Greenbuild

Waterproofing LA

How Cities and Buildings Adapt to Water Scarcity

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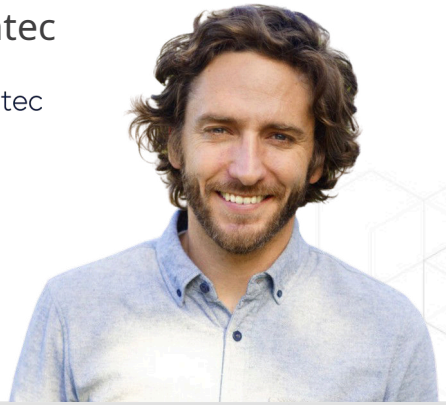
This session examines how Los Angeles is addressing a worsening water scarcity crisis by advancing integrated water management and decentralized reuse solutions. You will learn practical strategies for applying water reuse at multiple scales and hear about policies, technologies, and opportunities that can enhance water resilience and support sustainable growth in your projects.

Liz Crosson, JD

Metropolitan Water District of Southern California

Eric Hough, PMP

Epic Cleantec



Sunny Wang, PE

City of Santa Monica

Learning Objectives

1. **Multi-scale water resilience strategies** – Understand how water stress can be addressed through coordinated efforts at the regional, city, and building levels, including policies, infrastructure investments, and water management approaches.

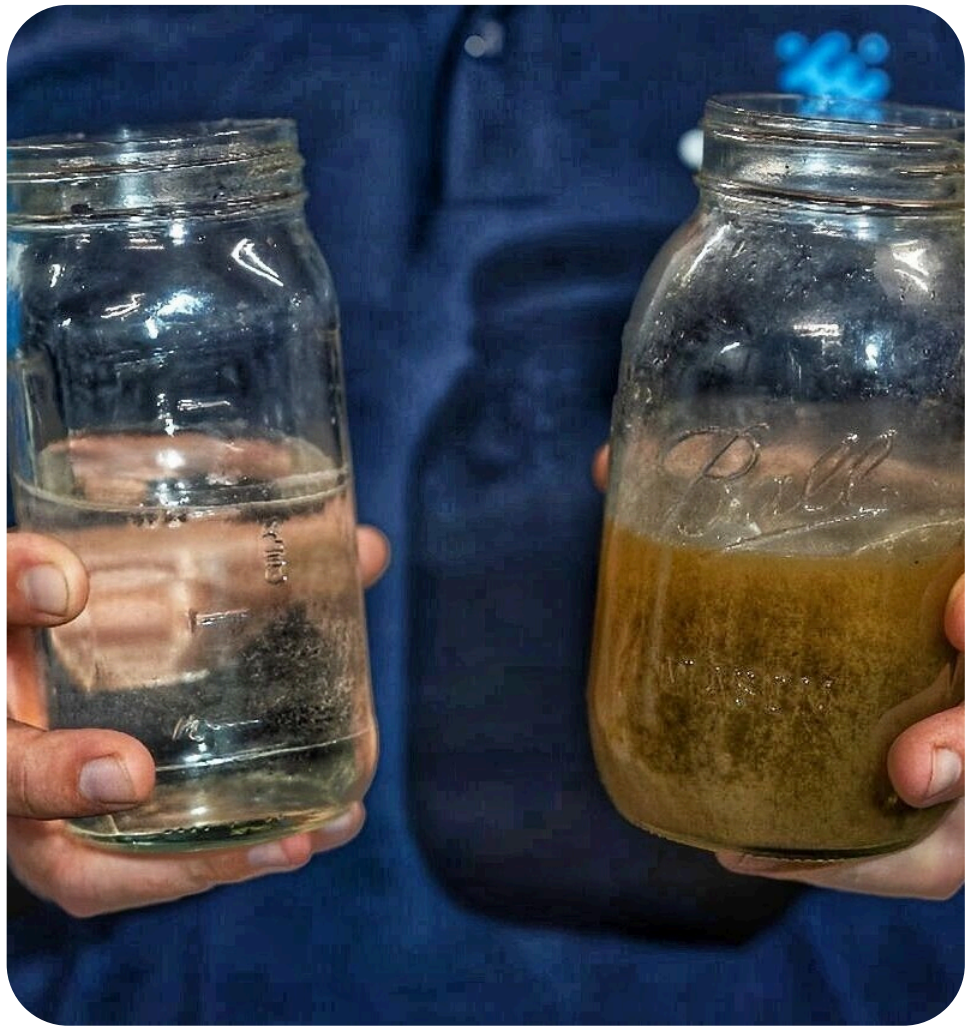
2. **The role of decentralized water reuse** – Learn how onsite water recycling systems can reduce reliance on imported water, enhance sustainability, and provide critical resilience in post-disaster rebuilding efforts.

3. **Policy and incentive landscape** – Learn about California's water policies, incentives, and funding, and see how those frameworks are extending to new markets like Texas, Florida, and Hawaii.

4. **Real-world application** – Gain insights from successful onsite water reuse projects located in Los Angeles, learning system design, operational benefits, and key lessons that can be applied to future developments.

Photo by Paul Nicklen


40 Million
population served
33%
Southern California
$1.4T
industry served
Photo by Jonas Kakó



UNTAPPED POTENTIAL OF WATER RECYCLING

While climate change intensifies stresses on both water and energy systems, it's important to recognize the tremendous amount of untapped potential we have in addressing this problem:

- Israel recycles nearly 90% of its wastewater
- Less than 0.3% of national water use comes from non-municipal reuse sources
- In USA, only 10% of wastewater is recycled

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Waterproofing LA

A Regional Perspective

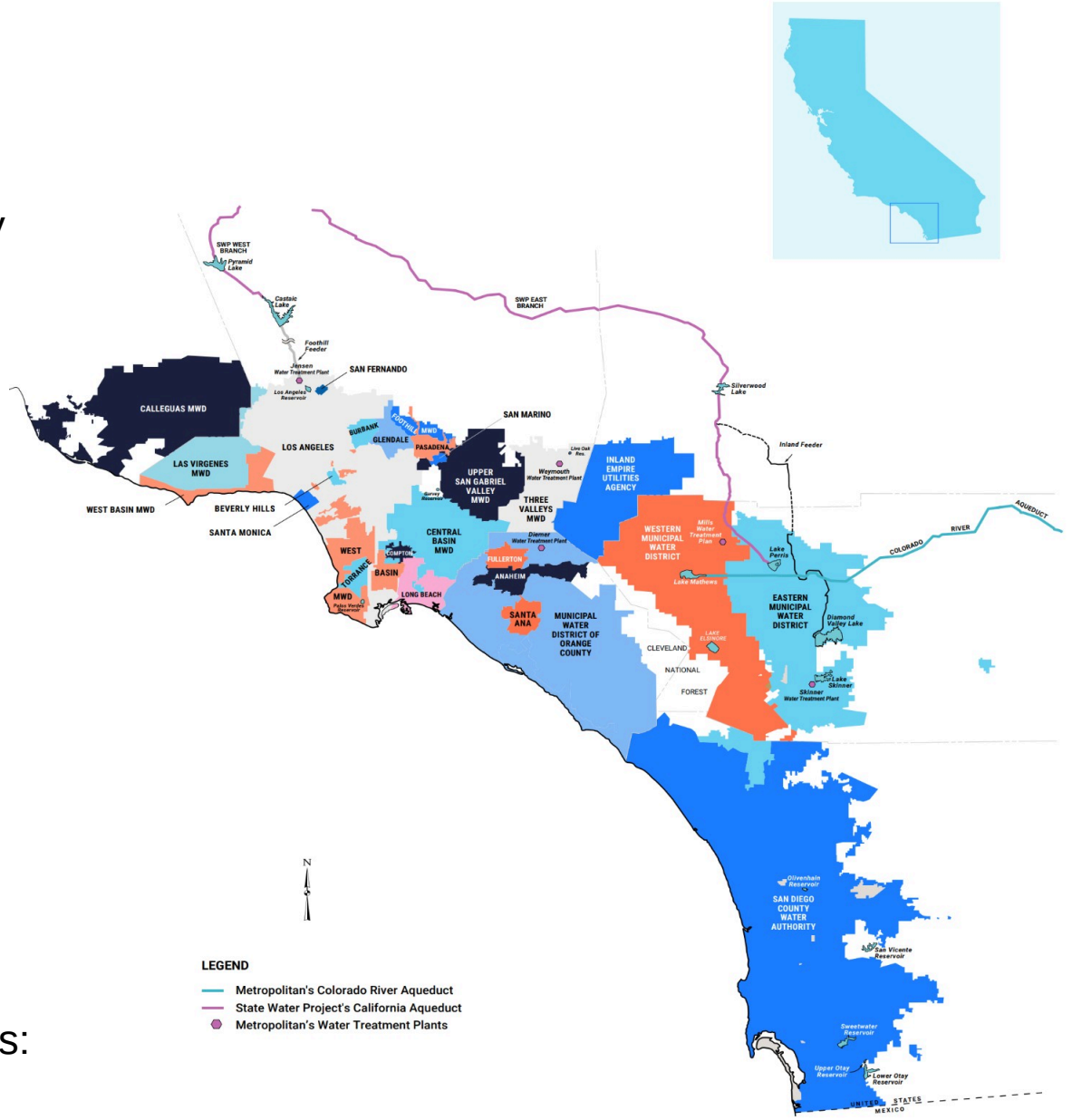
Liz Crosson, JD
Chief Sustainability, Resilience,
& Innovation Officer

