

look for



Saving Energy & Reducing Carbon with **WaterSense Labeled Homes**



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WaterSense Labeled Homes

- First national certification for water efficiency
- Provides a consistent and comprehensive approach to efficient homes
- Version 2.0 became effective in 2022:
 - Reduces water use in homes by **at least** 30% compared to code-built homes
 - Are third-party certified using existing certification infrastructure, overseen by EPA
 - Offers more flexibility relative to V1 while maintaining or increasing efficiency
 - Responds to market and climate changes
- Improved reporting under V2 allows for much better field research



<https://www.epa.gov/watersense/homes>



Photo: First community of all WaterSense labeled new homes in Issaquah, WA

How Much Energy Does Water Consume?

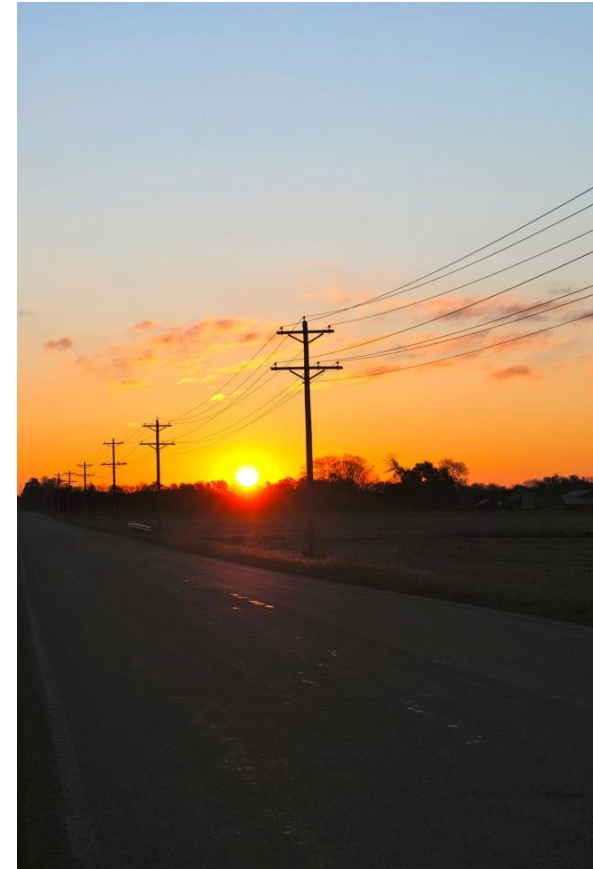


Every gallon of water has an energy “footprint” from moving, treating, and heating

Executive summary: **A lot**

Some estimates:

- 20% of electricity in California is consumed by pumping, heating, and treating water
- Water related energy uses account for more than 500 tWh/year
 - More than 14% of total consumption for 2020
- The water sector accounts for 4% of global electricity consumption
- The U.S. water sector accounts for 2% of total energy use





Oak Shade & Durango

- 219 WaterSense labeled homes in Menifee, CA
- Microgrid community
 - Community electric storage
 - Heat pump water heaters with UEF of 4.07
- Average home
 - 4 bedrooms
 - 2,261 ft²
 - 6,800 ft² lots
- Estimated water use of 87 kgal/home
 - Average HERSh2o score of 59
 - Savings of 61 kgal/home/year
- Report available on the WaterSense website
 - <https://www.epa.gov/watersense/tools-and-resources>

WaterSense® Labeled Homes Communities Save Energy and Support Decarbonization



In communities across the country, bringing water to homes requires a substantial amount of energy. This means that for every drop of water that comes out of a home's tap, there's energy that helped get it there. Within new residential developments, builders have an opportunity to construct homes that not only reduce the impact on regional water resources, but also minimize the energy use and carbon emissions associated with the water supplied to and used in those homes. As part of its commitment to energy and water efficiency, as well as climate resiliency, KB Home launched two communities—Oak Shade and Durango—comprised of more than 200 all-electric, solar-powered, WaterSense labeled homes in Menifee, California. Designed to be both energy- and water-efficient, the homes use 40 percent less energy and at least 30 percent less water than typical new construction, feature solar panels, and are backed by a microgrid community battery to reduce dependence on the conventional electrical grid. Further energy savings and emissions reductions are realized at each home and across the broader region by reducing the amount of energy needed to supply each of these homes with water and treat their wastewater.



Case Study Highlights

Location: Oak Shade and Durango communities in Menifee, California

Number of WaterSense Labeled Homes in Study: 219

Builder: KB Home

Average Home HERS_{H2O} Score: 59

Estimated Water Savings: 13.5 million gallons per year

Estimated Water-Related Energy Savings: 530,000 kilowatt hours (kWh) per year

Estimated Water-Related Carbon Reduction: 331,000 pounds CO₂ per year

The U.S. Environmental Protection Agency's (EPA's) WaterSense program and KB Home partnered to evaluate the impact that water savings will have on energy use and greenhouse gas emissions from these communities compared to a community comprised of similar-sized, typical new construction homes. The analysis considers the unique energy intensity of the water sources supplying the Oak Shade and Durango communities (i.e., the estimated energy used to extract, treat, and convey each water source); the communities' projected water use patterns; and the design and technology used within the

