



MAWAC-ENA WORKSHOP

PARIS

November
2025

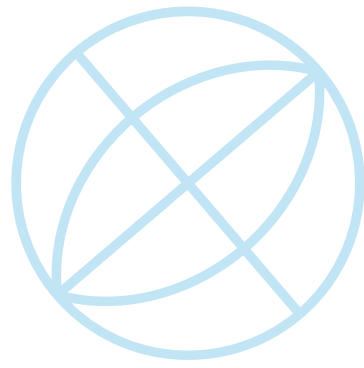


Water Efficiency: How Effective Is It -- and Is It Affordable?

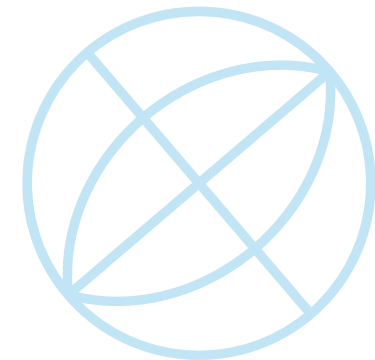
Mary Ann Dickinson
Dickinson Associates
USA



US Water Demand is Definitely Down



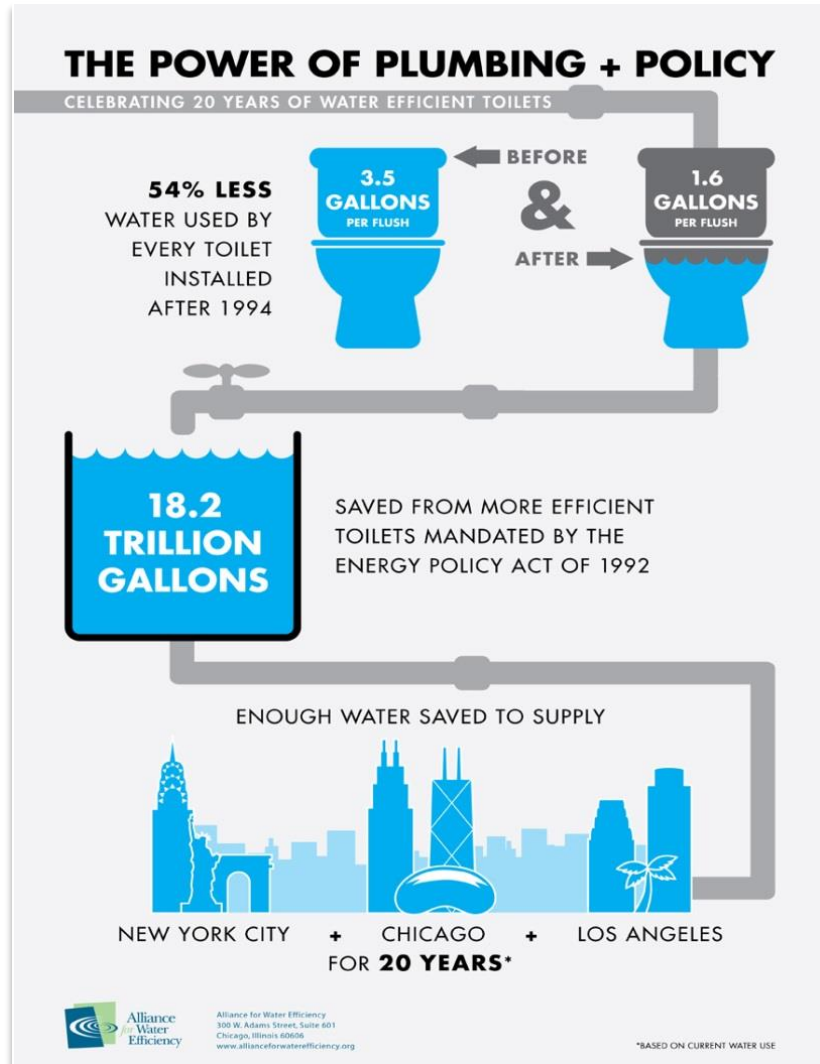
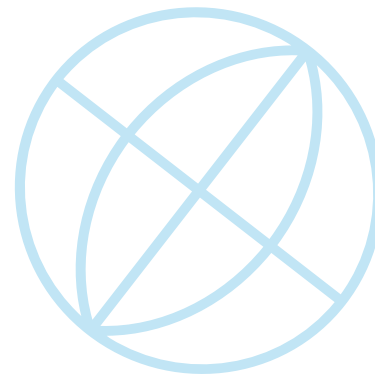
- Per capita consumption in North America historically the highest per capita consumption in the world
- Residential End Use Studies show a 22% decrease in indoor average household water use between 1999-2016
- 15% reduction in overall household water use: from 262 lpcd to 221 lpcd on average; very efficient homes were 138 lpcd in 2016, similar to Melbourne's target of 140 lpcd during their Millenium drought.
- New Residential End Use Study underway and expected to show more reductions; San Francisco is already at <150 lpcd.
- Urban landscape water use still drives higher demand than Europe (e.g. LA)



1992 US Federal Energy Policy Act

Fixture	US Standard Maximum
Water Closets	6 liters/flush
Showerheads	9.5 liters/minute
Faucets	9.5 liters/minute
Urinals	3.8 liters/flush

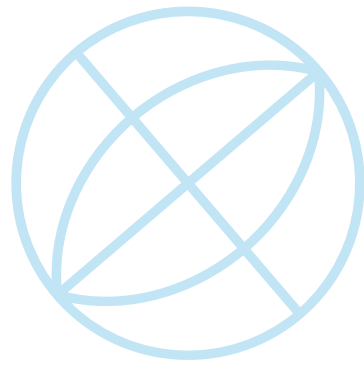
How Much Do Standards Save?



- Toilets alone, assuming a 4% change-out rate.
- Savings occur without cost to the water utility.
- Savings are permanent over the life of the fixture.
- **68.9 million Megaliters.**
- Enough to supply New York City, Chicago, and Los Angeles for **20 years.**

WaterSense Product Label

- **20%** more efficient than Federal standard.
- Products are all performance tested.
- 38,332 product models labeled
- Savings:
 - ✓ 6.4 trillion gallons of water (amount of water used by all US Households for 8 months)
 - ✓ over \$135 billion in water and energy bills
 - ✓ 754 billion kWh of electricity
 - ✓ 288 million metric tons of carbon dioxide



Types of Efficiency Programs

1. Public Education

School programs
Advertising & Social media
Outreach programs
Demonstration projects

2. “Good” Management

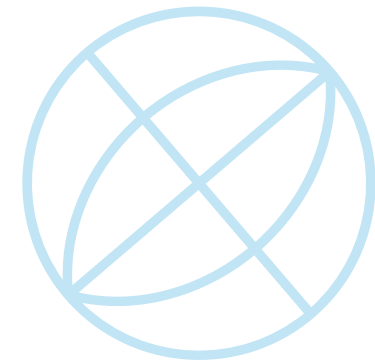
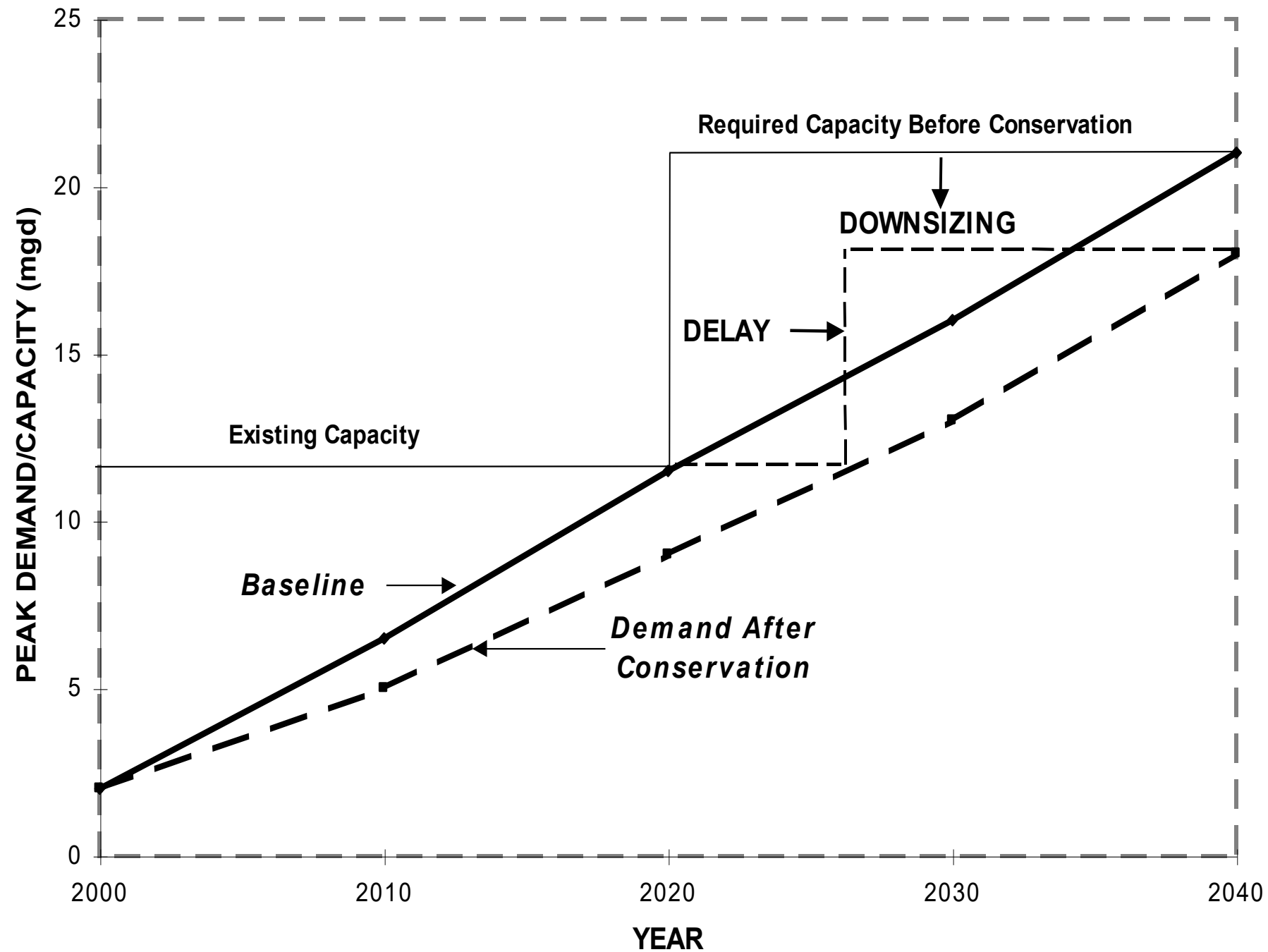
Leak detection and repair
Water network audits
100% Metering and billing