Metropolitan Water District
of Southern California

About Metropolitan Water District

Fast Facts.

- Nation's largest wholesale water provider
- Service area of nearly 19 million people, 5,200 square miles across parts of six counties
- 26 member agencies, 38-member board of directors
- Supports $1.6 trillion regional economy
- Regional rebate program: socalwatersmart.com
- Conservation website for water-saving tips & gardening resources: bewaterwise.com



Metropolitan Structure

One Board | 26 agencies

13 Cities/Retail agencies

13 Wholesale agencies with over 100 retail agencies

Value of Regional Cooperation

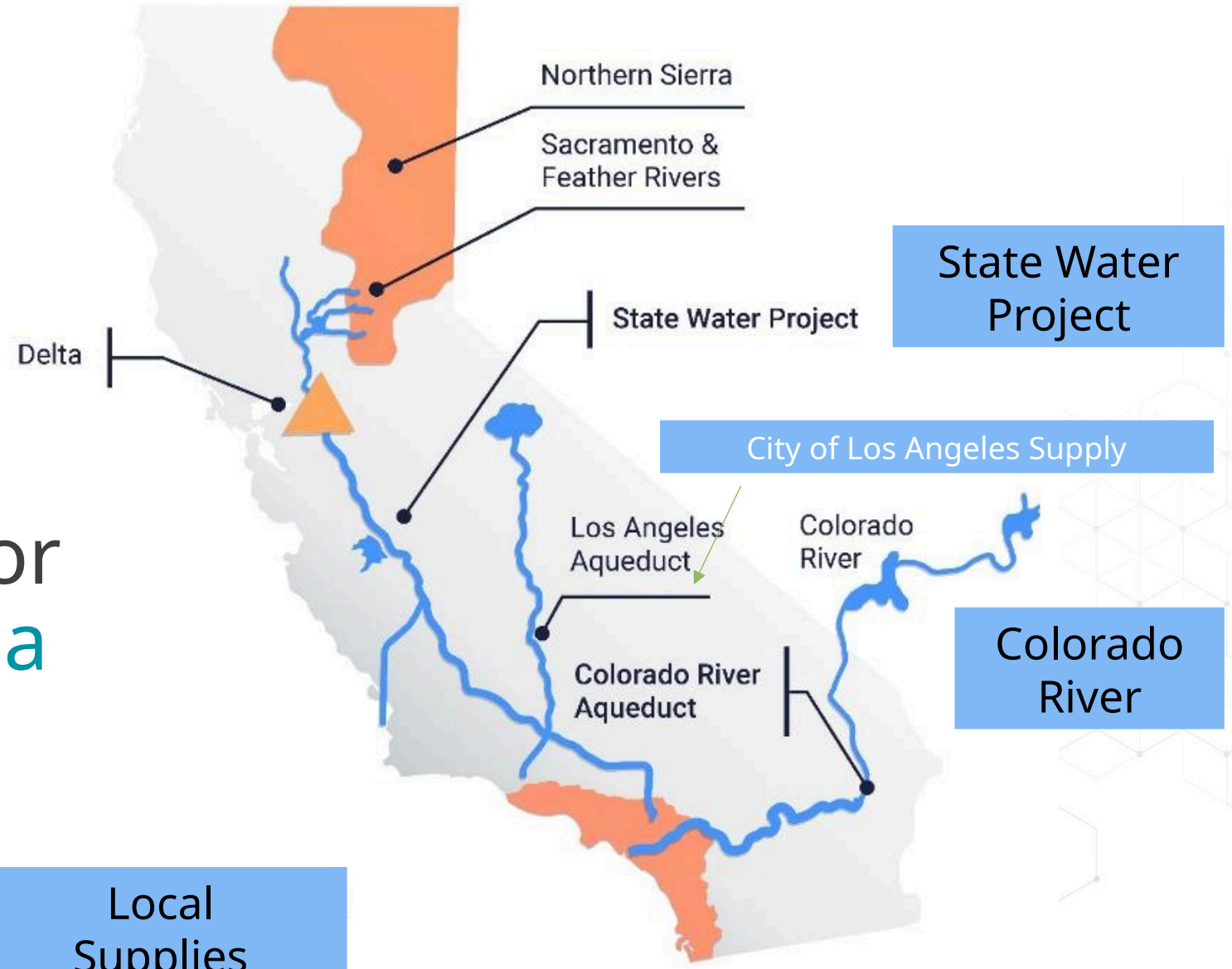
Supply Reliability

Sound Investments

Stewardship & Sustainability

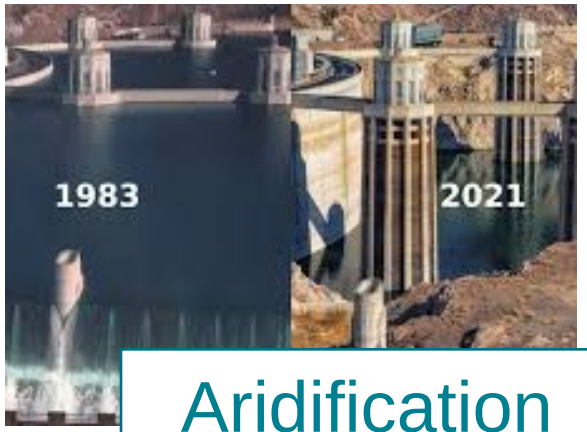
