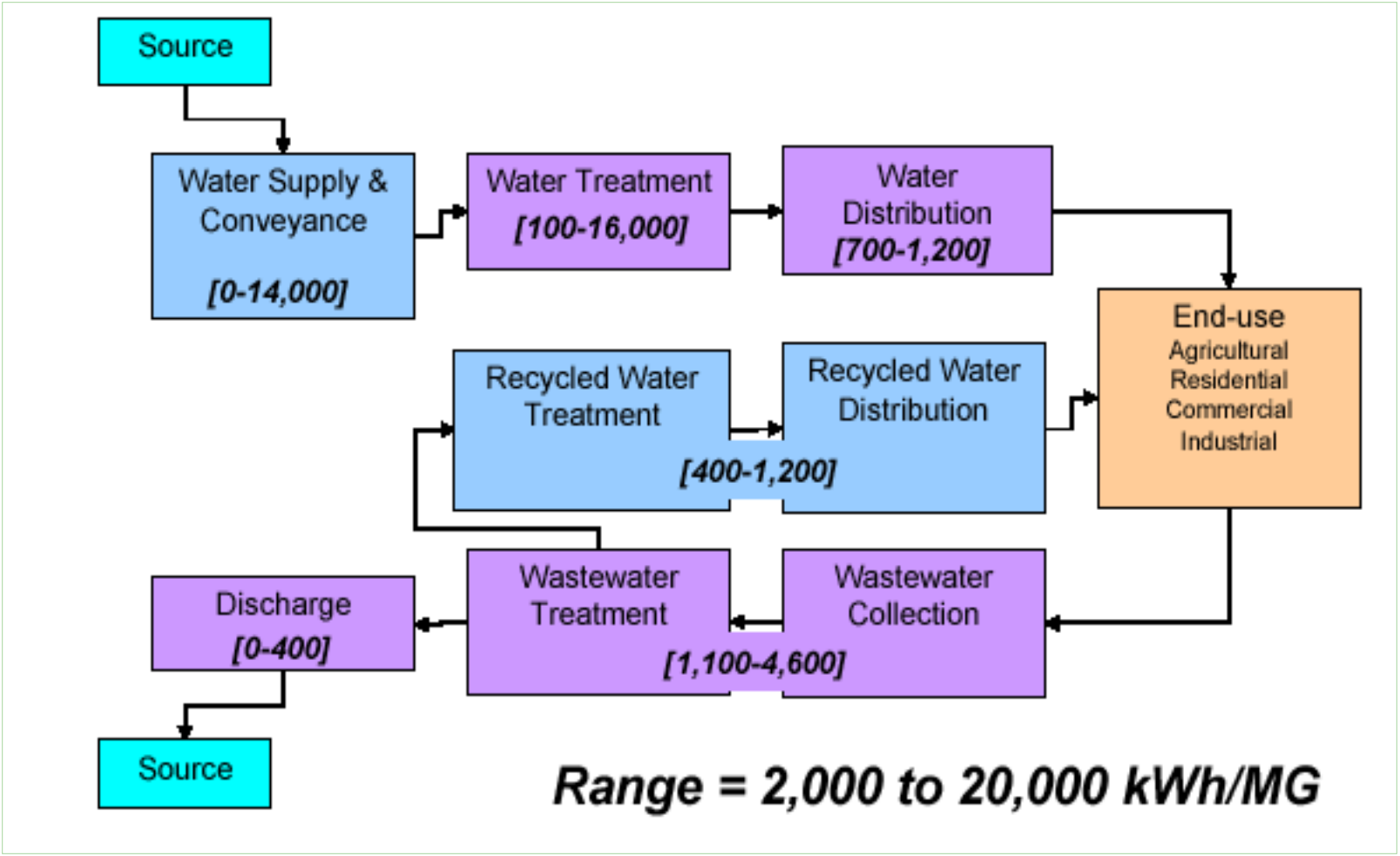
- Water suppliers (retail and wholesale)
- Water planning agencies
- Plumbing, appliance & irrigation manufacturers and retailers
- Efficiency-focused businesses
- Efficiency service providers
- Environmental community
- Energy community
- Government (federal, state, municipal)
- Academic representatives
- Cultural institutions

AWE's Water-Energy Work

Our Energy-Water Objective: Encourage and build collaborative opportunities between water and energy providers to optimize energy and water savings.

- Reports and Resources:
  - ✓ *Addressing the Energy-Water Nexus: A Blueprint for Action and Policy Agenda (50 recommendations)*
  - ✓ *Water-Energy Nexus Research: Recommendations for Future Opportunities*
  - ✓ *Water-Energy Nexus Research Database*
- AWE Water Conservation Tracking Tool
- Testimony before Senate Water and Power Subcommittee