3. Laws and Regulation

Efficiency Standards
Water banking and transfers
Local codes/ordinances

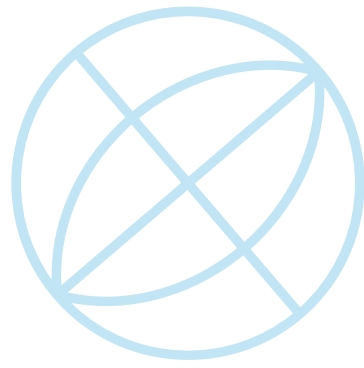
4. Economic Incentives

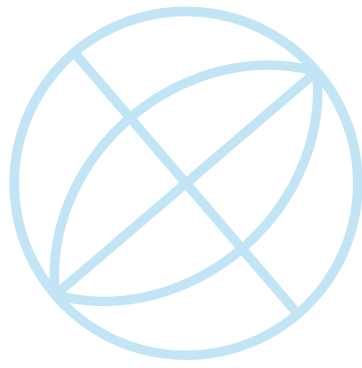
Pricing and tariffs
Subsidies and rebates
Tax incentives





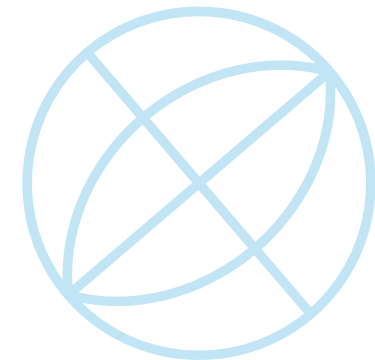
Southern California



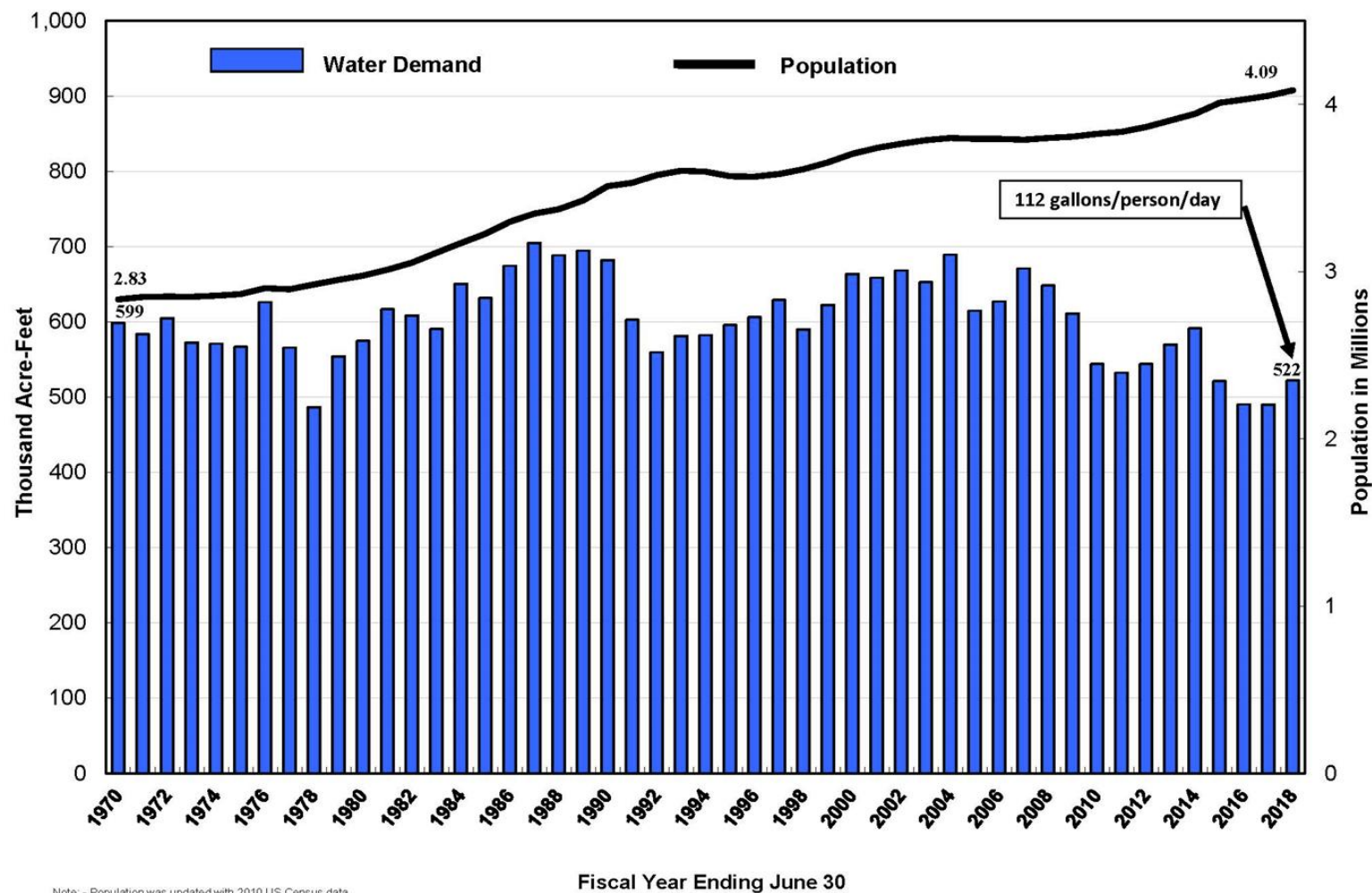


Metropolitan Water District

- Regional district of 14 cities, 11 municipal water districts, and one county water authority.
- Provides water to 19 million people in a 5,200-square-mile (13,000 km²) service area.
- Major investments in water conservation and recycling for households and businesses.
- Since 1990 \$840 million has been invested in water conservation by Metropolitan and its member water retailers.
- Since 1990 4,294,984 megaliters have been saved.



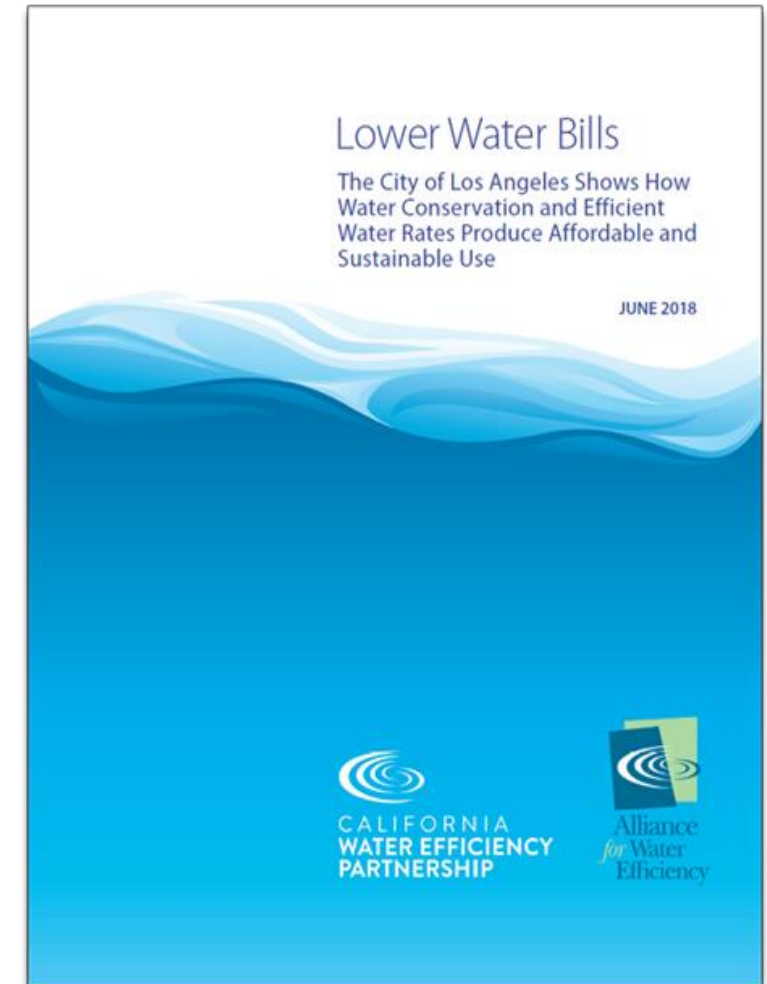
CITY OF LOS ANGELES WATER USE AND POPULATION