Regional Benefits

Securing Water for Southern California



Experienced Climate Impacts Led to Climate Adaptation Focus

Drought



Aridification

Flooding

Extreme Heat

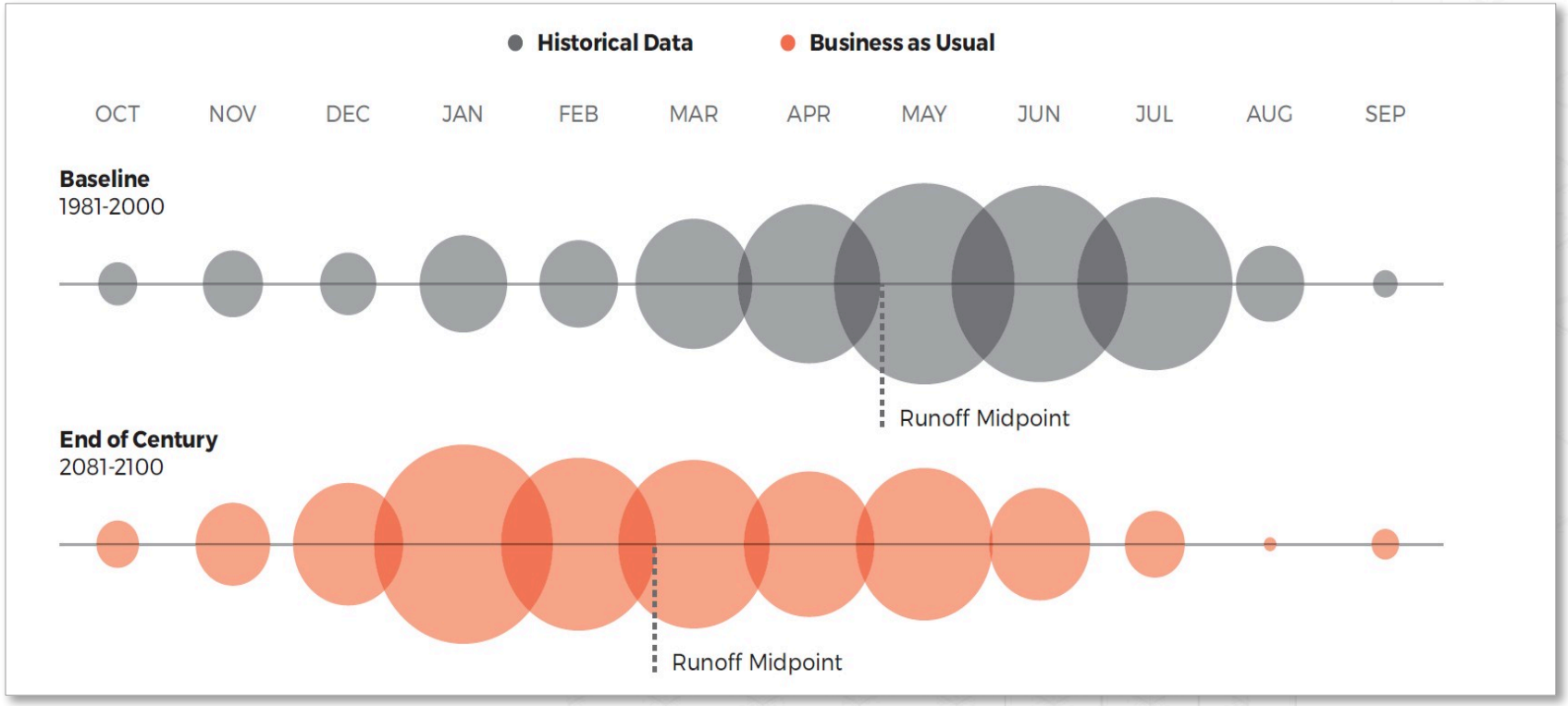
Sea Level Rise

Fire

Challenges of Climate Change

How Climate Change Impacts Water Resource Management

- Less snow/more fire
- Big atmospheric river events get bigger
- Flooding increases dramatically
- Dry years (probably) get drier

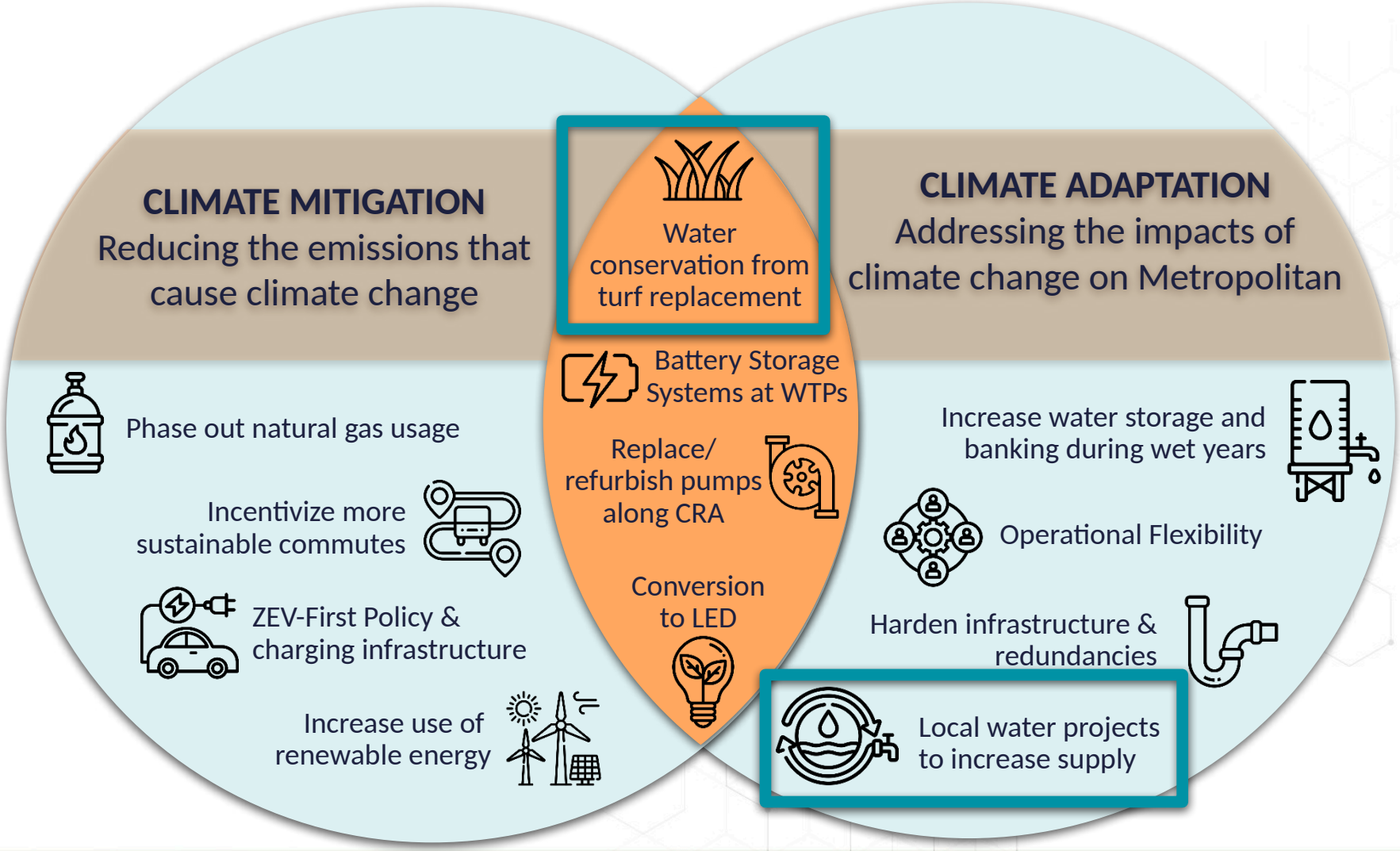


Reich, K.D., et al. (2018). Climate Change in the Sierra Nevada: California's Water Future. UCLA.

Increasing Climate Resilience

Climate Strategy

Metropolitan builds climate resilience by continuing to reduce its GHG emissions and by investing to manage more frequent & severe climate hazards.