Oak Shade & Durango

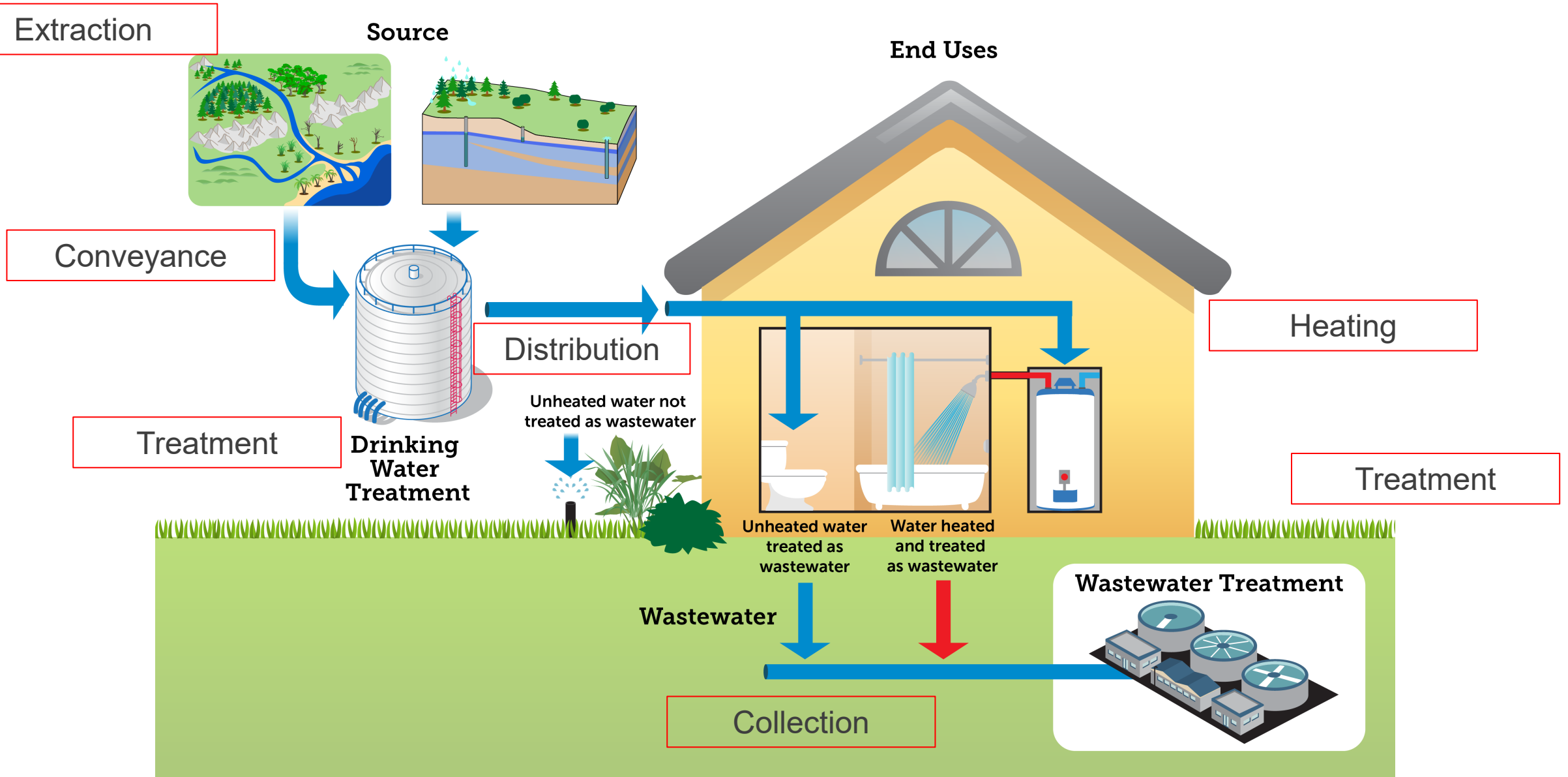


Water-related savings each year compared to code-built homes:

- 13.4 million gallons a year for the community
- 639,760 kWh/year
- 357,976 lbs of CO₂/year



What Influences the Energy Profile of Water?

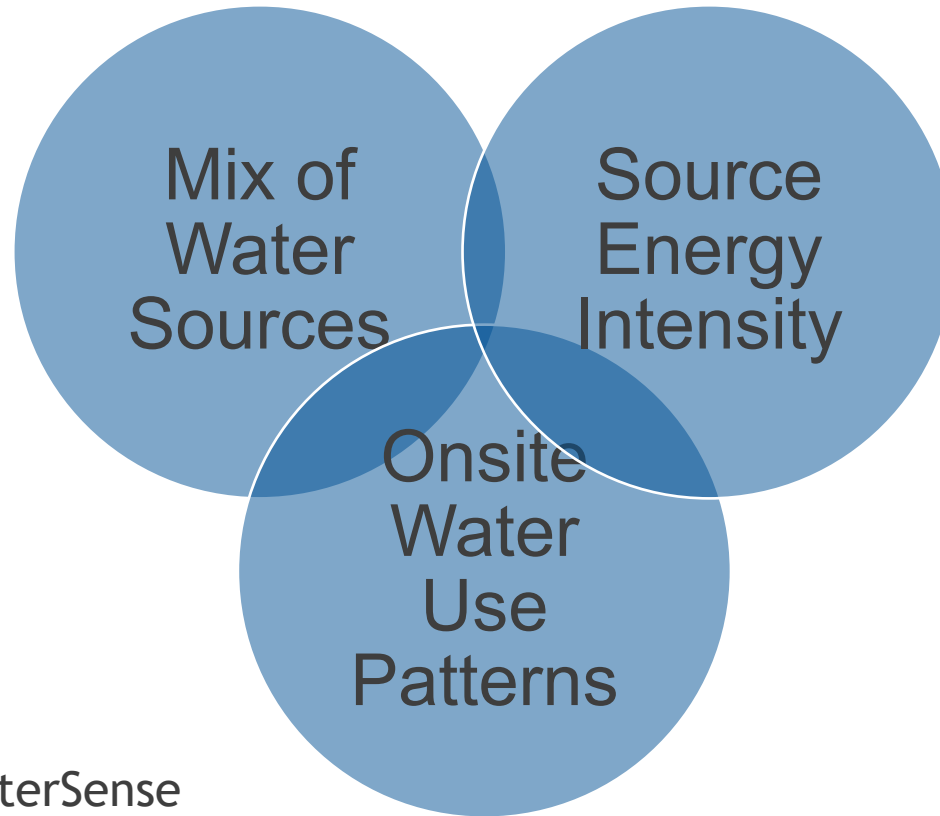


Getting to a Better Estimate

Requires site-specific information on:

Eastern Municipal
Water District Water
Management Plan

California Public
Utilities Commission
Data



HERSh2o/WaterSense
labeled homes
reporting data

Some Additional Data Points & Assumptions

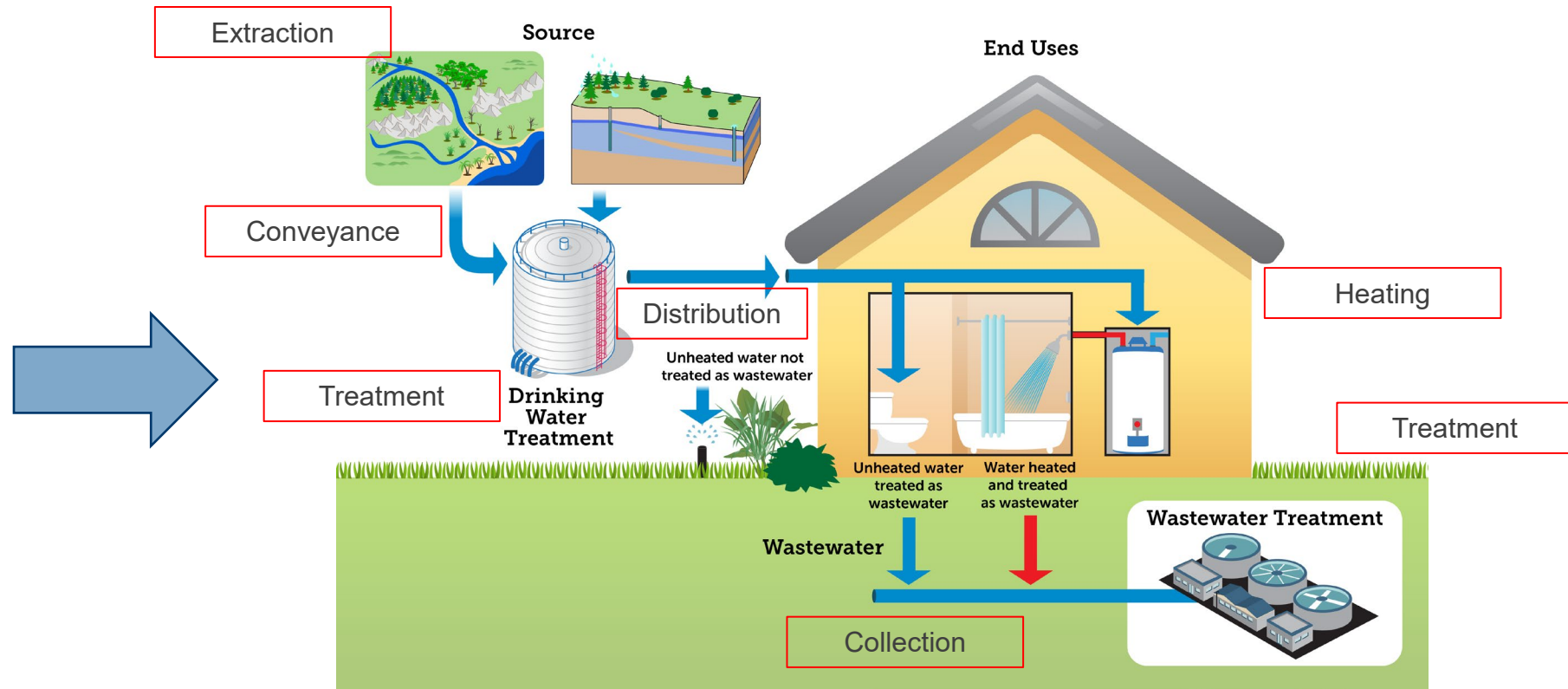
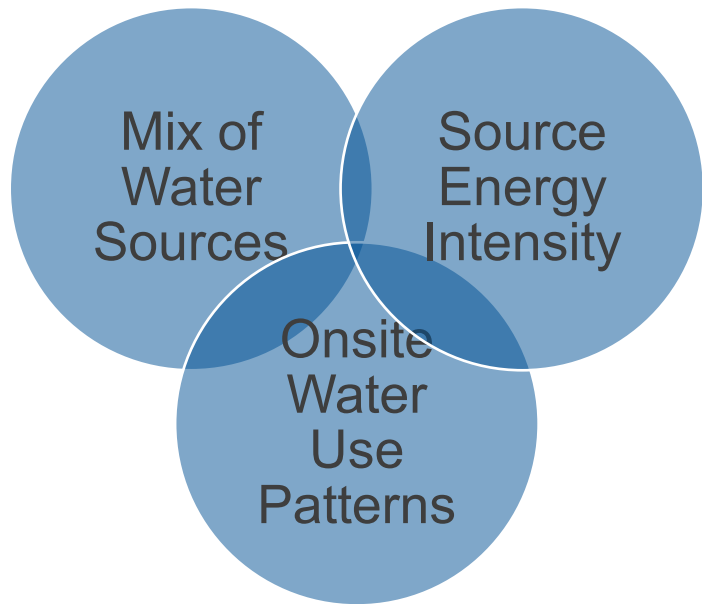
Data:

- Intensity of carbon in electricity from the EPA EGRID tool
- Temperature of incoming water from the HERSH2o rating
- Mix of hot and cold water at the point of use
- Temperature rise at the water heater
- Efficiency of the water heater per builder specification/UEF

Assumptions:

- Analysis is based on 100 WaterSense labeled homes
 - These numbers are extrapolated to the full build out (219 homes)
- Assume that all onsite electricity is supplied by renewables or the microgrid and is carbon neutral
- Assume that all water supplied is proportionally mixed based on system averages

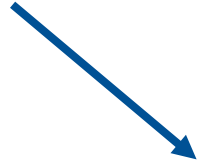
What Influences the Energy Profile of Water?