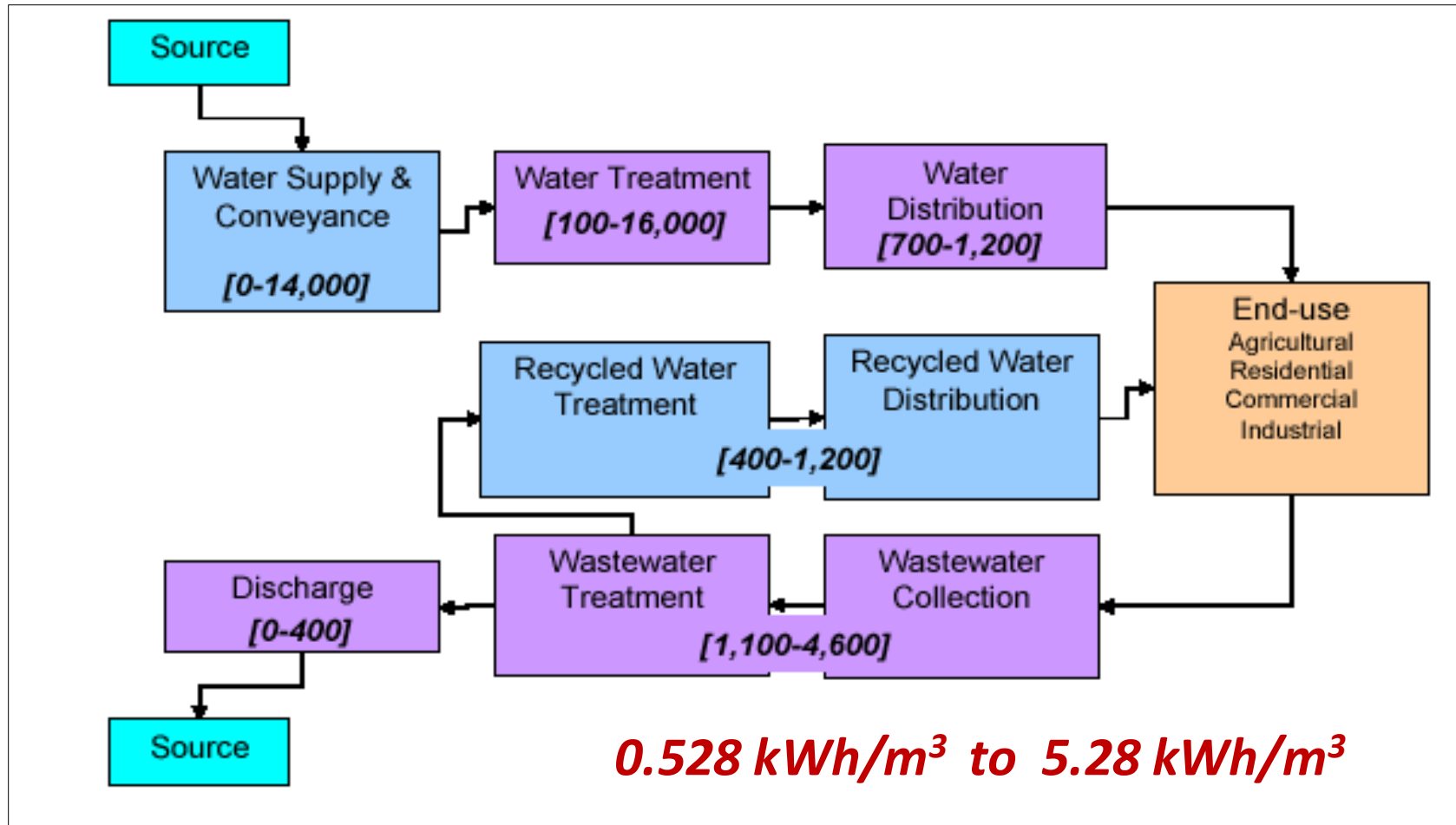
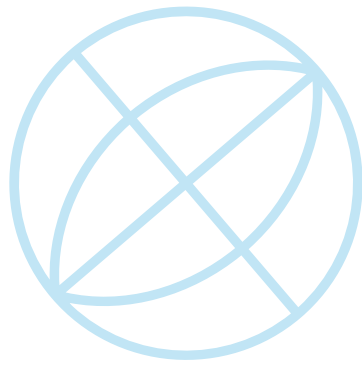
**112 GPCD =
423 LPCD**

BUT LOWER WATER BILLS IN LOS ANGELES

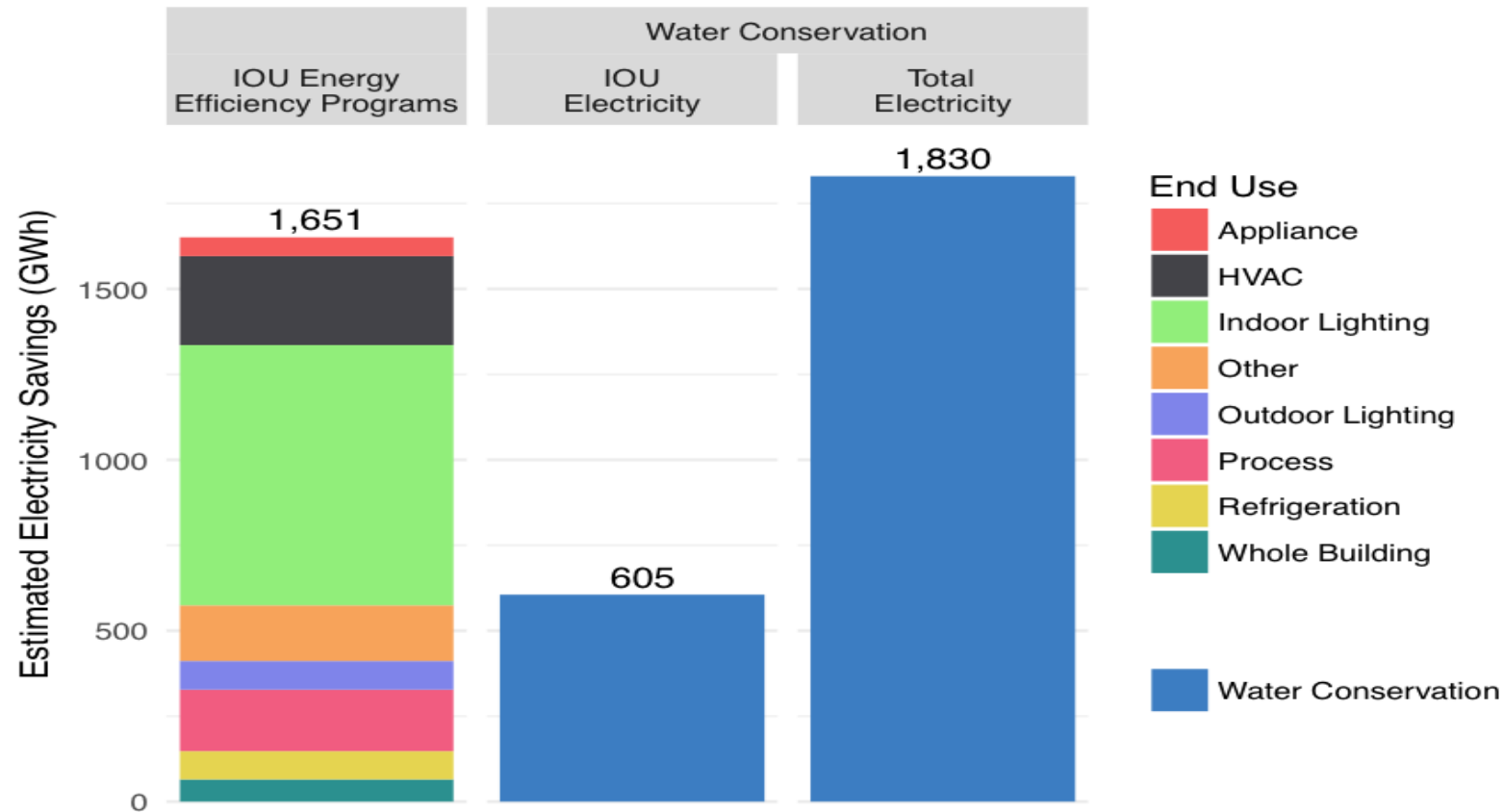
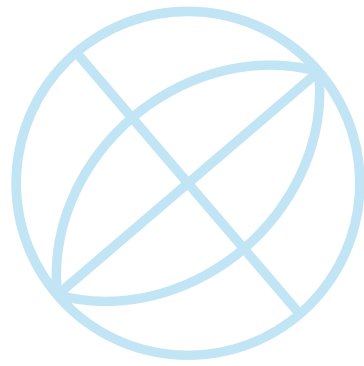
- AWE conducted study of utility costs avoided with water conservation programs.
- Analysis completed in August, 2018.
- Findings: LA had **\$11 billion** in avoided infrastructure costs, which reduced customer rates by **26.7%**.
- Three other studies done in Colorado and Arizona with similar results.