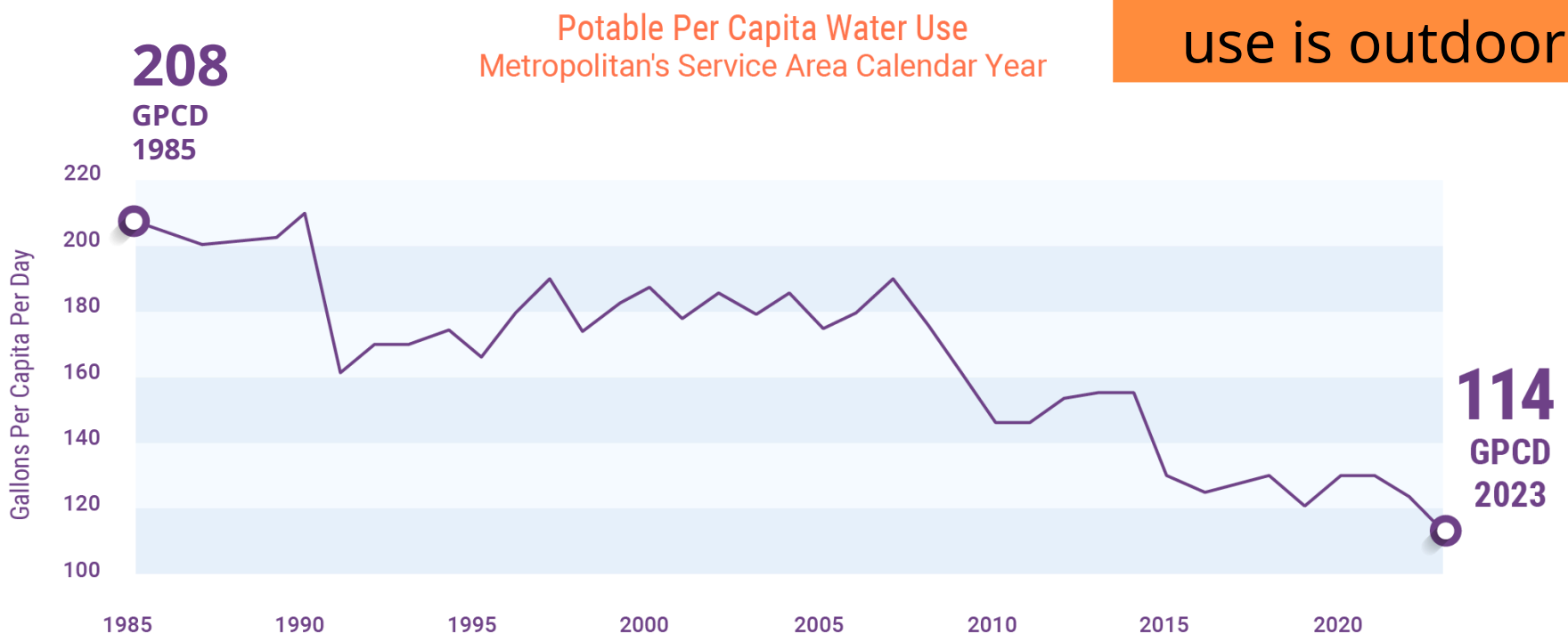
Potable Per Capita Water Use

Metropolitan's Service Area Calendar Year

Lowest Observed Per Capita Water Use

The lowest per capita water use recorded.

Up to 70% of household water use is outdoors

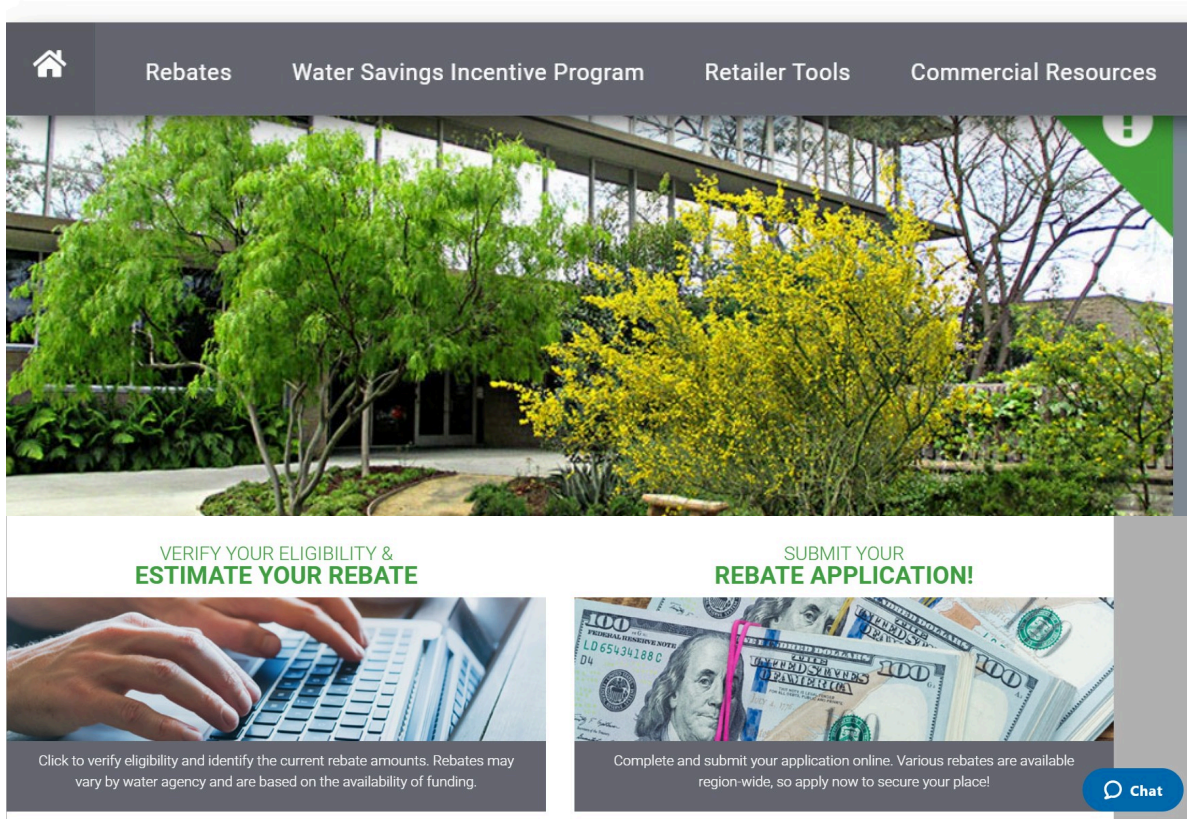


Regional Rebate Program

All rebates and incentives available to all in Metropolitan service area

SoCal Water$mart | Commercial Rebates

bewaterwise.com



Turf Replacement Program

Multi-pronged approach to maximize water use & promote conservation
Incentives available for residential, commercial and public agency customers