Embedded Energy in Water



Source: California Energy Commission, 2005 IEPR

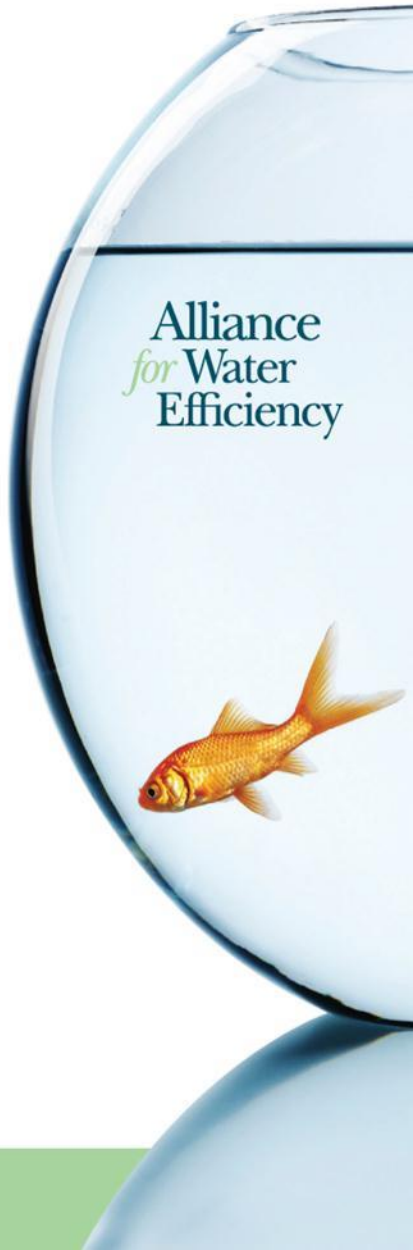
Joint Efficiency Opportunities

HOT WATER RESIDENTIAL

- Combined water/energy audits
- Clothes washers
- Showerheads and Faucets/Aerators

HOT WATER COMMERCIAL

- Combined water/energy audits
- Clothes washers
- Dishwashers
- Connectionless Steamers
- Pre-rinse spray valves



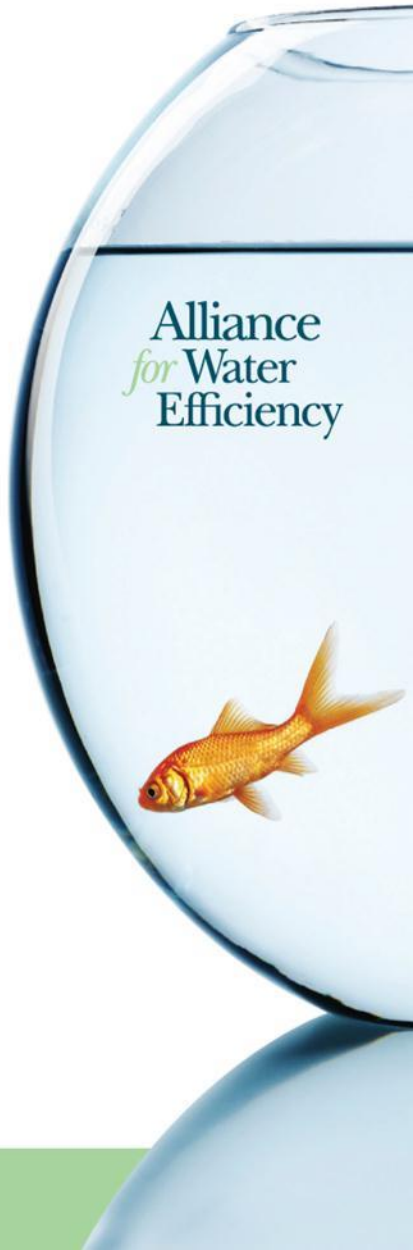
Joint Efficiency Opportunities

COLD WATER: RESIDENTIAL

- High efficiency toilets
- Landscape irrigation efficiency

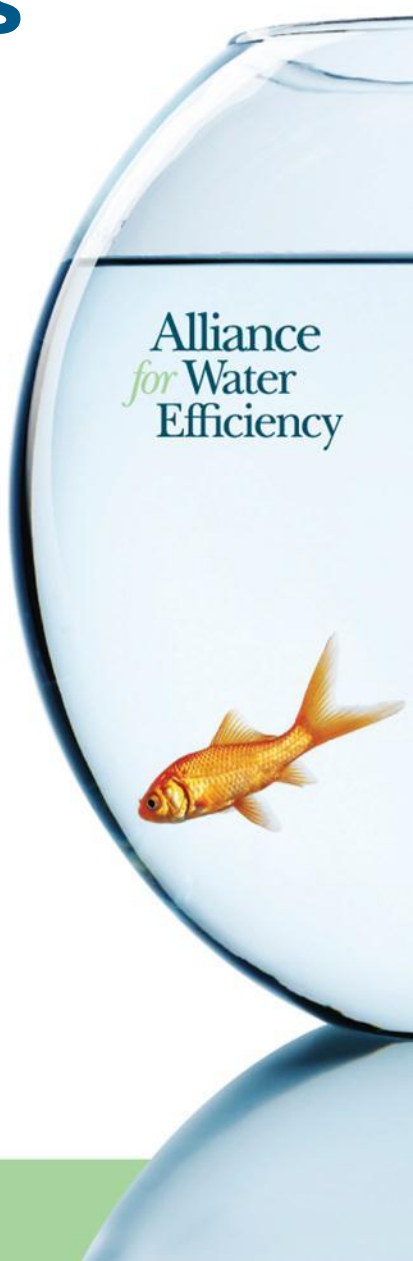
COLD WATER: COMMERCIAL

- High efficiency toilets
- Landscape irrigation efficiency
- Cooling Tower Management
- Icemakers