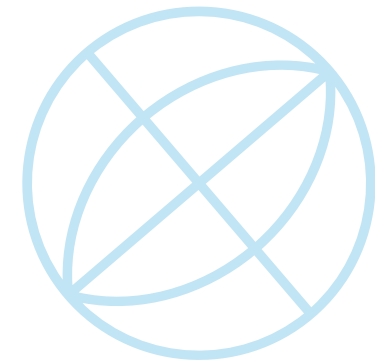
Energy Intensity of Water



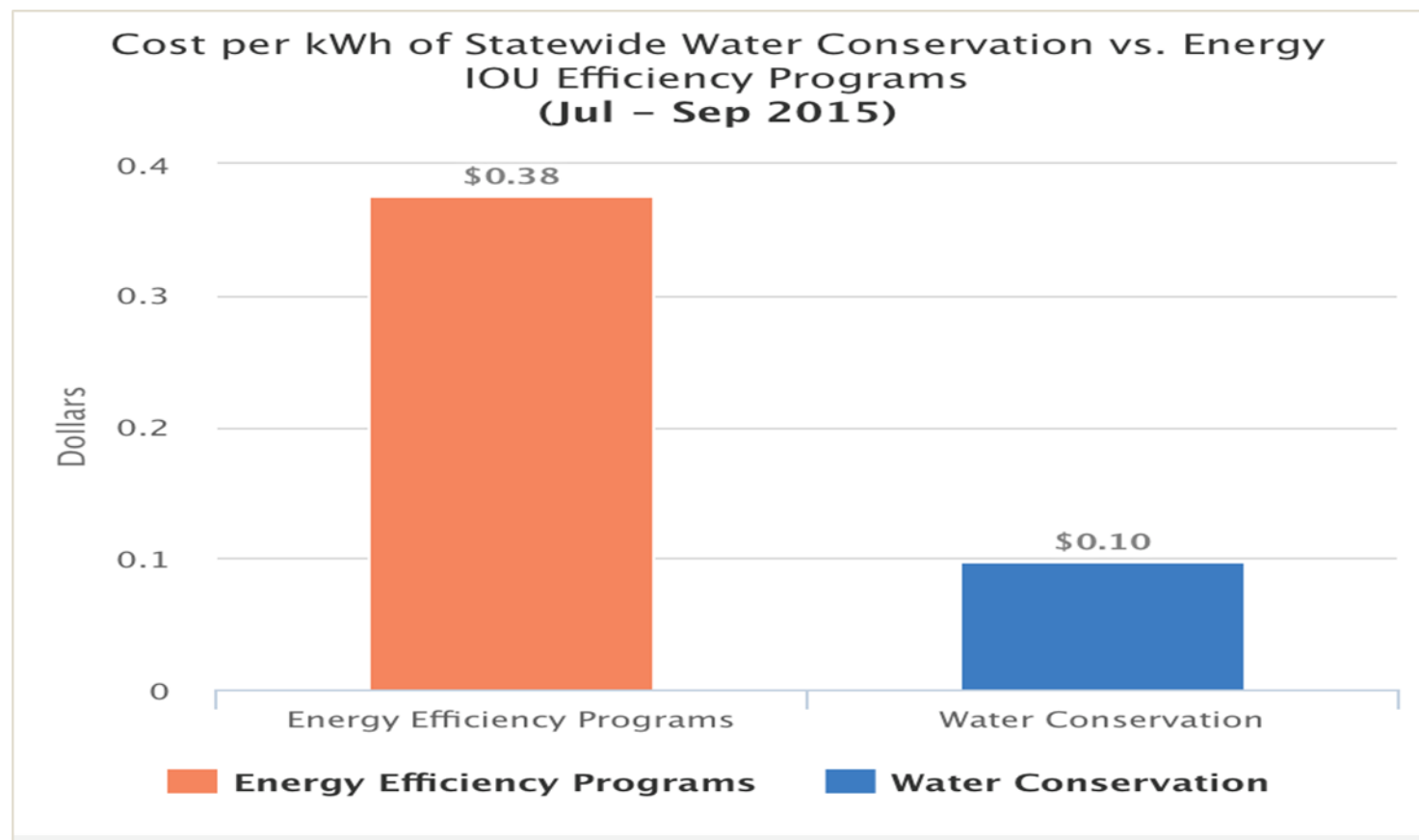
Electricity Savings



Source: UC Davis 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



Cost Effective Energy Savings

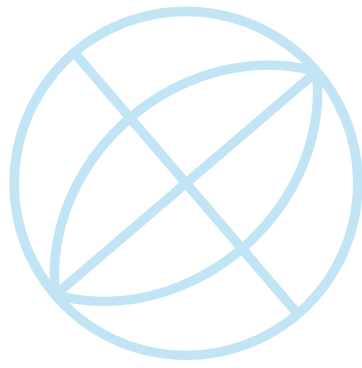


Center for Water-Energy Efficiency, UC Davis, 2016

Planning for Water Neutral Development Using Efficiency as a Tool

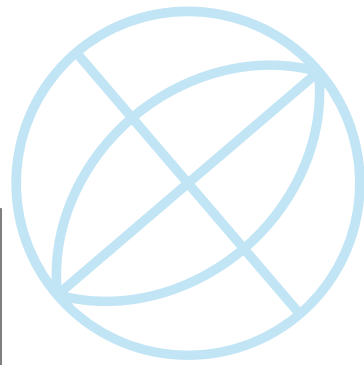
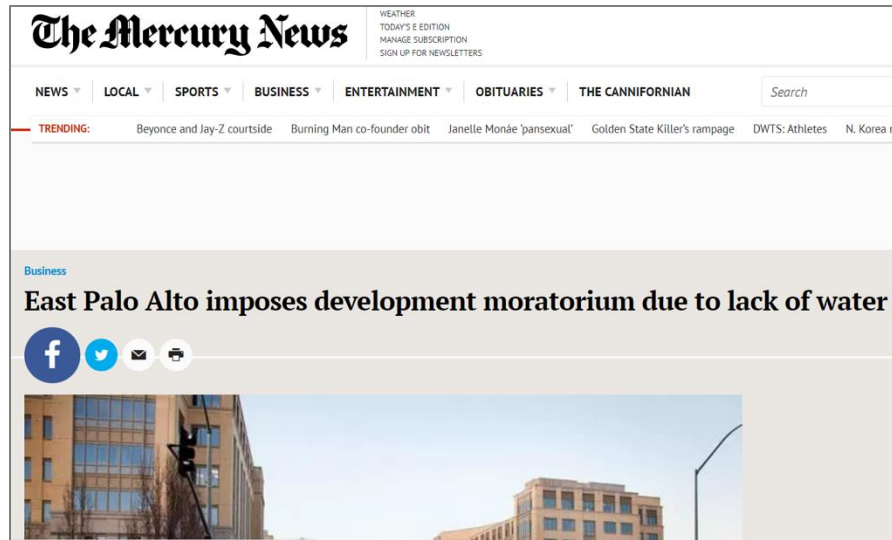
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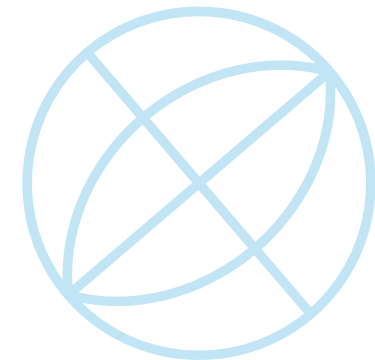