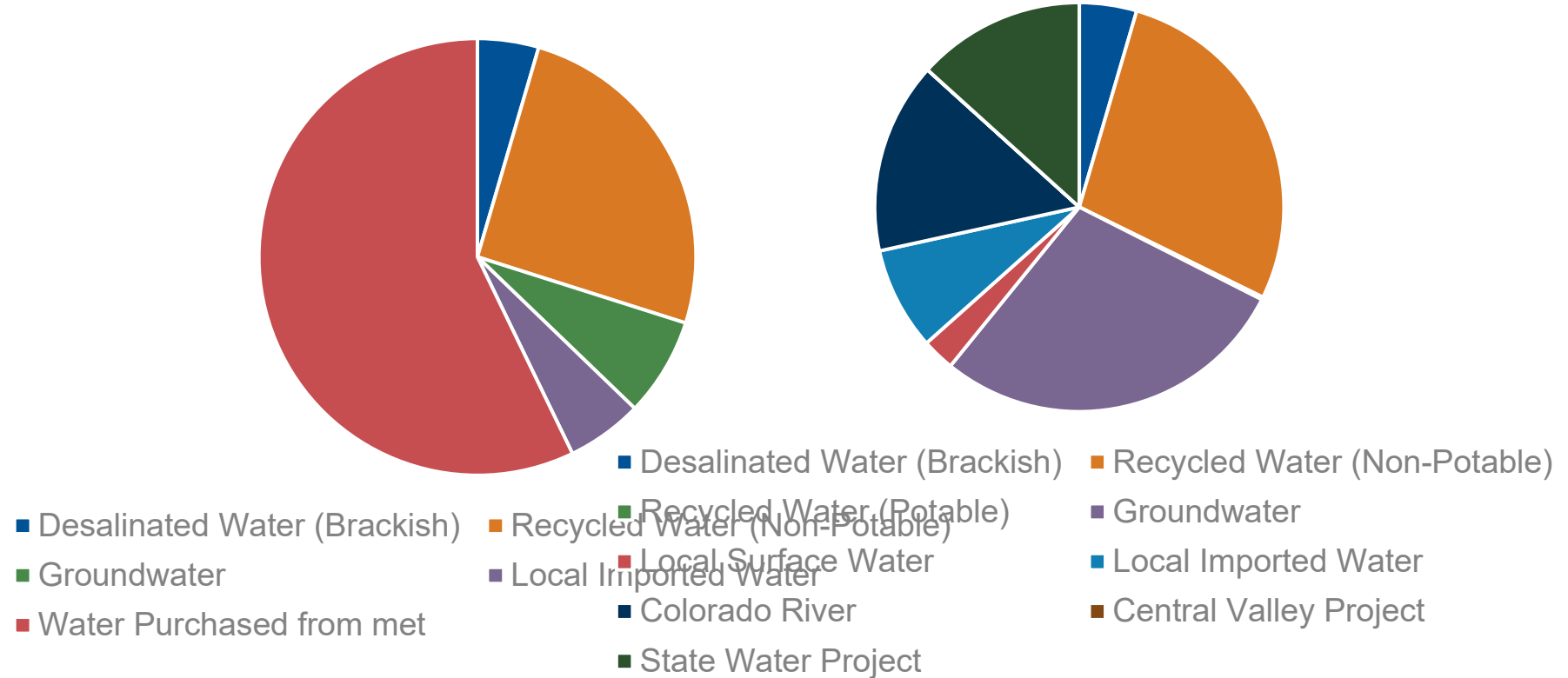
Eastern Municipal Water District

EMWD Supplies 161,332 AF/year

Can be further broken out.



EMWD Sources EMWD (with MET Water Broken Out)