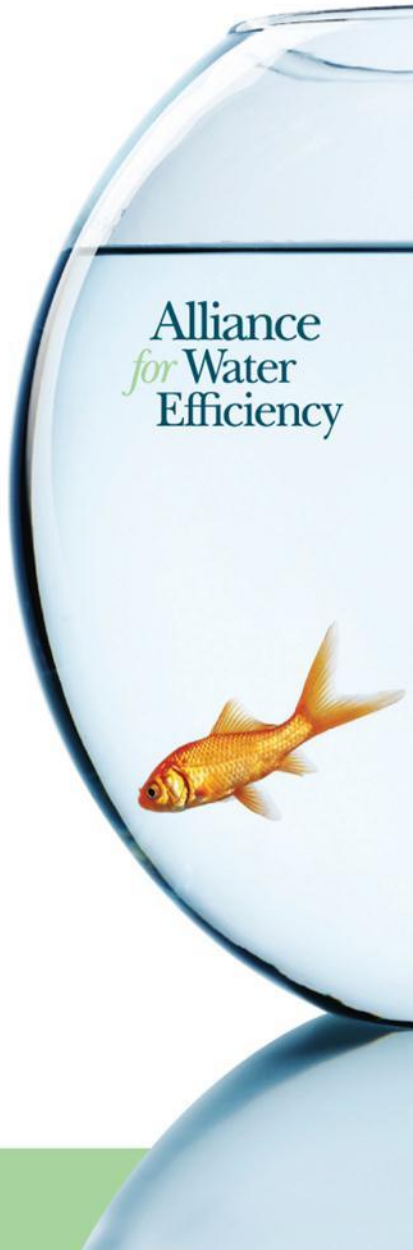
Cold Water Conservation Pilots

- 9 joint pilot programs between California electric & water utilities in 2008-09 to test the embedded energy connection
- Determine energy credit for "cold" water savings and potential for energy efficiency
- Pilots with highest energy savings: System Leak Detection, Low Income High Efficiency Toilets -- as determined in 2011 Study
- Other beneficial programs: Large Commercial, Recycled Water, Emerging Technologies for Water Pumping, Managed Landscapes



Water Efficiency Works!

- Saving water saves energy and greenhouse gas emissions
- Water suppliers optimize drinking water and wastewater energy use for pumping & treatment
- Water suppliers fund efficiency programs
- Partnerships needed across drinking water, wastewater, electric, and gas utilities
- Demand can be managed for both water and energy benefits
- Can be documented with available models (CPUC, AWE)



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 '"English Units Example" loaded into model on 7/27/2016 7:58:58 PM

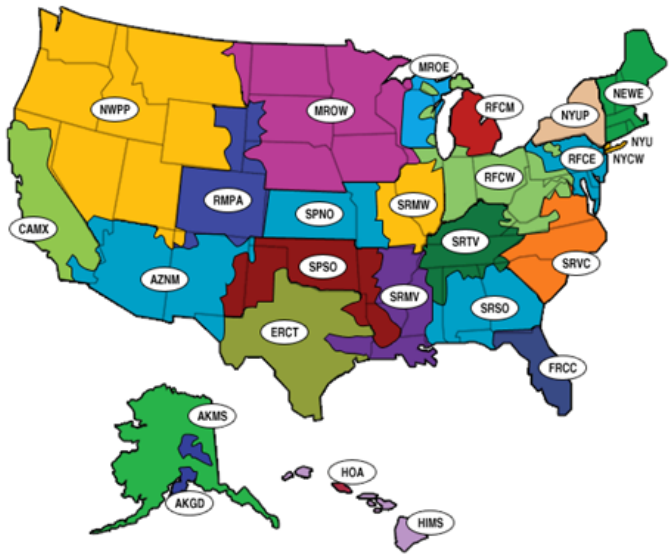
Select eGRID Region or Enter Your Own Emission Factors

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)	CAMX

Average Generation Emission Factors	eGRID Factors (lb/MWhr)	User Entered Factors (lb/MWhr)
CO_2	1,019	
CH_4	0.03761	
N_2O	0.00604	

eGRID Subregion Representational Map



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:	$0.15/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 Sources	KWh/AF	% of Local Supply
Local Surface Water	222	40%
Groundwater	624	40%
Brackish Desalination	528	0%
Recycled Water	730	10%
Seawater Desalination	4,497	10%
	Total:	100%

Average Energy Intensity of Local Water Supply	861	KWh/AF

Imported Water Supply Sources	KWh/AF	Default Value	
Select the imported water energy intensity level	Moderate		
Average Energy Intensity of Imported Water Supply		870	KWh/AF
Imported Water Supply as % of Total Supply	40%		
Local Water Supply as % of Total Supply	60%		