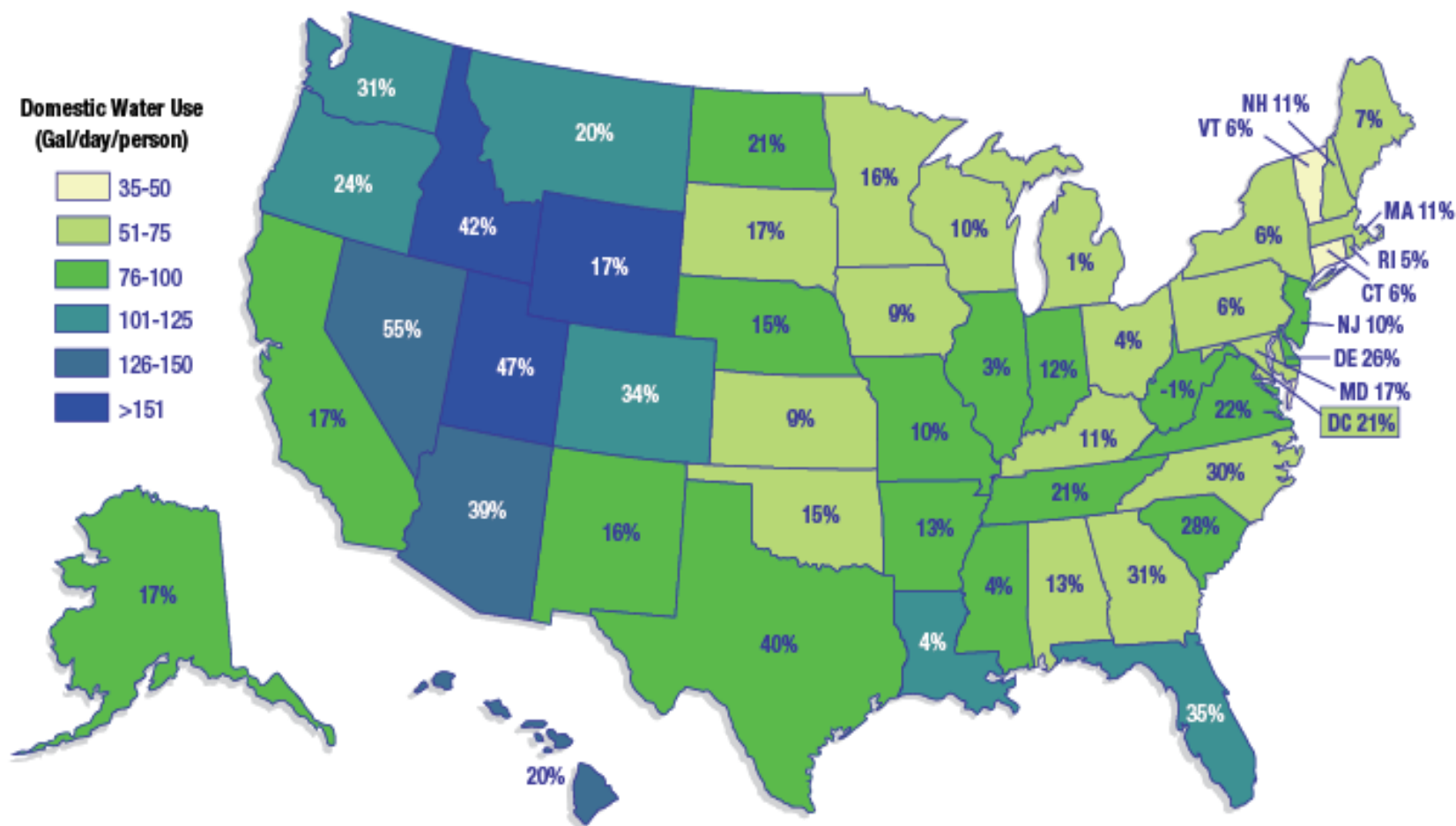
The Problem

- Many cities in North America are already challenged to meet their customer demands for water
- Growing population and economic growth will place even more pressure in arid and water-short areas
- As drought and water shortages occur, residents raise the issue about available water for new development when they are being restricted
- Some communities cannot accommodate growth with current water supplies, especially as drought intensifies

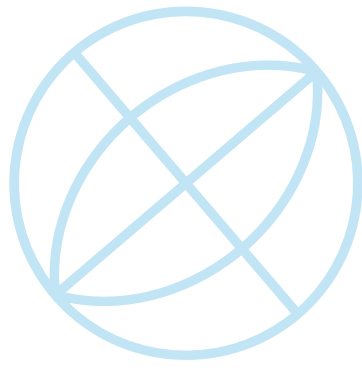




Domestic Water Use in Gallons per Day per Person and Percent Population Growth from 2000 to 2020

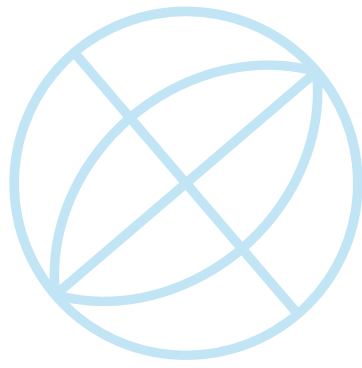


Sources:
U.S. Geological Survey, Circular 1441
U.S. Census Bureau, Historical Population Change Data (2000-2020)



Another Problem

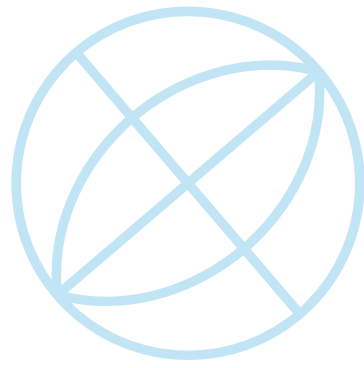
- Water utility planning and local community comprehensive planning have historically not been well connected
- Strong silos have existed for decades with minimal staff interchange
- Water utility managers historically have been nervous about looking like they are “social engineers” if they get involved in local planning efforts
- This disconnect occurs despite clear evidence that a lack of coordination is a disservice to local planning needs and results in a lack of focus on the very real water and land use nexus



Megacities Impact

- According to Architecture 2030, the world is expected to add about 2.6 trillion sq ft of new floor area to the global building stock between 2020 – 2060. Equivalent to adding a city the size of New York City every month for 40 years
- This will be an expansion crisis in our urban areas
- Build “smart from the start”
- Land Use/Water planning historically unconnected and that cannot continue.

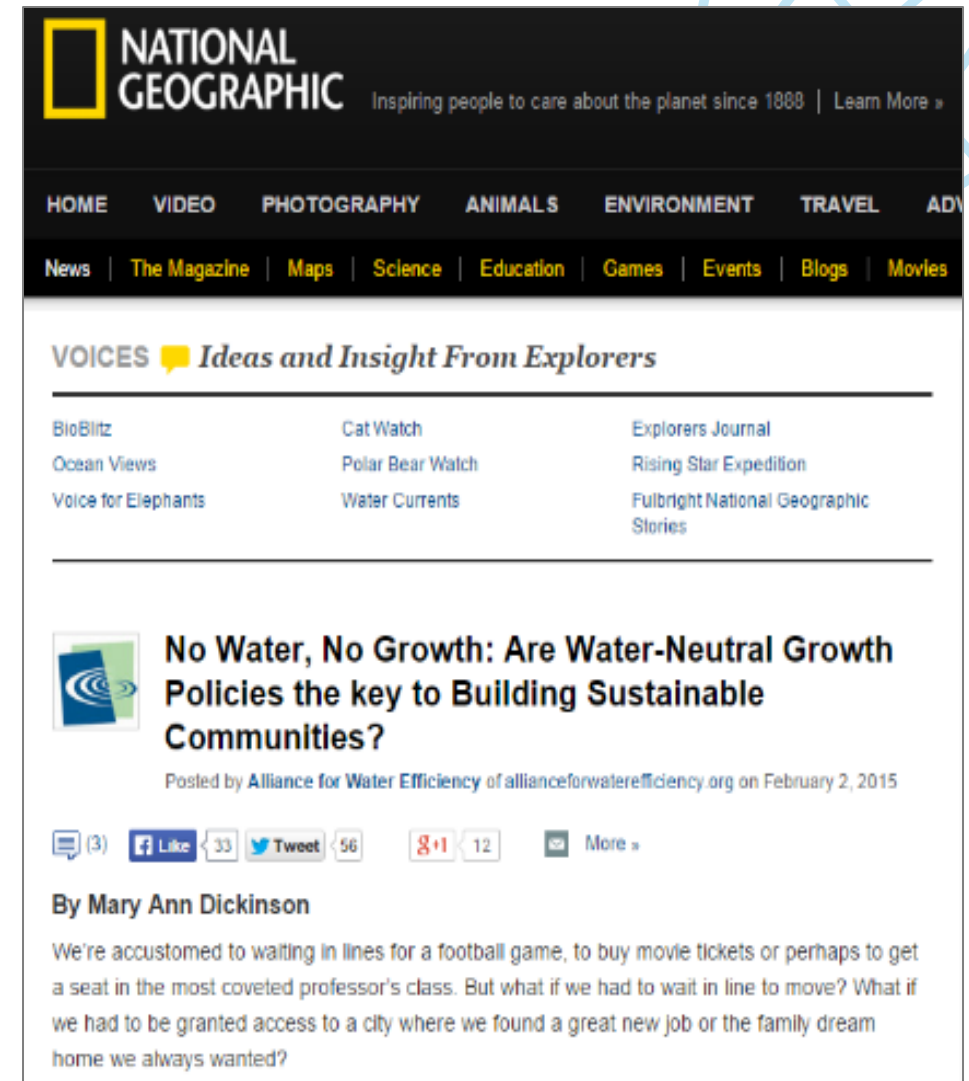
A Solution to Scarcity: Water Offsets



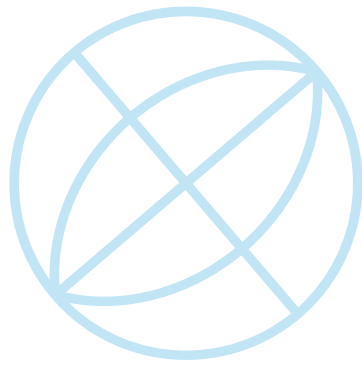
- Can allow growth without increasing system-wide water consumption across a community or a water supply service area
- Can be a combination of on-site water efficiency and off-site water efficiency
- Can reduce or completely eliminate impact of new development on water supply
- Can help avoid building moratoriums in resource-constrained communities