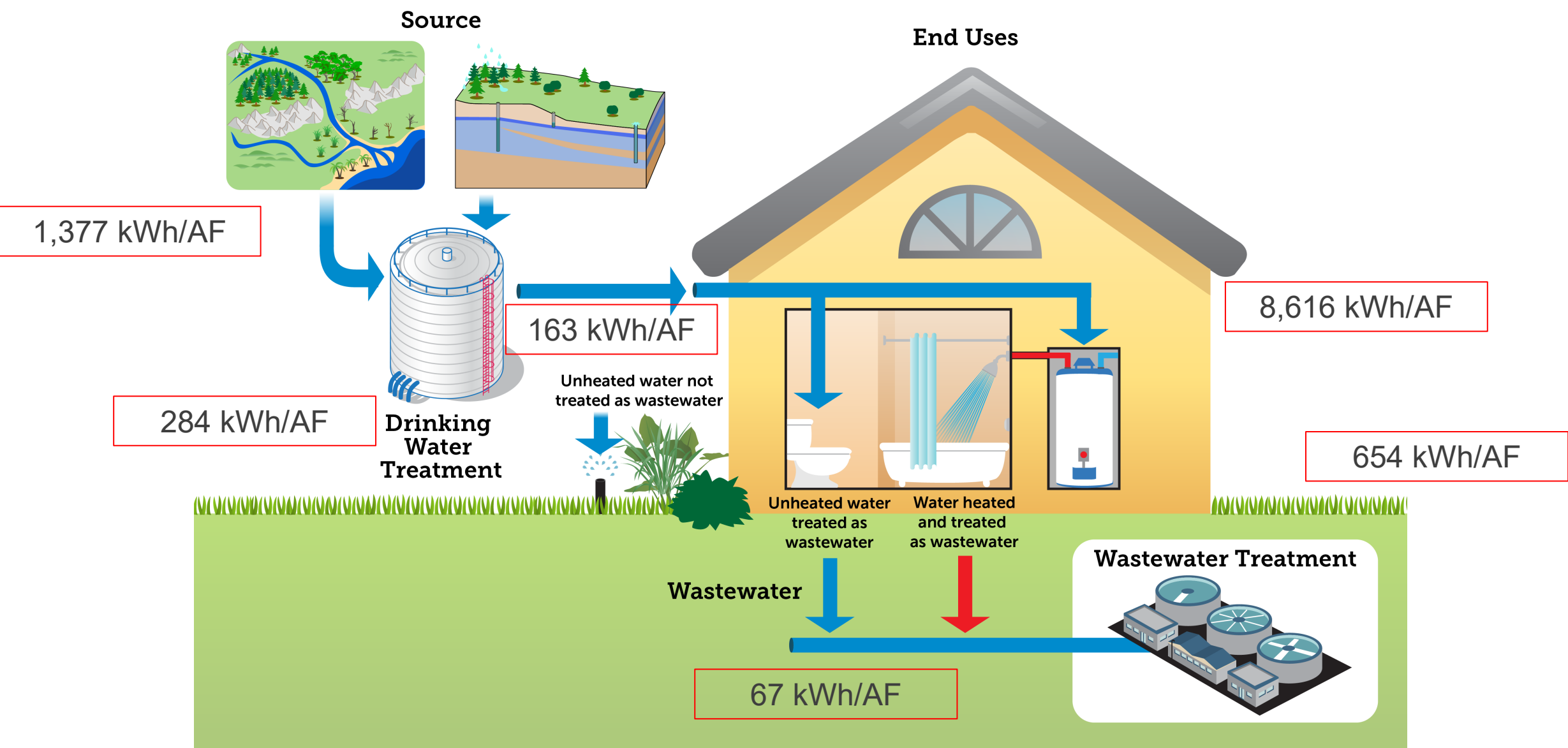


PUC Embedded Energy Values

kWh/Acre-foot (AF)

Source	Extraction & Conveyance	Treatment	Distribution	Wastewater
Desalinated Water (Brackish)	696.8	1406.5	163.0	723
Recycled Water (Non-Potable)	107.3	606.8	415.8	
Recycled Water (Potable)	696.8	1271.5	163.0	
Groundwater	696.8	205.3	163.0	
Local Surface Water	88.9	205.3	163.0	
Local Imported Water	33.0	205.3	163.0	
Colorado River	2110.9	205.3	163.0	
Central Valley Project	225.0	205.3	163.0	
State Water Project	3306.2	205.3	163.0	

What Influences the Energy Profile of Water?



Three Types of Water Use

Supply Only

- Outdoor water use
- 1,631 kWh/AF

Conservative National
Average: 674 kWh/AF

Supply & Wastewater

- Cold water indoor water use that goes down the drain
- 2,353 kWh/AF

Conservative National
Average: 1,474 kWh/AF

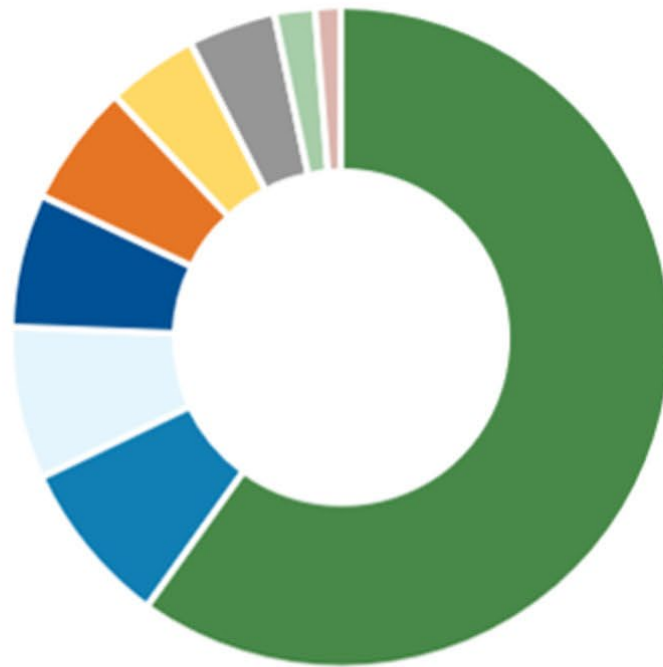
Supply, Heating, & Wastewater

- Hot water indoor water use that goes down the drain
- 10,969 kWh/AF

Conservative National
Average: 56,194 kWh/AF

How Will These Homes Use Water?