Average Energy Intensity per AF of Total Supply	**865**	**KWh/AF**

Water Treatment	KWh/AF	Supply Receiving This Treatment

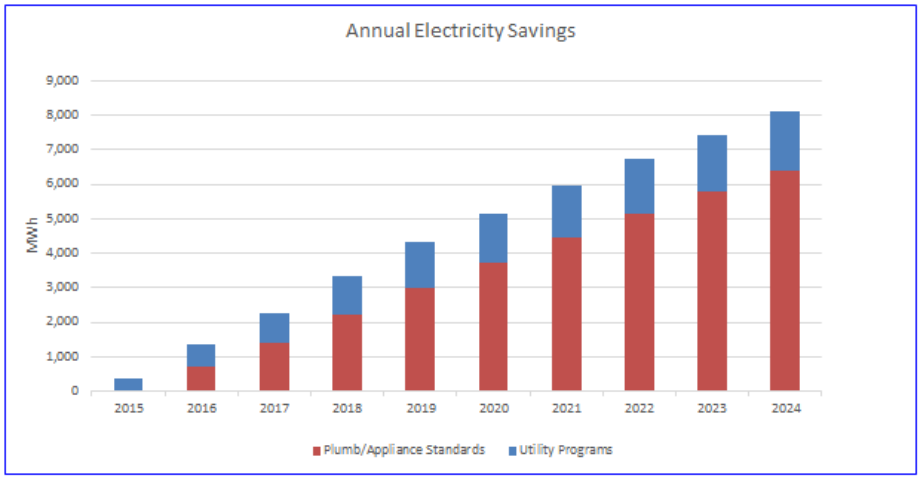
Imported Water Energy Intensity Key

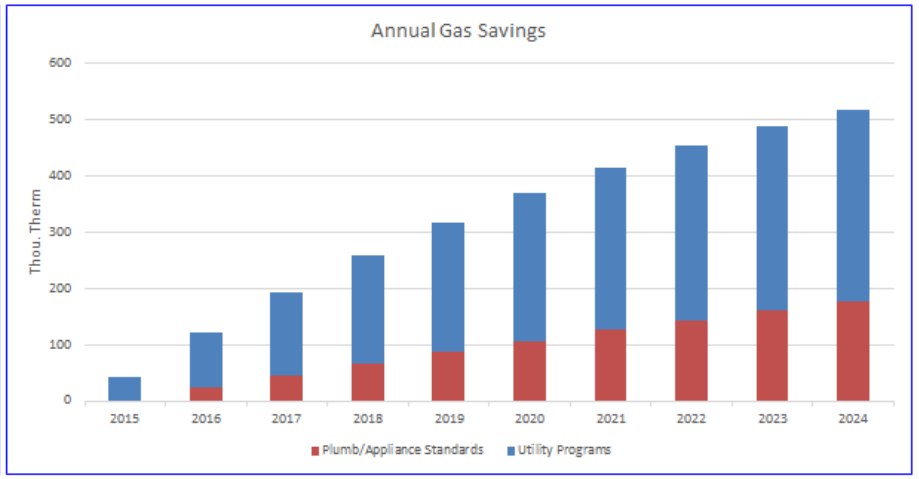
Low - Transmission mostly via gravity with limited pumping. More likely raw than treated water.
Moderate - Some transmission pumping required. Source may be groundwater. Delivered water may be raw or treated w
High - Transmission involves significant pumping. Source may be groundwater. Delivered water more likely treated than