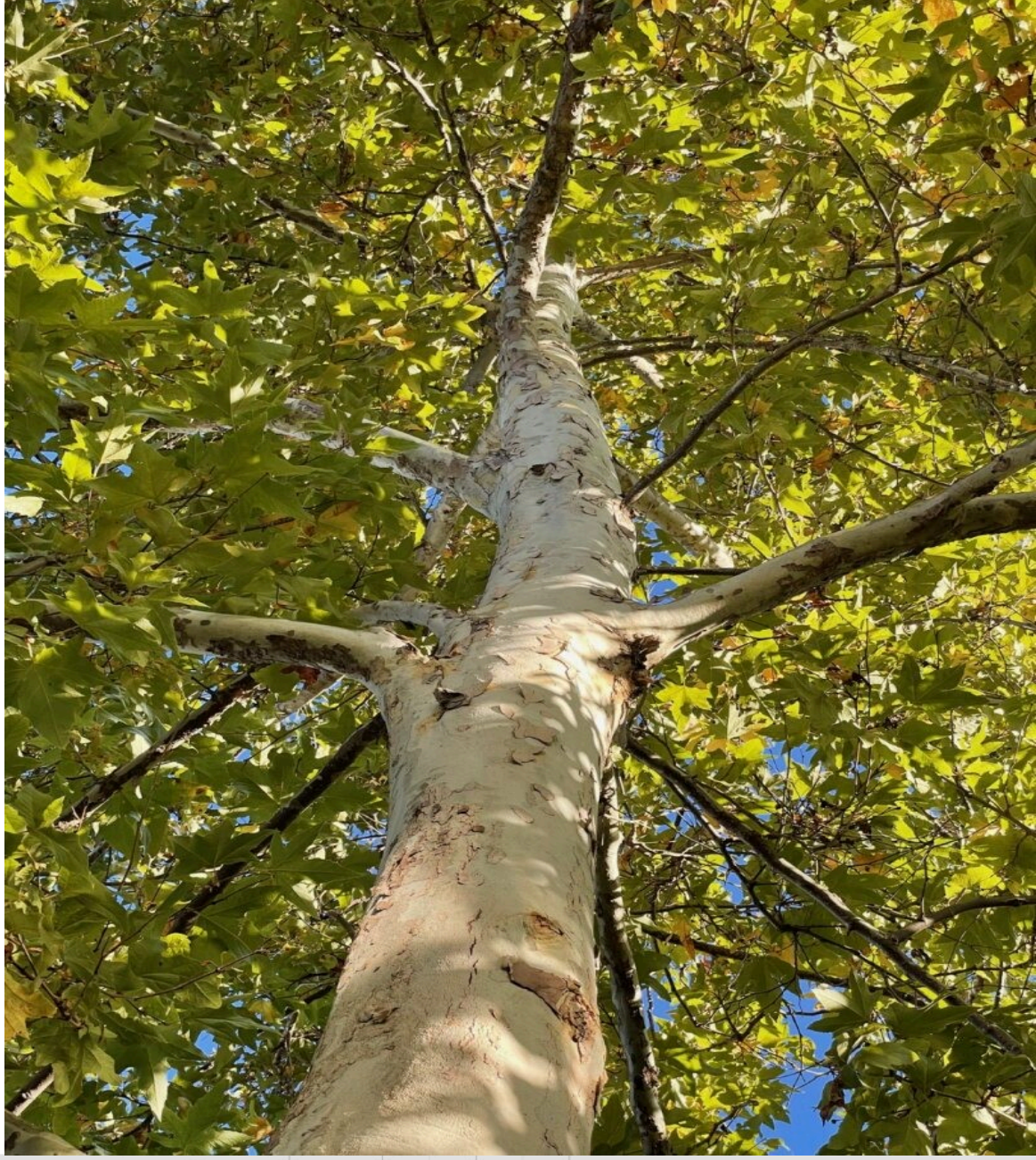
More than 200 million square feet of grass removed

8 billion gallons saved per year

New Tree Rebate

- Part of the Turf Replacement Program process
- Trees must be planted in project area
- $100 rebate per tree planted (max. 5)
  - 15-gallon minimum size
  - Edible fruit trees allowed in residential projects
- One new tree = three plants
- Receipts required