Typical Community




32,460,000 gallons/year

Oak Shade and Durango

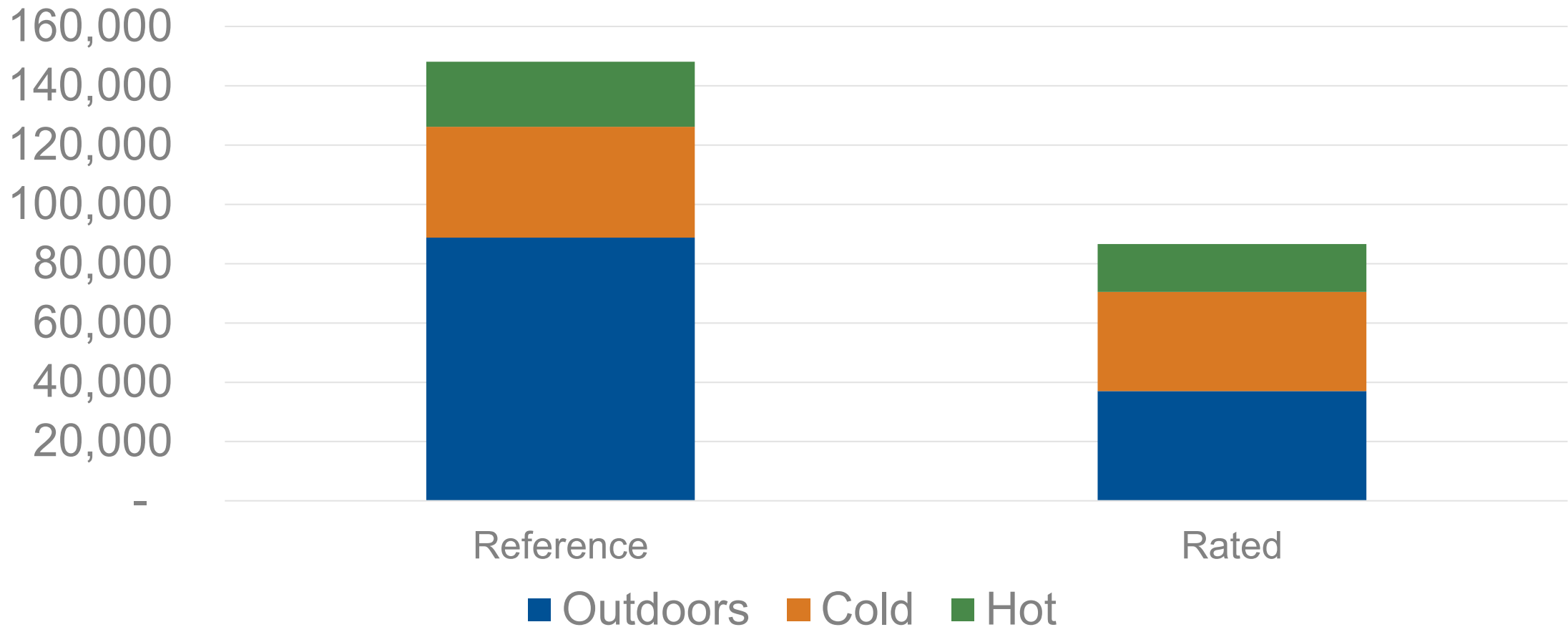


18,970,000 gallons/year

- | | | |
|--|---|--|
|  Showers |  Kitchen Faucets |  Lavatory Faucets |
|  Hot Water Delivery Waste |  Clothes Washer |  Dishwasher |
|  Toilets |  Other/leaks |  Outdoor |

How Will These Homes Use Water?