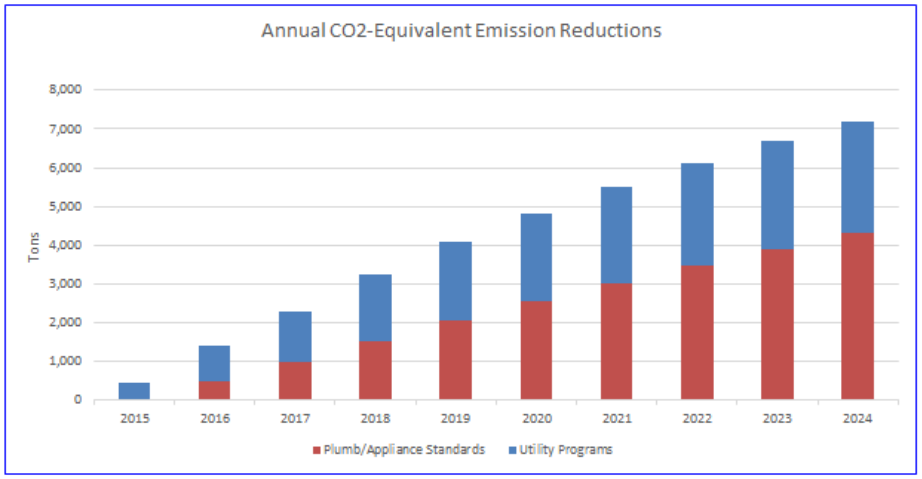
AWE CONSERVATION TRACKING TOOL: GHG REDUCTION BENEFITS WORKSHEET

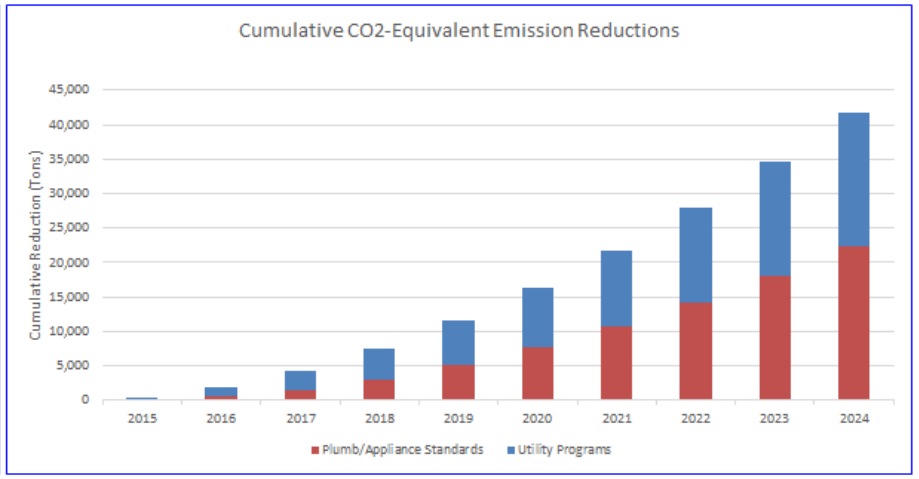
GHG reduction: This worksheet summarizes the calculated reduction in CO2-equivalent emissions due to plumbing/appliance standards and planned conservation. Below the charts are tables that summarize the results in five-year and annual increments.

Years to Display: 10









Summary Calculated Energy Savings

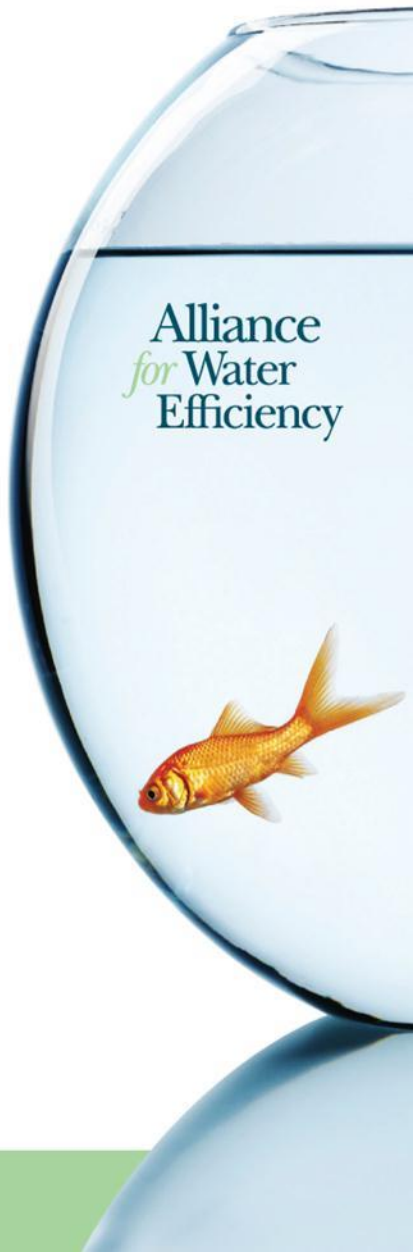
Total Annual Energy Savings	Units	2015	2020	2025	2030	2035	2040	2045	2050
Electricity	MWh	374	5,163	8,713	11,541	12,506	13,490	14,526	15,191
Natural Gas	Thou. Therm	43	370	548	673	522	451	411	378

Cumulative Energy Savings Since 201	Units	2015	2020	2025	2030	2035	2040	2045	2050
Electricity	MWh	374	16,841	53,768	106,105	166,587	232,144	302,784	377,469
Natural Gas	Thou. Therm	43	1,304	3,724	6,854	9,730	12,104	14,235	16,190

Value of Annual Energy Savings	Units	2015	2020	2025	2030	2035	2040	2045	2050
Electricity	*Thou. 2014*	$56	$784	$1,340	$1,797	$1,972	$2,154	$2,348	$2,487

One Water District's Story

- Saving water saves energy
- Not just hot water energy savings
- Cold water conservation also saves embedded energy
- Very cost effective investment where embedded energy values are high (e.g. high pumping, treatment costs)
- Even small water districts can benefit
- Lake Arrowhead Community Services District: 7700 connections at 5200 feet



Lake Arrowhead
COMMUNITY SERVICES DISTRICT
HOME

Supply source: Lake Water

636 kWh/AF Pumping to Treatment Plant (1,953 kWh/MG)

395 kWh/AF Treatment (1,213 kWh/MG)

596 kWh/AF Wastewater Collection (1,830 kWh/MG)

1,299 kWh/AF Wastewater Treatment (3,988 kWh/MG)

2,926 kWh/AF (8,984 kWh/MG)

Lake Arrowhead
COMMUNITY SERVICES DISTRICT

Supply source: Ground Water

600 kWh/AF Pumping to Treatment Plant (1,842 kWh/MG)

395 kWh/AF Treatment (1,213 kWh/MG)

596 kWh/AF Wastewater Collection (1,830 kWh/MG)

1,299 kWh/AF Wastewater Treatment (3,988 kWh/MG)