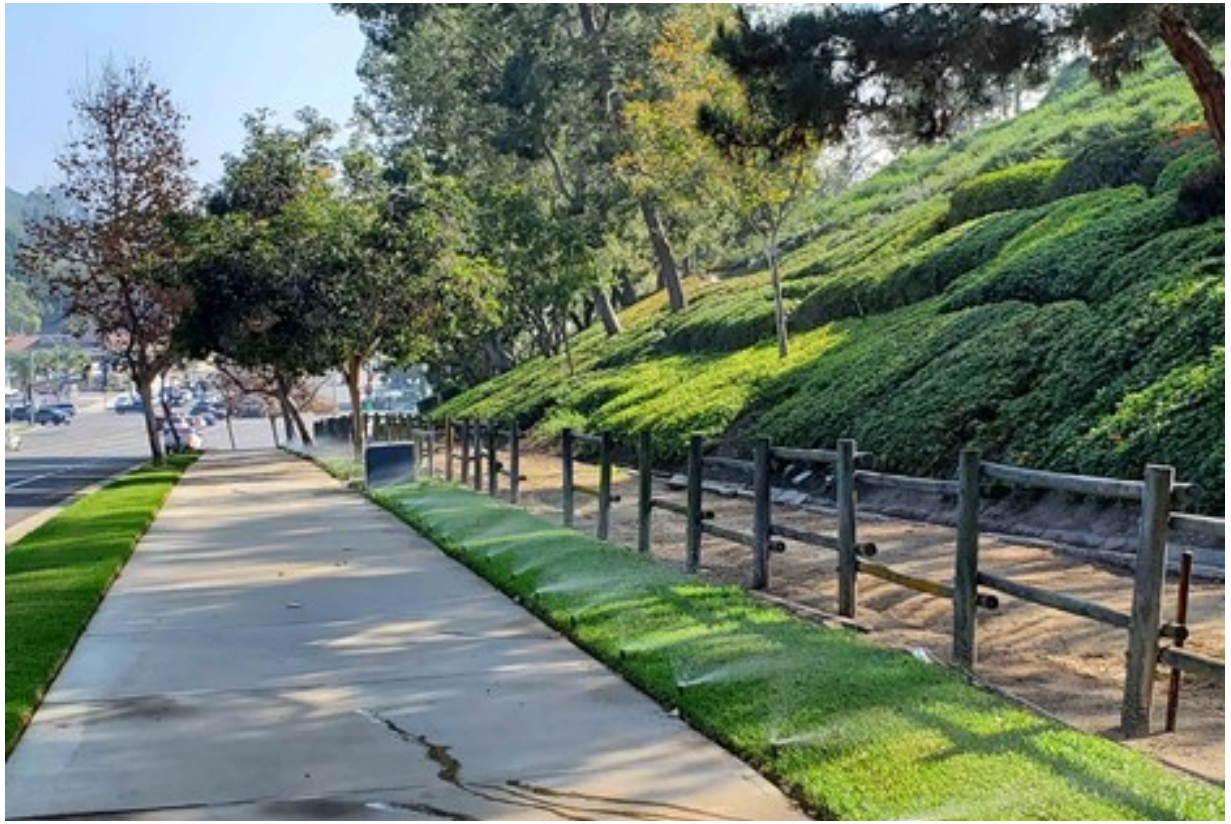
bewaterwise.com/trees

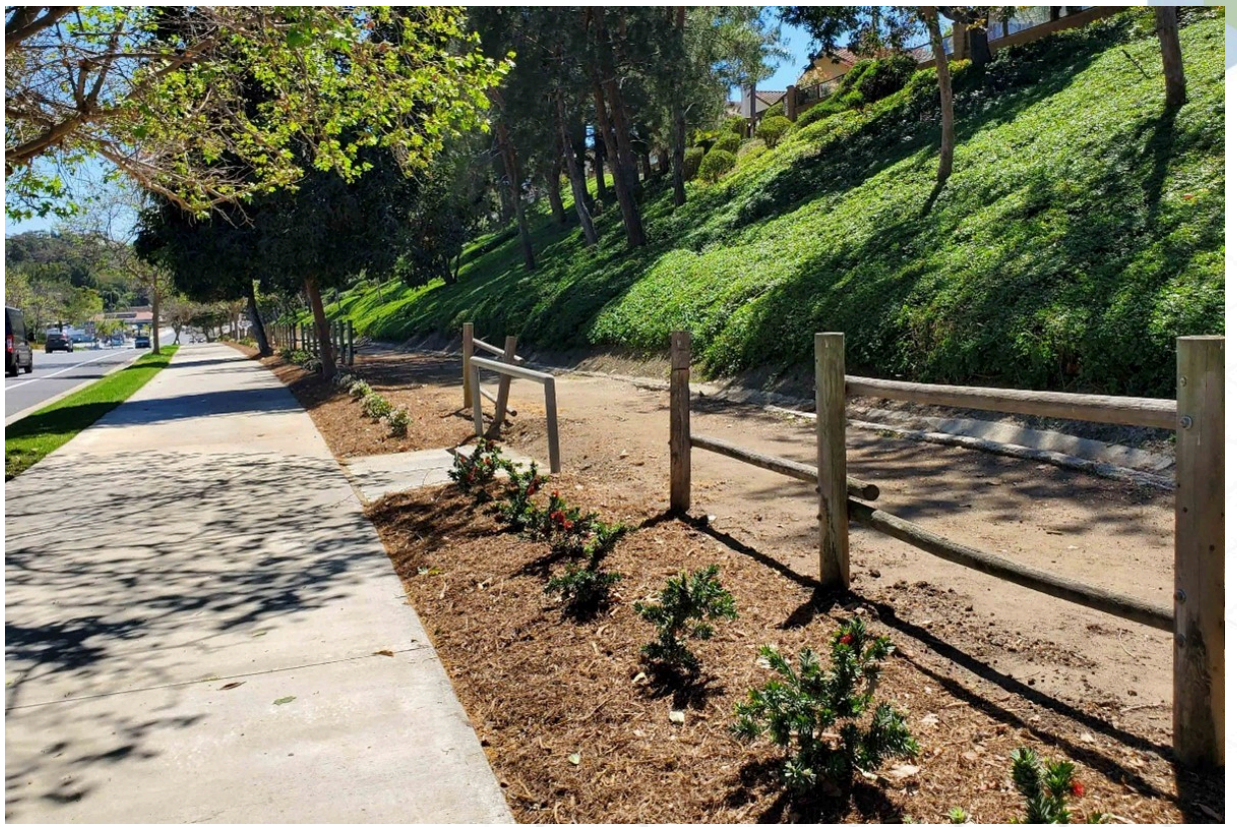


California Assembly Bill 1572

Prohibits the use of potable water to irrigate nonfunctional turf on commercial, industrial, municipal and institutional properties.

Jan 1, 2027: Public sites
Jan 1, 2028: Commercial sites





Non-Functional Turf Removal

Before & After

Non-functional turf is grass that is not regularly used for recreational purposes or for civic or community events

Increasing Water Reliability & Resilience

Diversify and protect water supply sources & watersheds

Increase & maintain storage to adapt to supply variability

Expand local water supply to increase resilience to climate and earthquakes

Adapting to Water Supply Variability

Record-high Storage

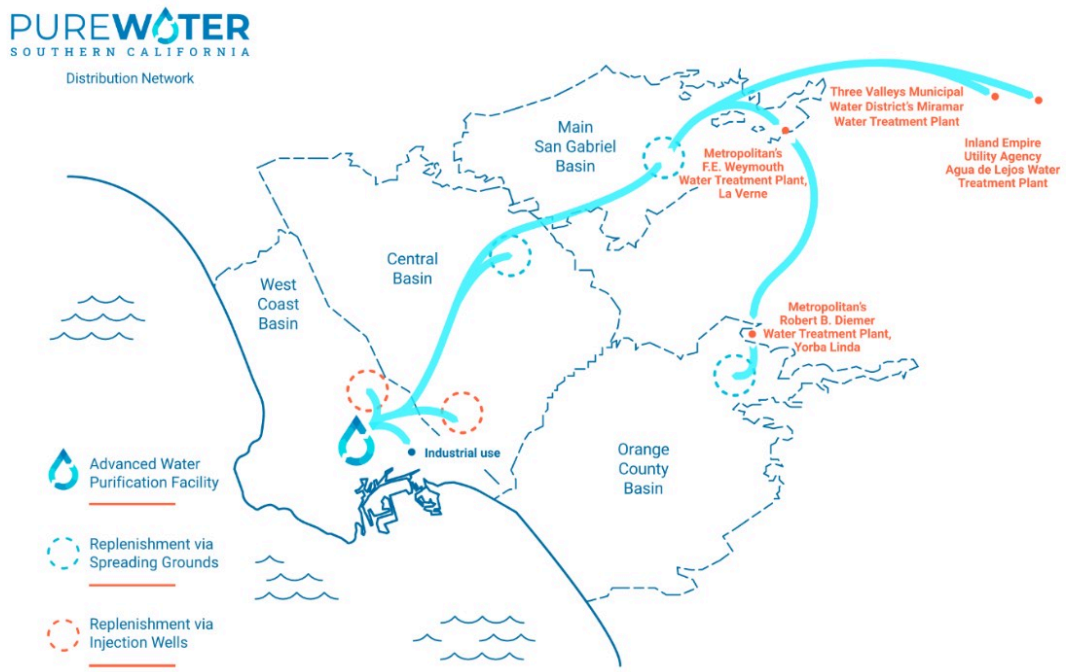
- Metropolitan is starting 2025 with a record 3.8 million acre-feet of water in storage.
- Metropolitan's Diamond Valley Lake, the Southland's largest reservoir, is at 97% capacity.
- The district is well-positioned to meet our water demands this year.
- Evaluating new storage opportunities.

Diamond Valley Lake, January 2025

Expanding Local Supply

Pure Water Southern California

Pure Water Southern California, a regional recycling water program, would purify and reuse cleaned wastewater that currently flows to the ocean



- Metropolitan is partnering with Los Angeles County Sanitation Districts
- A full-scale project can produce up to 150 million gallons daily, enough for 500,000 homes
- Nearly $100 million in grant and partnership funds are secured

Pure Water Southern California

Pure Water Southern California Program Benefits

- Water Supply Benefits
- Environmental Benefits
- Economic Benefits

Sustainability Centered Approach

Metropolitan's commitment to environmental stewardship includes:

- A comprehensive planning process called Climate Adaption Master Plan for Water (CAMP4W), which provides a roadmap for future capital investments and our business model
- Using renewable energy and zero-emission vehicles
- Investing in ecosystem protection and restoration programs
- Promoting sustainable landscape with California Friendly® and native plants

Climate Adaptation Master Plan for Water

CAMP4W is a comprehensive effort to create the roadmap that will guide our future capital investments and business model.

Waterproofing LA

A City Perspective

Sunny Wang, PE
Water Resources Manager
City of Santa Monica

Green and Sustainable Water Management Strategies

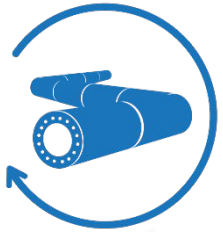
City of Santa Monica – Water Resources Division

93,000+ residents
2,700+ commercial customers

Drinking water and fire protection

Groundwater (local)

Surface water (MWD)