Water-Neutral Growth

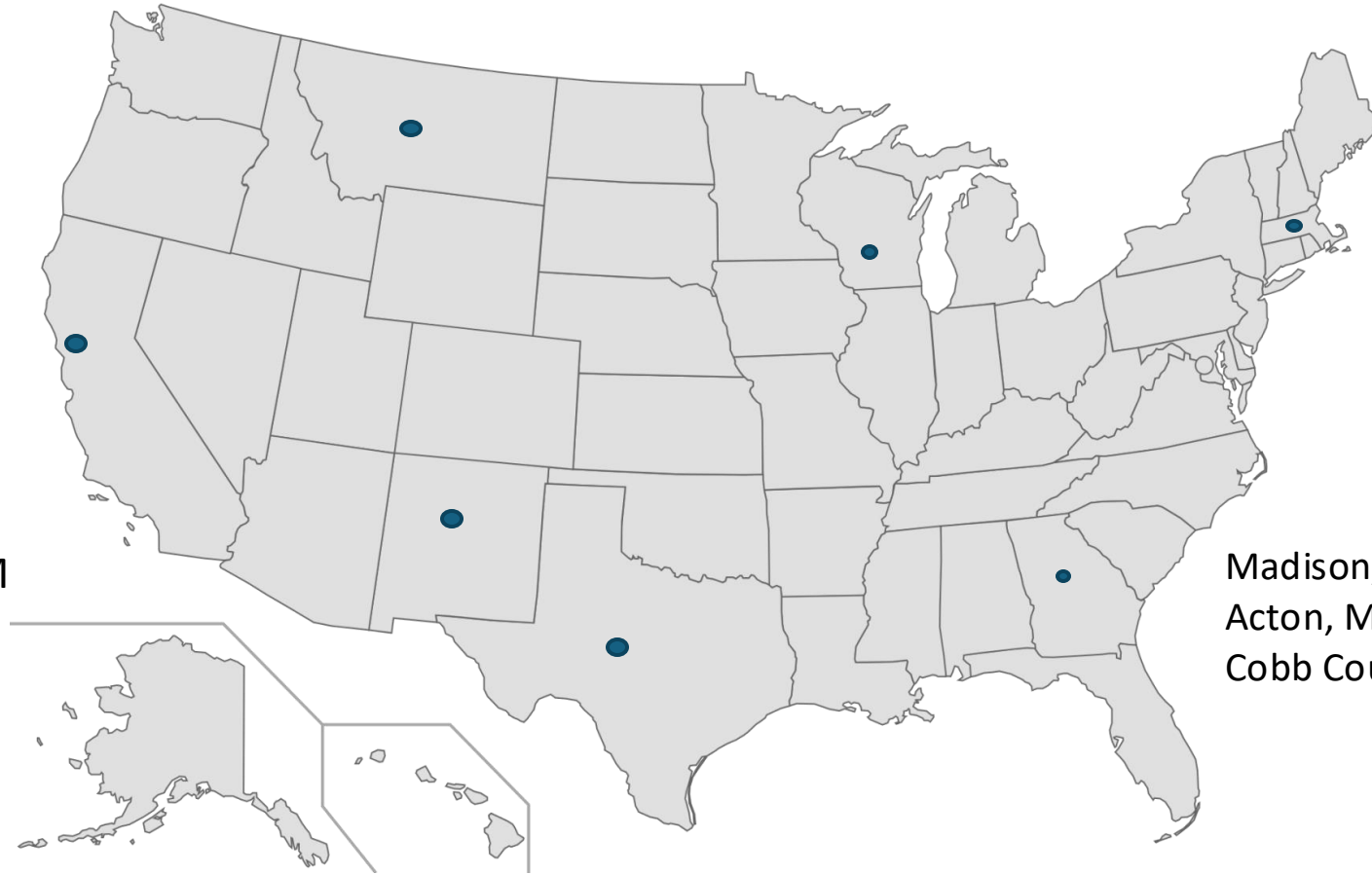
- 3-year project to create a national ordinance development tool that can be tailored to create a customized water demand offset approach
- Partners: Alliance for Water Efficiency, Environmental Law Institute, and River Network
- Worked with 7 partner cities in the US to vet the approach



Partner Communities

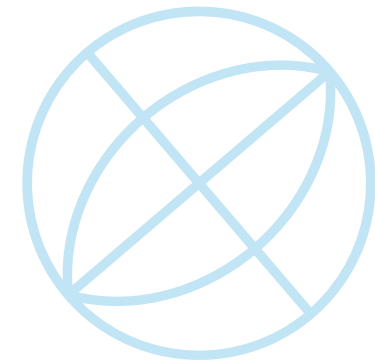


Bozeman, MT
San Francisco, CA
Albuquerque, NM
Austin, TX



Madison, WI
Acton, MA
Cobb County, GA

Launched “Net Blue” Toolkit



PROMOTING AN EFFICIENT & SUSTAINABLE WATER FUTURE

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RESOURCES

NEWS

EVENTS

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ABOUT

Net Blue: Supporting Water-Neutral Growth

Section: [Water and Land Use Planning](#)

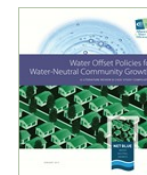


Net Blue is a collaborative initiative of the Alliance for Water Efficiency (AWE), the [Environmental Law Institute](#) (ELI), [and River Network](#) to support sustainable community growth. The project team members developed a model ordinance that communities can tailor and customize to create a water demand offset approach meeting local needs. Communities in different regions throughout the United States were consulted to help develop the model ordinance and the offset components, and to ensure that the program is adaptable to many different political climates, legal frameworks, and environmental challenges.

The Net Blue Project is divided into four parts:

1. Initial Offset Research

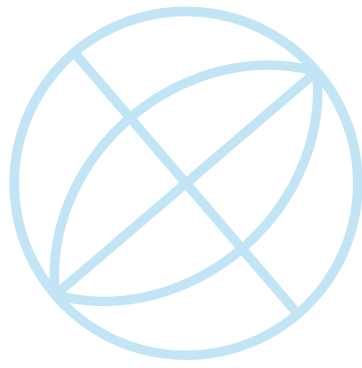
Report entitled, [Water Offset Policies for Water-Neutral Community Growth](#), which reviewed 13 communities throughout the United States that currently have a water demand offset policy or water neutral growth policy in place. These policies require offsetting the projected water demand of new development with water efficiency measures to create a “Net Zero” or neutral impact on overall service area demands and water use. The report found that the most common scenario where this has been applied entails issuing building permits for development that requires offset of the new water use through both on-site water efficiency measures and replacement of inefficient fixtures in pre-existing facilities. In numerous California communities and in cities ranging from Santa Fe, New Mexico to Sharon, Massachusetts, water demand offset programs have been utilized to help enable new construction that likely would have been prohibited due to supply constraints. The report also contains a literature review related to this topic, and information on communities that had a water demand offset policy in the past.