2,890 kWh/AF (8,873 kWh/MG)

Lake Arrowhead
COMMUNITY SERVICES DISTRICT

Supply source: State Water Project

3,300 kWh/AF Pumping through Central Valley to Lake Silverwood (10,131 kWh/MG)

2,550 kWh/AF Pumping from Lake Silverwood uphill to Lake Arrowhead Treatment Plant (7,829 kWh/MG)

395 kWh/AF Treatment (1,213 kWh/MG)

596 kWh/AF Wastewater Collection (1,830 kWh/MG)

1,299 kWh/AF Wastewater Treatment (3,988 kWh/MG)

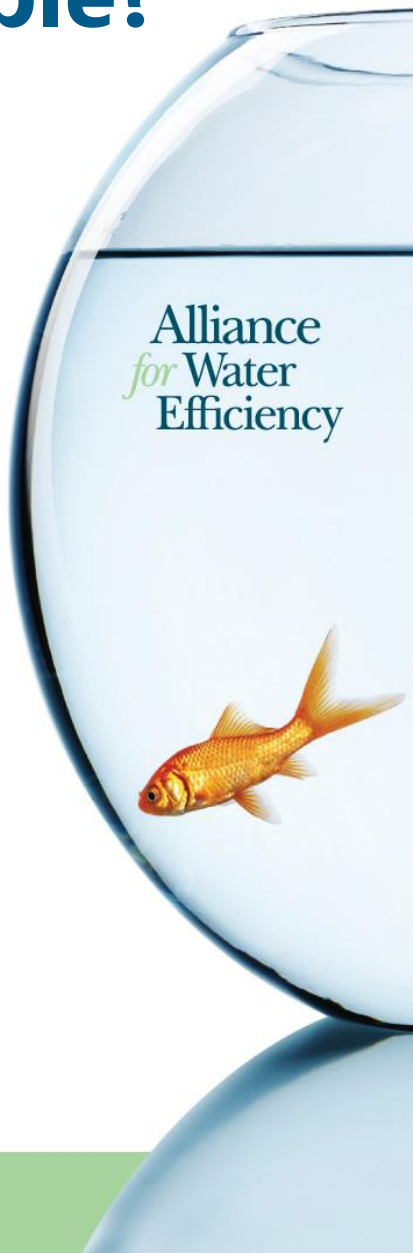
8,140 kWh/AF (24,991 kWh/MG)

What To Do?

- SWP clearly the highest embedded energy and cost
- Landscape irrigation was roughly 30% of district water use and a good opportunity for rolling off of SWP water
- Cold water conservation was not funded in the current energy efficiency portfolio budgets, although SCE funded a leak detection pilot with CPUC funds
- LACSD undertook a landscape conservation program on its own at its own expense
- **Result: Demand Reduced to No More State Water Project Deliveries, with major energy, cost savings**

So…How Much Saving Is Possible?

- 2005 IEPR of California Energy Commission examined the opportunity for energy savings from water conservation programs
- Concluded that energy savings from water conservation could produce **95%** of the savings expected from the 2006-2008 energy efficiency program portfolio, at **58%** of the cost
- Peak savings could account for **60%** of planned reductions in demand
- Sound implausible? ☺ Look at the recent drought results!