Sewer collection and recycled water

9 million gallons

of high-quality drinking water daily

14 million gallons

of wastewater captured and delivered for treatment each day

Up to 1.5 million gallons

per day of recycled water

4 water storage reservoirs

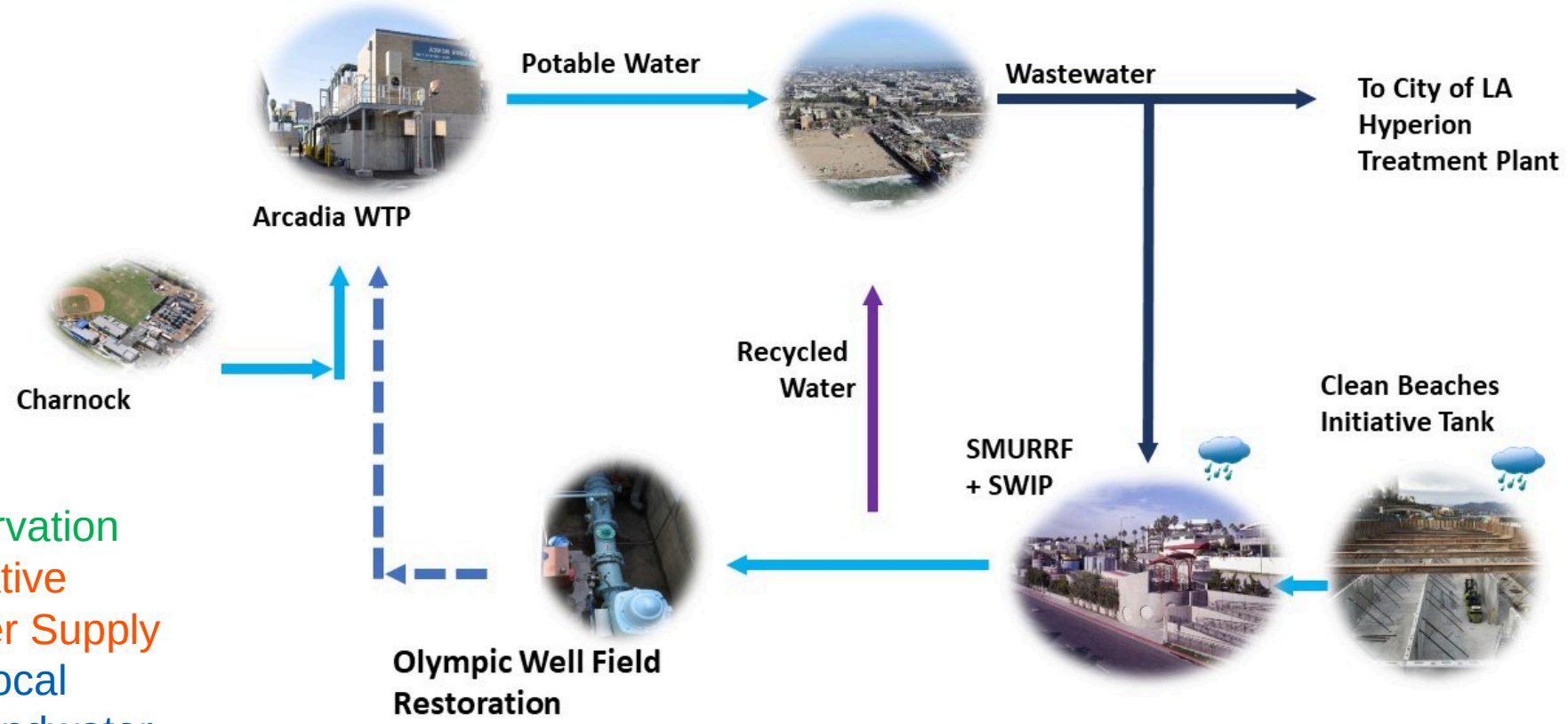
totaling 40 million gallons

Goals of the City's Sustainable Water Master Plan

- Long term cost benefits for ratepayers
- Diverse, sustainable, & drought resilient water supply to support a sustainable community
- Reduction of energy footprint to support carbon reduction goals for the City

Greenbuild

One Water Approach to Maximize Local Water Resources



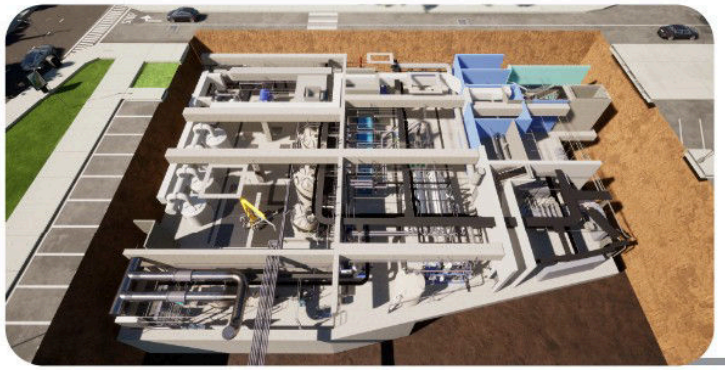
Component 1 – Conservation
Component 2 – Alternative Water Supply
Component 3 – New Local Groundwater

Sustainable Water Infrastructure Project (SWIP)

- **Element 1**
  - 1.5 MG Clean Beaches Tank
  - SMURRF Upgrades
- **Element 2**
  - New 1 MGD SWIP AWTF
  - 30/70 Blend of Stormwater and Wastewater
- **Element 3**
  - New 1.5 MG Stormwater capture tank

SWIP Advanced Water Treatment Facility

0 FT.



-20 FT.

-45 FT.

1

2

Ground Level

At the surface, the Civic Center Parking Lot is restored to serve the surrounding community.

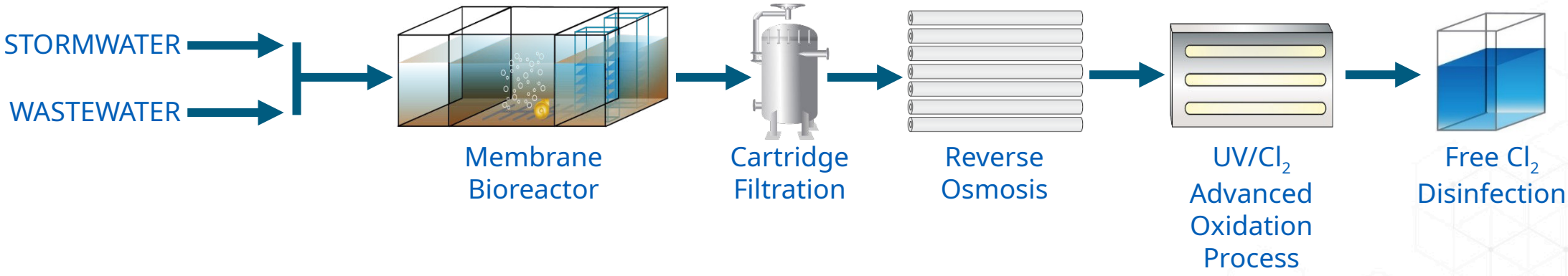
Subsurface Operating Floor (Level One)

The first subsurface level of the SWIP AWTF houses the headwork screens, odor control facility, bulk chemical storage, Membrane Bioreactor, cartridge filters, RO system, UV AOP system, control room, and electrical room.

Subsurface Operating Floor (Level Two)

The SWIP AWTF's treatment process basins are located on subsurface level 2, including the biological basins, chlorine disinfection tank, and waste return and evacuation sump.

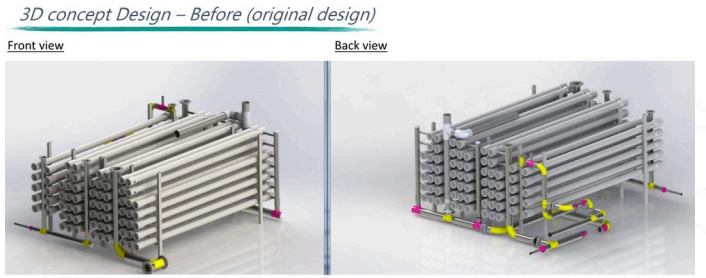
First of Its Kind Advanced Water Treatment Facility in CA

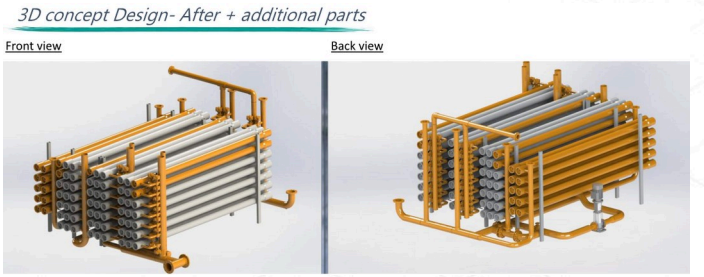


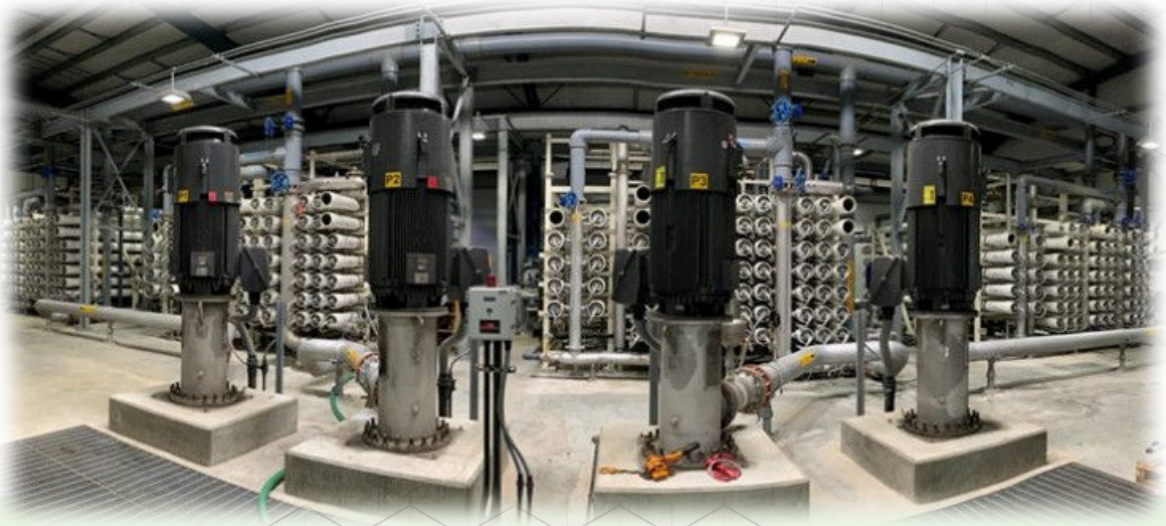
- First stormwater harvesting project in CA to meet potable reuse standards and directly inject the treated stormwater into the groundwater aquifer.
- First membrane bioreactor and cartridge filter system in CA to be granted pathogen removal credits for potable reuse applications.
- First below-grade AWTF designed to treat raw wastewater and stormwater to groundwater recharge standards all within one facility.