2. Model Ordinance

A template for a model ordinance that requires or incentivizes offsetting the impact of new development's water use via water efficiency measures. ELI led the work on developing the model ordinance. Building on AWE's initial offset research report, ELI did the following: (1) Analyzed the legal language used in existing water offset ordinances; (2) Identified potentially useful supplemental language in other ordinances; (3) Assessed a variety of institutional configurations that may influence the adoption and implementation of a water offset ordinance; and (4) Examined legal opportunities for and constraints on expanding the concept to new places. The final work product resulted in a model ordinance worksheet, a user's guide, and three examples of customized ordinances. Due to the variety of circumstances that occur in a county, municipality, or utility, and the diversity of legal constraints and authorities that can dictate the form of such an ordinance, a “one size fits all” approach does not work in this context. Thus, the model ordinance is in the form of a

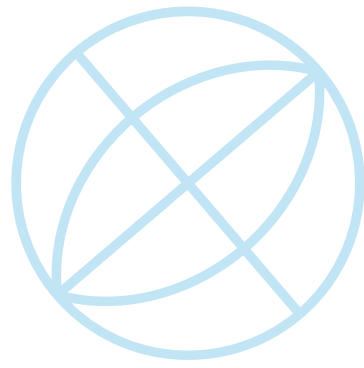




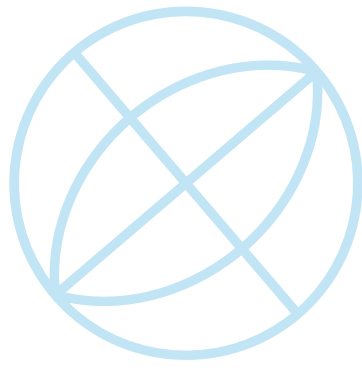
Net Blue Toolkit

1. Model Ordinance Worksheet
2. Model Ordinance User Guide
3. Three Ordinance Examples
4. Offset Methodology Workbook
5. Offset Methodology User Guide
6. Three Offset Examples matching the ordinance examples
7. Outreach Materials

The Model Ordinance Worksheet



- We built an ordinance-development tool, not just a model ordinance, because:
 - Variety of settings: constraints, governing entities, enabling laws
 - We anticipate a variety of users (not just lawyers)
 - It is intended to assist with outreach
- This tool is intended to help the users identify and think about critical issues in their own communities



The Ordinance Sections

Establishing the Legal Basis

Purpose

Findings

Authority

Fashioning the Ordinance

Requirement and Applicability

or Incentive

Definitions

Determining the Offset Amount

Identifying the Offset Activities

Enforcing the Ordinance

Compliance with the Offset

Verification

Monitoring (optional)

Enforcement

Options for the Ordinance

Offset Credit Bank (optional)

In-Lieu Fee (optional)

Administrative Fees (optional)

Modifications (optional)

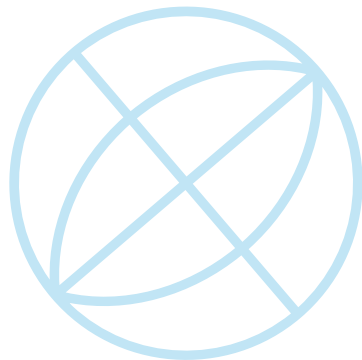
Administering the Ordinance

Appeals

Severability

Consistency with Other Laws

Effective Date



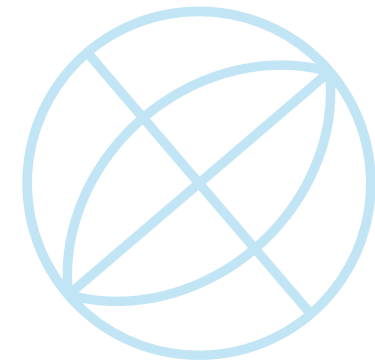
Purpose:

The declaration of an ordinance's purpose primarily helps reviewing courts and officials charged with its administration to interpret the ordinance. A purpose section also can inform (a) elected officials as to why they are adopting the ordinance, and (b) the general public and property owners as to the intent of the ordinance.

Reference ordinances: [Dungeness River Watershed](#); [Monterey County](#); [Morro Bay \(Ch. 13.20\)](#); [San Luis Obispo County \(Title 26\)](#); [Soquel Creek Water District](#)

The purpose of this ordinance is to: **[select all that apply]**

- Protect and promote the public health, safety, and general welfare
- ☐ Ensure that there is enough water at all times to meet the basic needs of the community, including fighting fires
- ☐ Establish and assist in achieving sustainability goals and objectives
- ☐ Manage the demand for more water in **identified city, county, or district**, to ensure that **[select the applicable one]**
 - ☐ demand for water does not exceed available current or future supply
 - ☐ demand for water does not exceed the sustainable yield of the source
 - ☐ demand for water does not disproportionately adversely affect certain water user groups (e.g., low-income communities or the environment)
 - ☐ demands on water infrastructure do not exceed its capacity or impair its function
- ☐ Ensure a reasonable and orderly process and pace of making water **supply / infrastructure capacity** available to new users
- ☐ Minimize the adverse effects on the community of limitations on **identified city, county, or district's** water **supply / infrastructure**
- ☐ Manage **water / water infrastructure** to better satisfy both present and future human needs
- ☐ Manage **water / water infrastructure** to be more resilient to drought



This section clarifies the effect that this ordinance has on other laws, to what extent it is limited by other laws and to what extent it supersedes other laws.

Reference ordinances: [Dungeness River Watershed](#); [Morro Bay \(Ch. 13.20\)](#)

This ordinance shall not affect: **[select one or more]**

- ☐ Rights to surface water and groundwater in existence before the effective date of this ordinance
- ☐ Federal and tribal reserved rights
- ☐ State duty-to-serve laws
- ☐ Other rights, laws, or plans

[Select one or none]

- ☐ To the extent the provisions of this ordinance conflict with any provisions in the existing laws and codes, the provisions of this ordinance shall supersede and control.
- ☐ In the event of conflicts between the provisions of this ordinance and laws and codes, the more restrictive provisions shall prevail.

Effective Date:

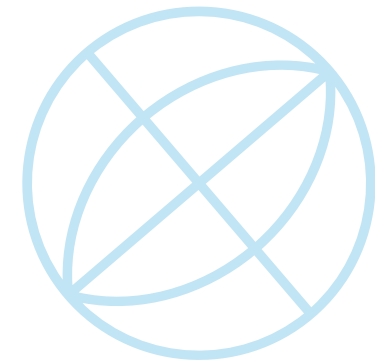
This ordinance shall take effect **[select one]**

- ☐ immediately upon adoption.
- ☐ on date.
- ☐ upon triggering event (e.g., declaration of drought).

Press Me

Press this button only once, and please be patient.

*It will take **up to a minute** to produce the new document (during which time Word will be unresponsive).*



Offset Methodology Workbook

- Designed to help communities evaluate and select off-site offsets for development projects

NET BLUE
WATER
NEUTRAL
GROWTH

[Offset Strategies](#)

[Selected Offsets](#)

[Res-Toilet Stock Estimate](#)

[Rainwater Harvesting](#)

[Stormwater Calculator](#)

Net Blue is a collaborative initiative of the Alliance for Water Efficiency, the Environmental Law Institute, and River Network to support sustainable community growth.

This tool accompanies the model ordinance template and is intended to help communities evaluate and select strategies to offset the projected potable water use of new development or expanded use of existing connections. This workbook is related to offsite offsets and does not include calculations to determine the demand of new development, including onsite demand reduction measures.

This workbook contains the following worksheets:

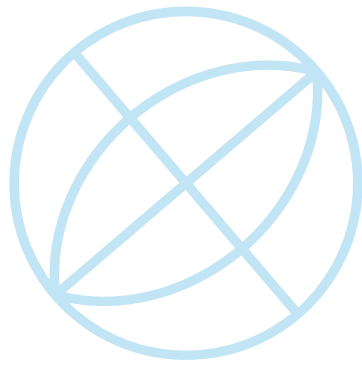
Offset Strategies – The *Offset Strategies* worksheet can be used to evaluate and select a suite of measures to offset the demand of new or expanded water use. It contains example offset strategies related to indoor water fixture and appliance replacements and retrofits. Custom offset strategies can also be entered by the user.

Selected Offsets – This worksheet contains table that can be used to compile selected offset strategies for a new or expanded water use project. It can also be used to tally offset implementation. It is populated based on selections made on the *Offset Strategies Worksheet*.

Res-Toilet Stock Estimate – This worksheet can be used to create a general estimate of the stock of inefficient toilets in a given service area if such an estimate does not already exist. This can be helpful to determine the potential for inefficient toilet replacements which is typically a cost-effective and reliable strategy that provides theoretically permanent water savings.

Rainwater Harvesting – This worksheet contains a calculator for estimating the yield of rainwater harvesting (RWH is assumed to be the rain that falls on building roofs; rain not on roofs is considered stormwater.) It carefully addresses how much of the harvested rainwater is used on-site (and thus reducing on-site potable water demand) and how much rainwater is used off-site to offset potable water demand offsite.

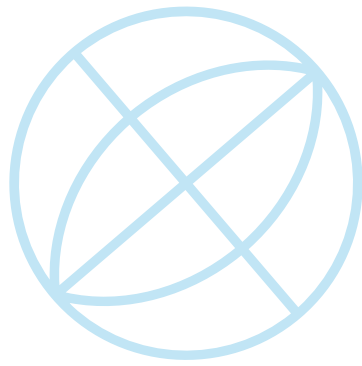
Stormwater Calculator – This worksheet contains information and links to the USEPA Stormwater Calculator. If stormwater is captured and can be distributed off-site use, then this volume of water would qualify as a potable water demand offsite.



Offset Workbook Components

- New demand information
- Offset strategy evaluation worksheet
 - Water conservation strategies
 - Rainwater harvesting calculator
 - Stormwater capture calculator
 - Custom offsets
- Selected offsets worksheet
- Supplemental sheets
 - Inefficient toilet stock estimator
 - Baths and Half Baths Housing Data

Offset Strategy Worksheet



Offset Strategies Worksheet

This worksheet can be used to evaluate and select a suite of measures to offset the demand of new or expanded water use. It contains example offset strategies related to indoor water fixture and appliance replacements and retrofits. Cooling tower retrofits are also included. Additionally, the user can enter custom measures. Example savings estimates are provided for the included offsets, but the user is encouraged to evaluate savings of offset strategies in relation to their service area.