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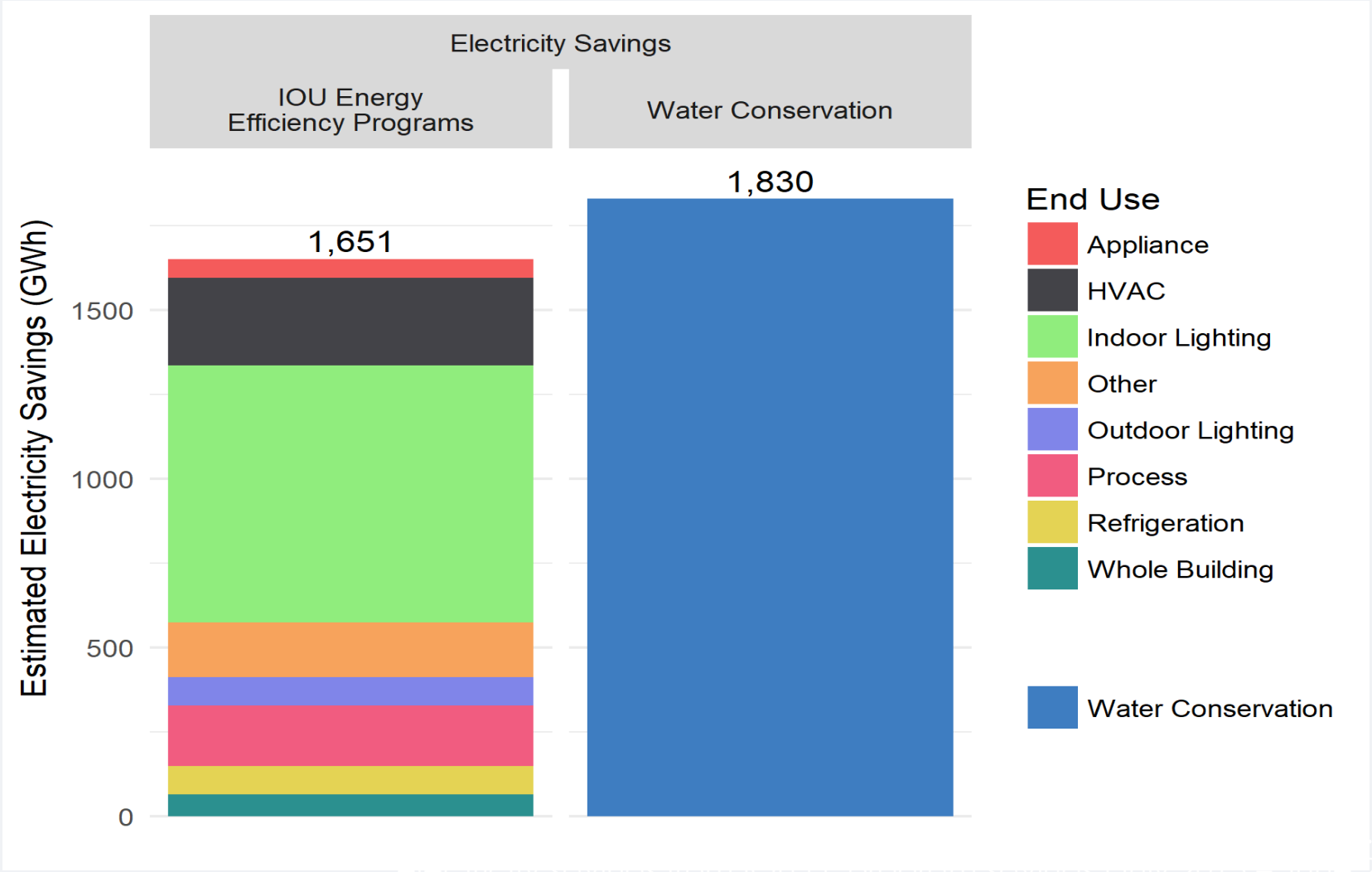
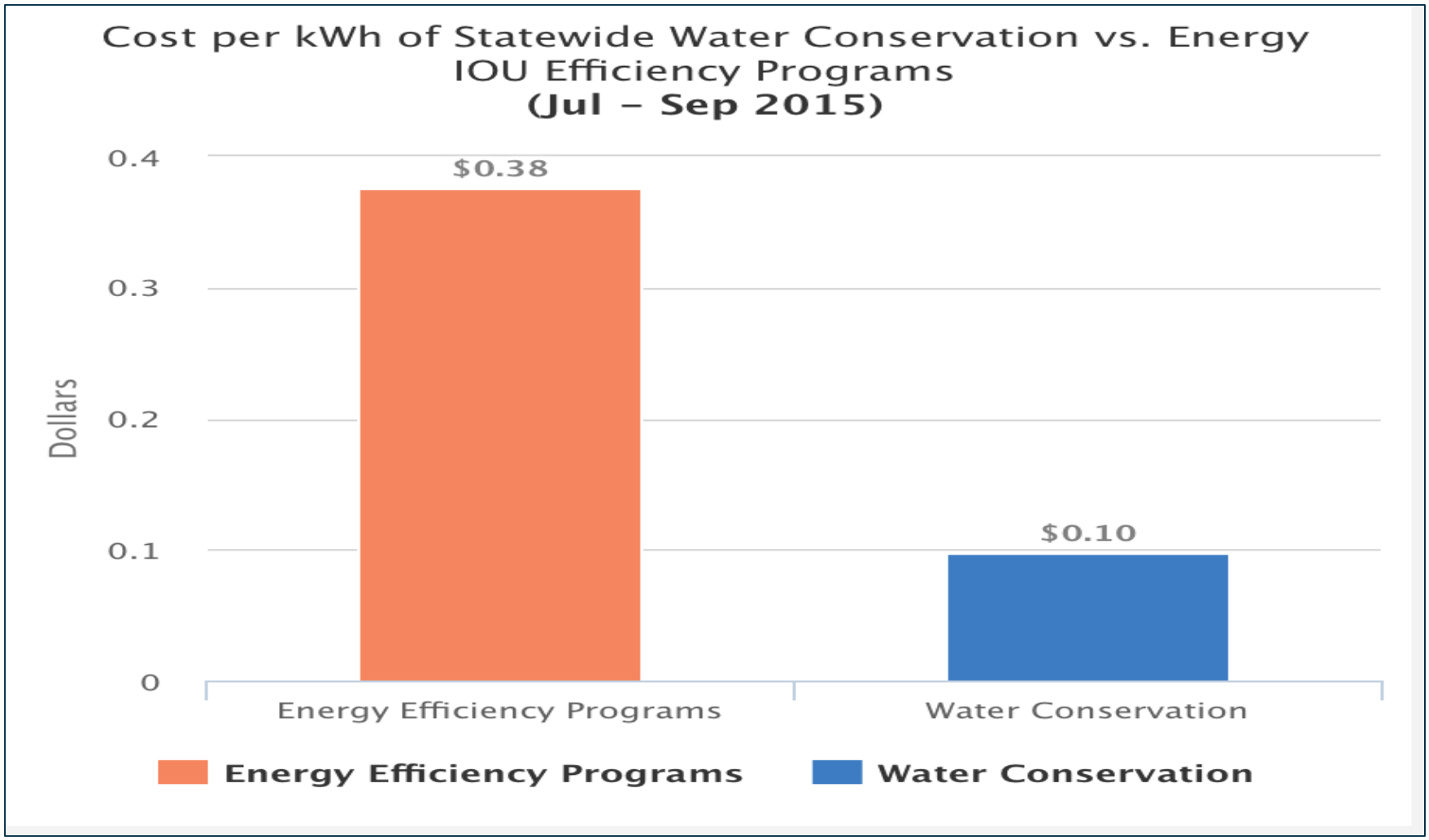
Center for Water-Energy Efficiency