Average water use predictions

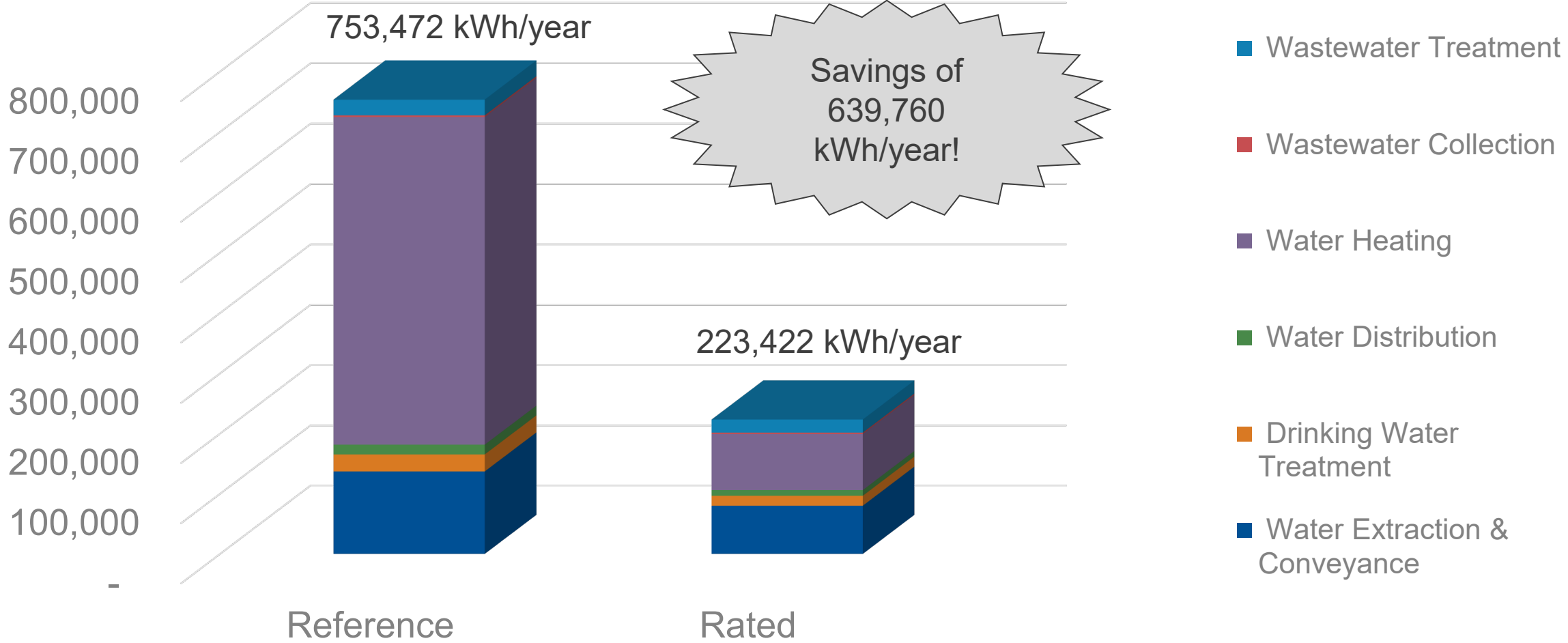




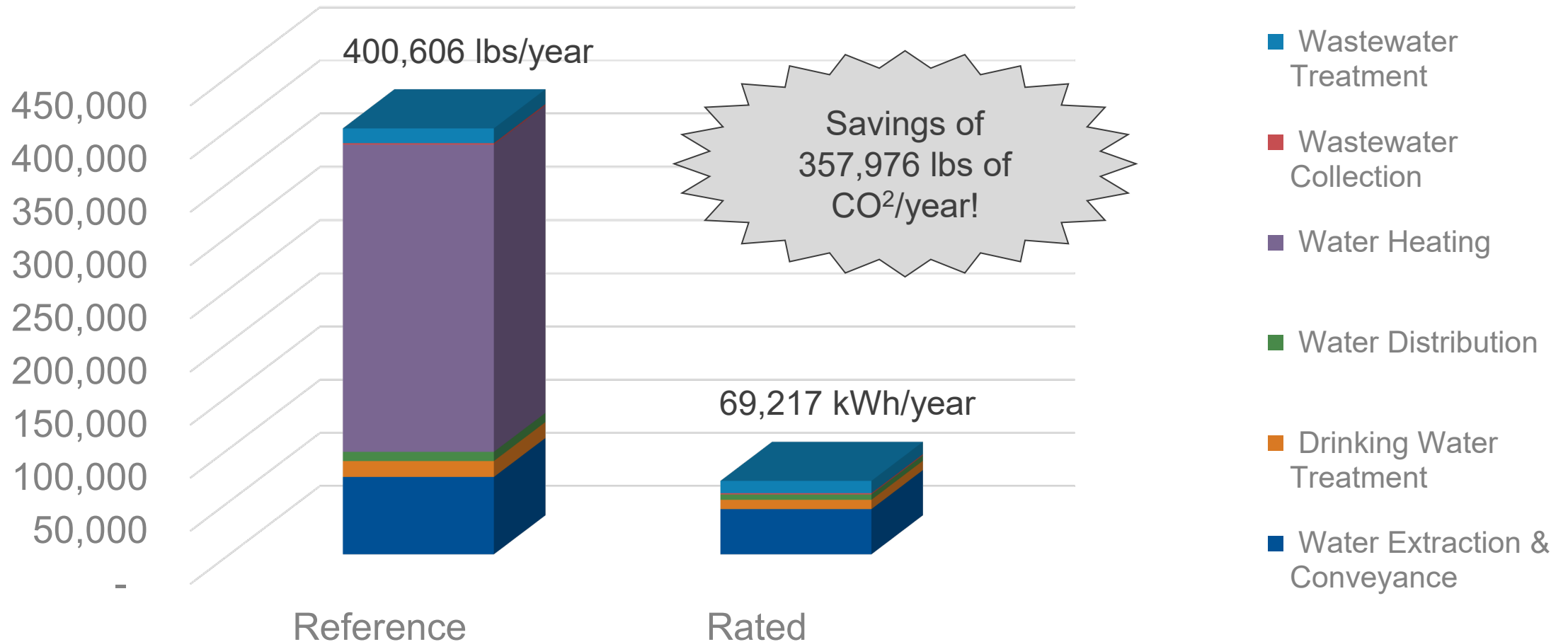
Savings

	Extraction & Conveyance	Treatment	Distribution	Wastewater Collection	Wastewater Treatment	Heating
Gallons/house/year	61,601	61,601	61,601	9,687	9,687	5,791
kWh/house/year	260	54	31	2	19	153
Lbs of CO ₂ /house/year	138	29	16	1	10	-
Gallons/community/year	13,490,637	13,490,637	13,490,637	2,121,540	2,121,540	1,268,224
kWh/community/year	56,992	11,744	6,748	436	4,259	33,533
Lbs of CO ₂ /community/year	30,301	6,244	3,588	232	2,264	-

kWh/Year Used for Water by 219 Homes in Oak Shade & Durango



Lbs of Carbon/Year Emitted for Water by 219 Homes in Oak Shade & Durango



How Can We Decarbonize With Water?

Three strategies to decarbonizing water use:

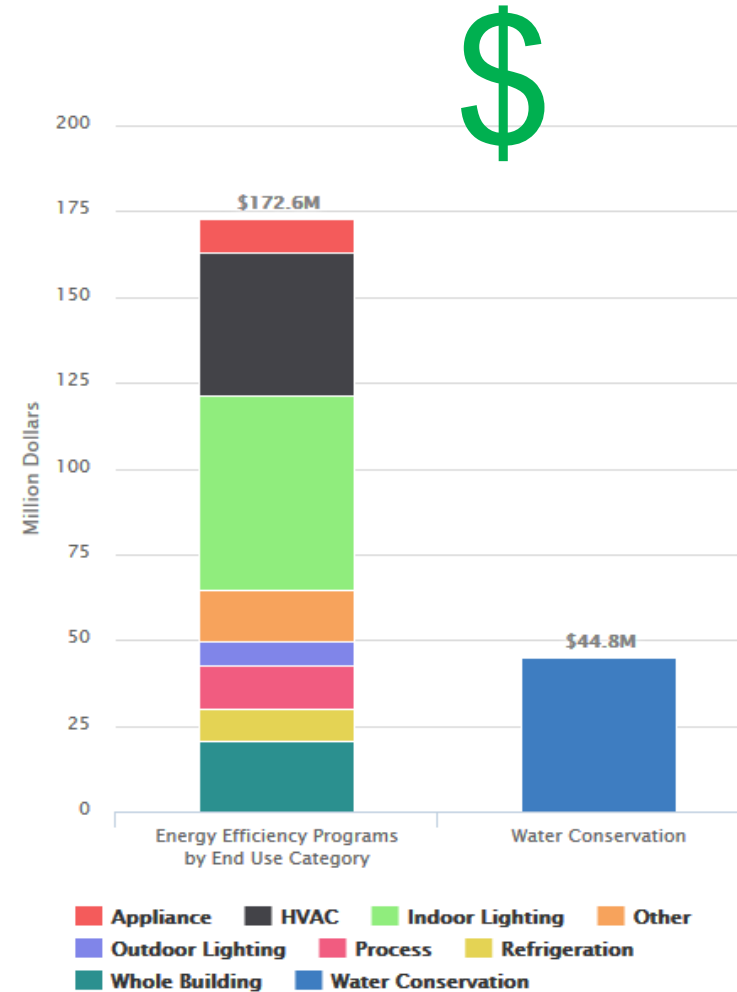
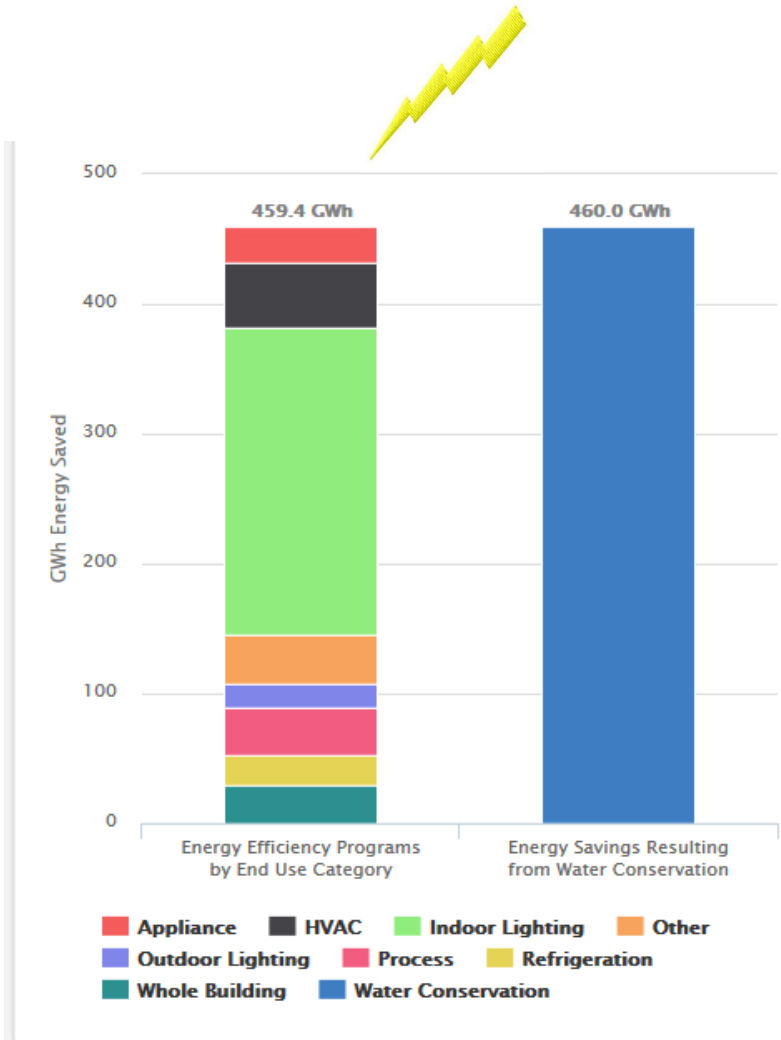
		Microgrid Scenario	Heat Pump Water Heaters Scenario	Water Efficiency Scenario
Features	Electric Generation	0 lbs CO ₂ /MWh	531.68 lbs CO ₂ /MWh	531.68 lbs CO ₂ /MWh
	Water Heater Efficiency	0.95 UEF	4.07 UEF	0.95 UEF
	Water Consumption	32.5 million gallons/year	32.5 million gallons/year	19 million gallons/year
Savings	kWh/Year Saved	0	416,000	224,000
	Pounds CO ₂ /Year Avoided	289,000	221,000	119,000