User inputs and selections are required in cells with a white background: User Input green cells do not require any input or selection.

Selecting "Yes" in 'Column J' will include the offset measure in the *Selected Offsets* worksheet as long as 'Column D' is populated with a savings estimate value.

Step 1: Enter Information about New or Expanded Water Use

Project Name/Description	Example Development	
Projected New Potable Water Demand of New or Expanded Use	500,000	Gallons per Year
Does above estimate include adjustment for on-site rainwater harvesting?	No	
Use RWH_Calculator estimate of on-site rainwater harvesting?	No	
Are USEPA Stormwater calculator results used in this model?	No	
Percent of New or Expanded Use that Must be Offset	110%	
Total Offset Requirement for New or Expanded Water Use	550,000	Gallons per Year

Select Gallons, Million Gallons, Acre-Feet, Litres or Megalitres per Year

Step 2: Enter Persons Per Household for the Service Area (used to generate savings for toilet replacements)

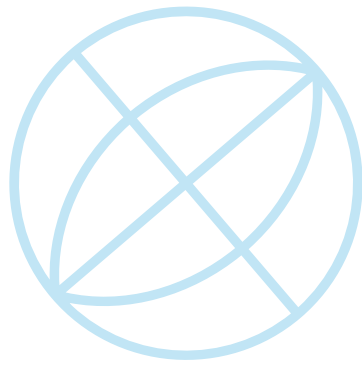
Service Area Average Persons Per Household Single-Family	2.50
Service Area Average Persons Per Household Multifamily	2.00

Step 3: Define and Select Water Demand Offset Strategies

Offset Strategy	Example Savings Estimate Per Replacement/Retrofit in Gallons per Year*	User Specified Savings Estimate Per Replacement/Retrofit in Gallons per Year	Approximate Number of Replacements/Retrofits to Meet Offset if Sole Strategy?	Related Plumbing Code?	Useful Life	Seasonality of Water Savings	Percent of Total Offset Requirement per Replacement/Retrofit	Include in Selected Offset Table?
Single-Family High-Efficiency Toilet Replacements	9,541	9,500	58	Yes	Theoretically Permanent	Even throughout year	2%	Yes
Multifamily High-Efficiency Toilet Replacements	16,472	15,000	37	Yes	Theoretically Permanent	Even throughout year	3%	Yes
Showerhead Replacement Single-Family	2,062		-	Yes	Theoretically Permanent	Even throughout year	-	No
Showerhead Replacement Multifamily	1,898		-	Yes	Theoretically Permanent	Even throughout year	-	No
Single-Family Clothes Washer Replacement	7,043	7,000	79	Yes	Theoretically Permanent	Even throughout year	1%	Yes
Multifamily Clothes Washer Replacement	25,310	25,000	22	Yes	Theoretically Permanent	Even throughout year	5%	Yes
CII Urinal Replacements or Retrofits	6,206	6,000	92	Yes	Theoretically Permanent	Even throughout year	1%	Yes
CII High-Efficiency Toilet Replacements	13,020	13,000	42	Yes	Theoretically Permanent	Even throughout year	2%	Yes
Laundromat Clothes Washer Replacements	31,435		-	Yes	Theoretically Permanent	Even throughout year	-	No
Commercial Dishwasher Replacements	57,757		-	No	20 Years	Even throughout year	-	No

Intro
Offset Strategies
Selected_Offsets
Res_Toilet_Stock
RWH_Calculator
Stormwater_Calculator
RWH 10 ...

Selected Offset Table





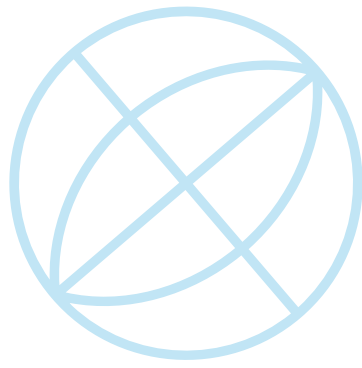
NET BLUE
WATER
NEUTRAL
GROWTH

Update Selected
Offsets Table

This worksheet contains an auto-populating table based on user selections made in the *Offset Strategies* worksheet. The table can be populated using the "Update Selected Offsets Table" button to the right of the Net Blue logo. The user manually enters the implementation value (e.g., number of toilet replacements) in 'Column D.' The 'Percent of Total Offset Requirement' column is automatically calculated after the user specifies implementation. If changes are made in the *Offset Strategies* worksheet, the user must update the selected offsets table using the "Update Selected Offsets Table" button.

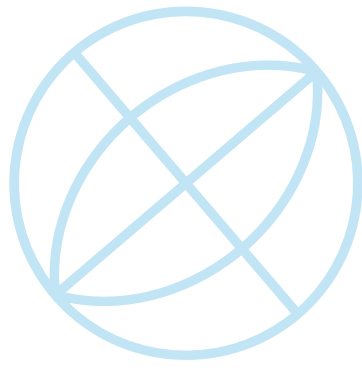
Offset Strategy	Savings Per Unit in Gallons per Year	Number to be Implemented	Percent of Total Offset Requirement
Single-Family High-Efficiency Toilet Replacements	9,500	15	13%
Multifamily High-Efficiency Toilet Replacements	15,000	10	13%
Single-Family Clothes Washer Replacement	7,000	10	6%
Multifamily Clothes Washer Replacement	25,000	5	11%
CII Urinal Replacements or Retrofits	6,000	10	5%
CII High-Efficiency Toilet Replacements	13,000	10	12%
Pre-Rinse Spray Valve Replacements	28,000	10	25%
Rainwater Harvesting (Off-site)	155,722	1	14%
Total			100%

Intro | Offset_Strategies | **Selected_Offsets** | Res_Toilet_Stock | RWH_Calculator | Stormwater_Calculator | RWH 10 ...



Example: Parker County Council

- County government with anticipated surface water shortage
- Offsets required of all site plan approval requests
- Compliance proof required 90 days after application approval
- Monitoring required to validate savings
- Offset amount: 100% (1:1)
- No in-lieu fee option



Example Offset

- New Beer Brewery
- Projected new annual water demand: 1.75 million gallons (6,624 cubic meters/year)
- Required Offset amount: 100% or 1:1
- Offset strategy: On-site rainwater harvesting project to flush toilets and single-family toilet replacements
- Offset amount:
 - 100% of toilet flushing with rainwater;
 - 330,150 excess gallons per year (1,250 cubic meters/year) to be used as off-site credit;
 - 129 single family toilet replacements

Outreach Materials

- Fact Sheet
- Frequently Asked Questions
- All outreach items online
- Requests for toolkit online

www.net-blue.org



NET BLUE Frequently Asked Questions

A collaborative initiative of the Alliance for Water Efficiency, the Environmental Law Institute, and River Network
www.net-blue.org

1. What is Net Blue?
"Net Blue" is an approach to keep water use at the same or reduced levels as a community continues to develop. This concept of "water neutral" growth is achieved by integrating land use planning and water management to require or incentivize water use offsets (e.g., water efficiency retrofits) that will equal or exceed the additional demand of new development or redevelopment (residential and commercial). By choosing to adopt an ordinance or incentive that requires or encourages this approach, communities can stretch their water supplies, decrease the need for new infrastructure, and help ensure more water for fish, wildlife and recreation as well as provide other benefits. The Net Blue team has created a model ordinance toolkit to assist communities interested in tailoring this approach for their specific needs and context at www.net-blue.org.



2. Why might my community be interested in adopting Net Blue?
There are many benefits to Net Blue. Communities with high growth and stressed water supplies are finding that water scarcity is affecting their economic development potential. Water demand offset policies thus offer communities a meaningful and sustainable way to enable population and economic growth without increasing overall water demands in a utility service area. Making sure that additional development does not further increase demand for highly treated water will reduce the need to pump and treat additional water and the need for new withdrawals from local water sources, and thus reduce expenses for the community. Another benefit of Net Blue is to defer new and costly infrastructure investment. Water efficiency is often the least expensive form of new supply, especially when compared to developing new reservoirs, diversions or other infrastructure. Even in communities that are not immediately water-stressed, reducing water use helps to build in additional resilience for the future by stretching existing supplies. Net Blue also can benefit recreation and fish and wildlife by keeping more water flowing in streams and rivers.

3. How can Net Blue benefit local streams and rivers and other freshwater resources?
In many places, rivers, streams, groundwater and other waterbodies are suffering from depletion when the amount of water withdrawn is greater than the amount returned. When this happens, fish, wildlife, recreation and downstream communities all suffer. Using a Net Blue approach can help to prevent further depletion of our rivers, streams and aquifers by reducing the current amount of water withdrawn or preventing the need for increased withdrawals. Although this approach may not automatically translate into more water for our rivers, it is one important tool in the toolbox to reduce demand for highly treated water, taking some pressure off of our waterways and groundwater resources.

Thank you for your attention

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