Electricity savings from IOU EE program savings (July 2015 – June 2016) by end use vs. estimated electricity savings (IOU & total) from statewide water conservation



Center for Water-Energy Efficiency, UC Davis, 2016

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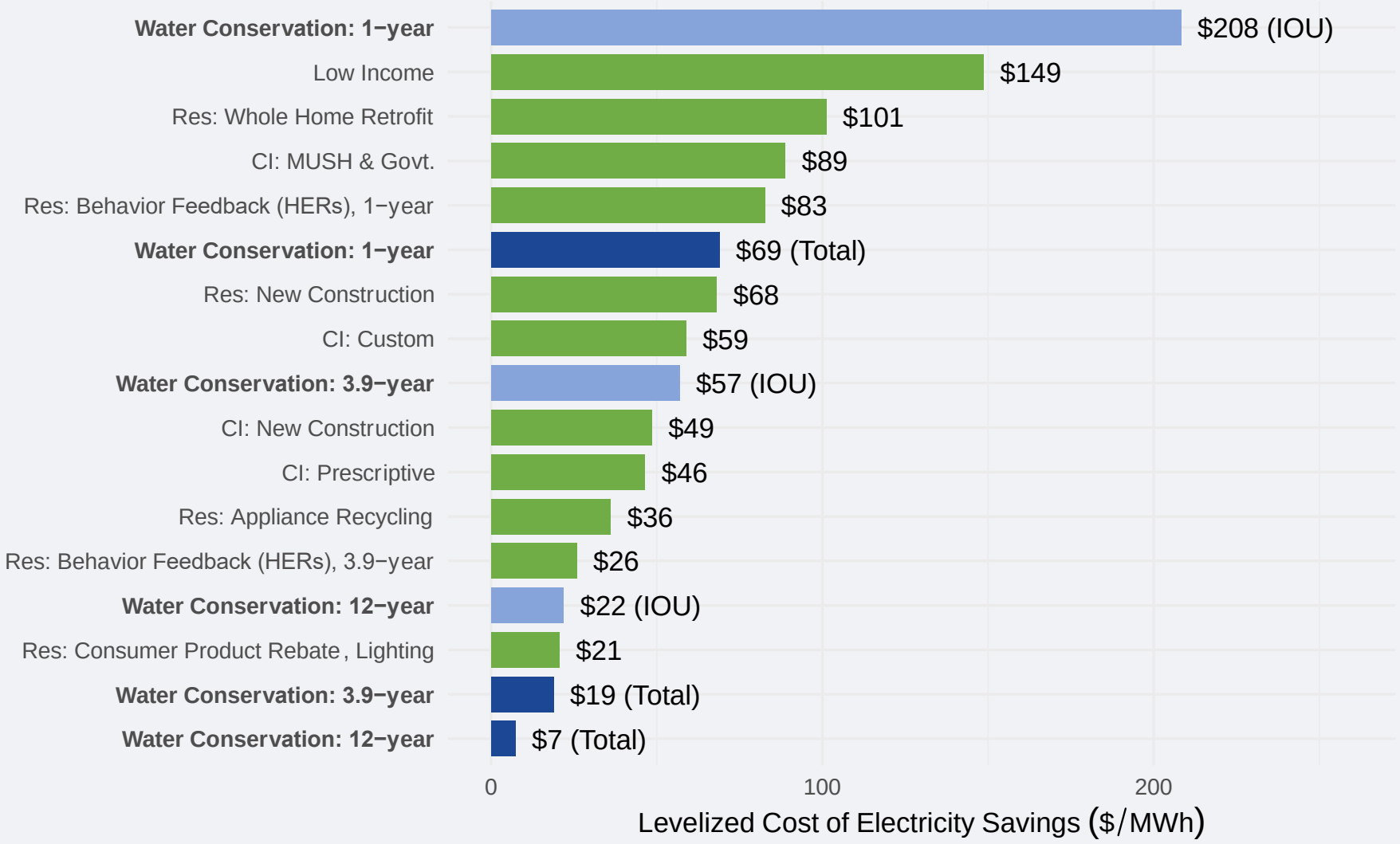

Levelized cost of electricity savings achieved through statewide water conservation relative to other energy efficiency programs

Alliance *for* Water Efficiency

A VOICE AND
A PLATFORM
PROMOTING THE
EFFICIENT AND
SUSTAINABLE
USE OF WATER

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