- Savings from standard/typical
- Savings are not additive
- What's the cost of these upgrades?

We've Seen This Before!

UC Davis Analysis of California EO B-29-15 mandating water use reductions in response to the drought in 2015

2.7 kWh Saved
 per
 \$ spent
 on energy
 savings



10.3 kWh Saved
 per
 \$ spent on
 water savings

WaterSense Partner Savings Calculator



WaterSense Partner Savings Calculator

This tool is designed to help WaterSense partners estimate their savings contributions from participating in the WaterSense program. It provides estimates for gallons of water saved, energy saved (in kilowatt-hour equivalency), metric tons of greenhouse gas reduced (in carbon dioxide equivalents), and U.S. dollars saved for calendar year 2022.

The tool offers estimates for manufacturer, retailer/distributor, and builder partners.

Please select your partner type from the options below, then visit the corresponding worksheet to enter your information.

Partner Name:

Partner Type:

Year:

- Manufacturer
- Retailer/Distributor
- Builder

2022 Version
Last Update: January 9, 2023

Results

2022 Savings Summary

has delivered more than 266100 WaterSense labeled products!

Year	Table 1. Water Savings		Table 2. Total Energy Savings Converted to kWh		Table 3. Combined Greenhouse Gas Savings in CO ₂ equivalents		Table 4. Total Utility Bill Savings (water, wastewater, electric, and natural gas) in current year USD	
	gallons		kilowatt-hrs		metric tons		USD (\$2022)	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2007	724,164	724,164	3,324	3,324	2.36	2.36	\$ 6,144	\$ 6,144
2008	4,561,747	5,285,911	407,854	411,178	148.97	151.33	\$ 72,568	\$ 78,712
2009	9,569,170	14,855,081	936,383	1,347,562	343.22	494.55	\$ 159,970	\$ 238,682
2010	17,474,395	32,329,476	1,707,999	3,055,560	626.72	1,121.27	\$ 293,191	\$ 531,873
2011	27,436,186	59,765,662	2,663,968	5,719,528	986.04	2,107.31	\$ 477,023	\$ 1,008,896
2012	42,496,066	102,261,728	3,824,625	9,544,153	1,422.09	3,529.40	\$ 738,407	\$ 1,747,303
2013	60,780,030	163,041,758	5,148,154	14,692,307	1,935.47	5,464.87	\$ 1,048,176	\$ 2,795,480
2014	81,417,403	244,459,161	6,642,459	21,334,765	2,504.18	7,969.05	\$ 1,423,430	\$ 4,218,910
2015	104,694,999	349,154,160	8,176,305	29,511,071	3,190.29	11,159.34	\$ 1,848,207	\$ 6,067,117
2016	130,102,300	479,256,460	9,899,885	39,410,956	3,870.86	15,030.20	\$ 2,314,621	\$ 8,381,738
2017	156,486,043	635,742,503	11,731,975	51,142,930	4,580.16	19,610.35	\$ 2,866,278	\$ 11,248,016
2018	184,315,172	820,057,676	13,644,353	64,787,283	5,332.86	24,943.21	\$ 3,408,090	\$ 14,656,106
2019	213,109,316	1,033,166,991	15,562,650	80,349,933	6,132.91	31,076.12	\$ 4,014,972	\$ 18,671,078
2020	242,380,360	1,275,547,351	17,560,764	97,910,698	6,924.85	38,000.97	\$ 4,678,546	\$ 23,349,623
2021	272,794,569	1,548,341,920	19,543,997	117,454,695	7,713.07	45,714.04	\$ 5,219,169	\$ 28,568,792
2022	307,711,484	1,856,053,404	21,723,261	139,177,956	8,581.25	54,295.30	\$ 5,500,076	\$ 34,068,869

Comparing Numbers

Assuming 219 WaterSense labeled homes in California:

	Gallons	kWh	Lbs CO2 Equivalent
This Analysis	13,400,000	639,760	357,976
Partner Savings Calculator	10,829,643	230,489	211,467

- It's possible to create a much more accurate estimate
 - It requires more detailed inputs
 - It requires more data than what's consistently available



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