First Municipal Flow Reversal RO in the World

- Increase Efficiency to ≥90%
- Maximize use of existing assets
- Same energy consumption as traditional RO
- Operation flexibility
- Low risk profile
- Lower operation and life-cycle cost while increasing production







City Hall East – Living Building Challenge

Net Zero Building Systems

Net Zero Energy Strategy: Renewable System

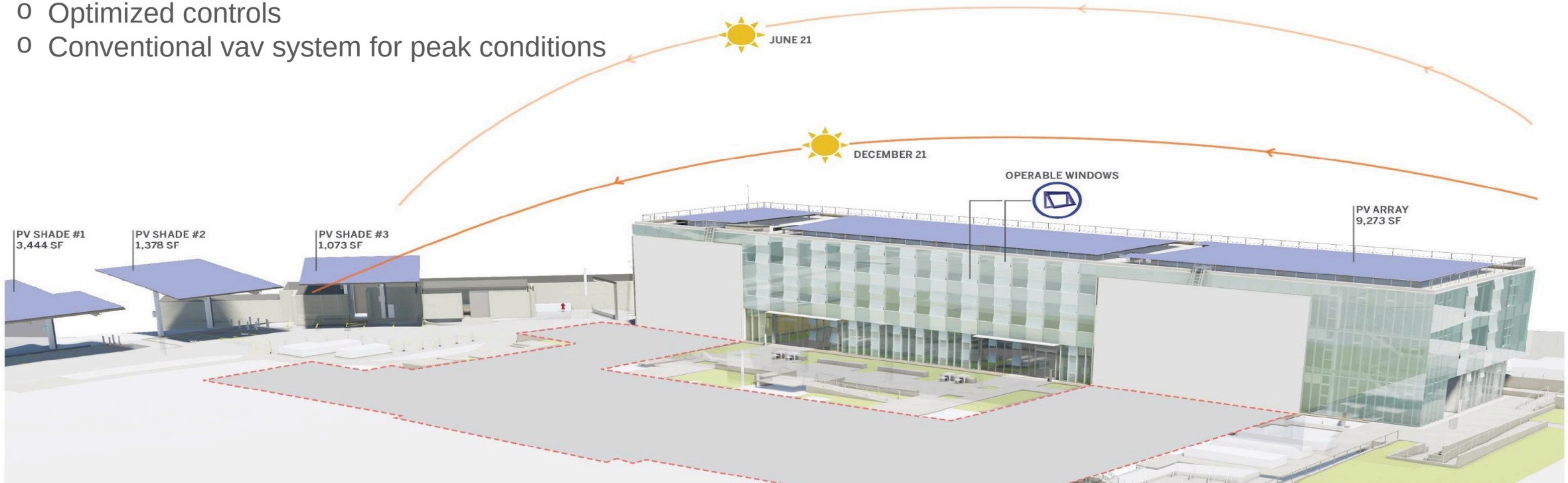
- Annual energy generated = energy demand
- Solar photovoltaic power generation (approx. 200 kw array)

Net Zero Energy Strategy: Active Systems

- Radiant heating and cooling embedded in the slab
- Air source heat pumps (no combustion) to heat hot water for both domestic water and radiant slab use
- Optimized controls
- Conventional vav system for peak conditions

Net Zero Energy Strategy: Passive Systems

- High performance glazing to minimize solar gain
- Weather station for optimized controls with automated natural ventilation
- Day lighting controls
- Expanded comfort criteria (70 to 78°f)
- Localized control with desk fans and operable windows



Onsite Treatment Solution For Living Building

Net Zero Water Strategy: Rain to Potable

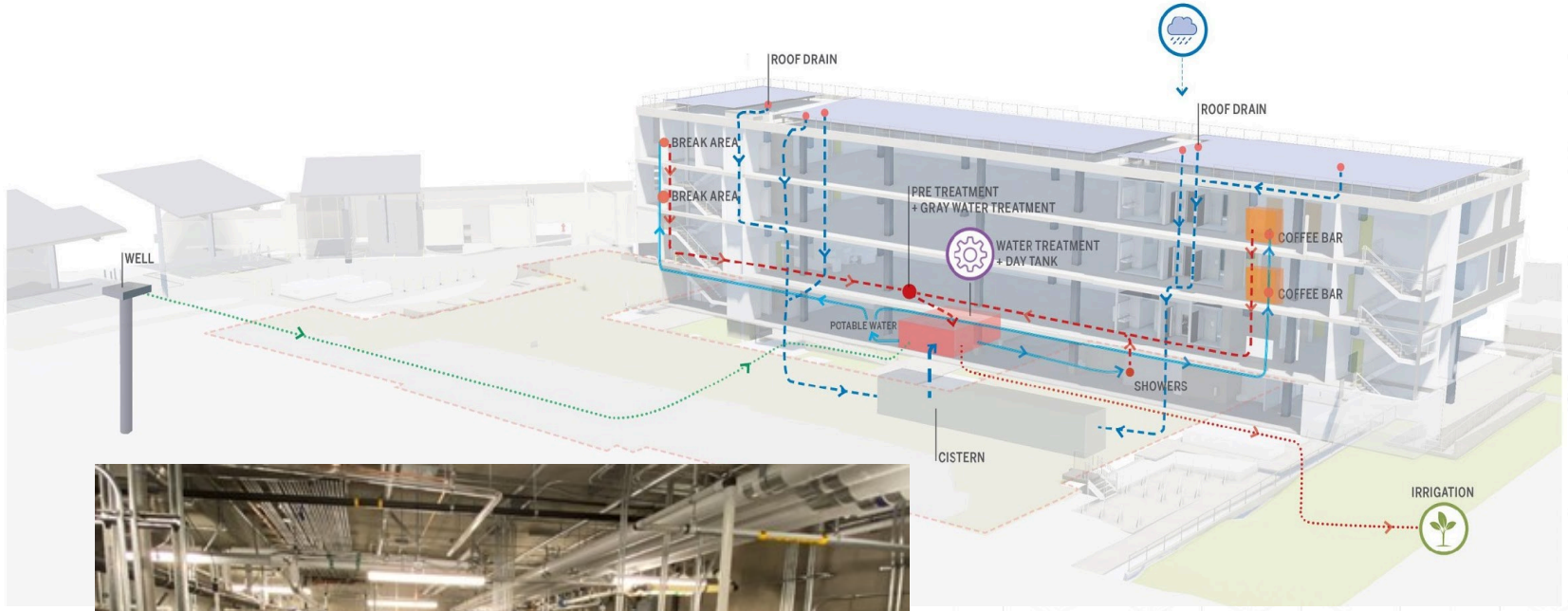
- Rainwater to be collected from NSF certified roof and PV canopy
- Food grade roofing and components will be used throughout
- Surface water treatment rule

Greywater Recycling

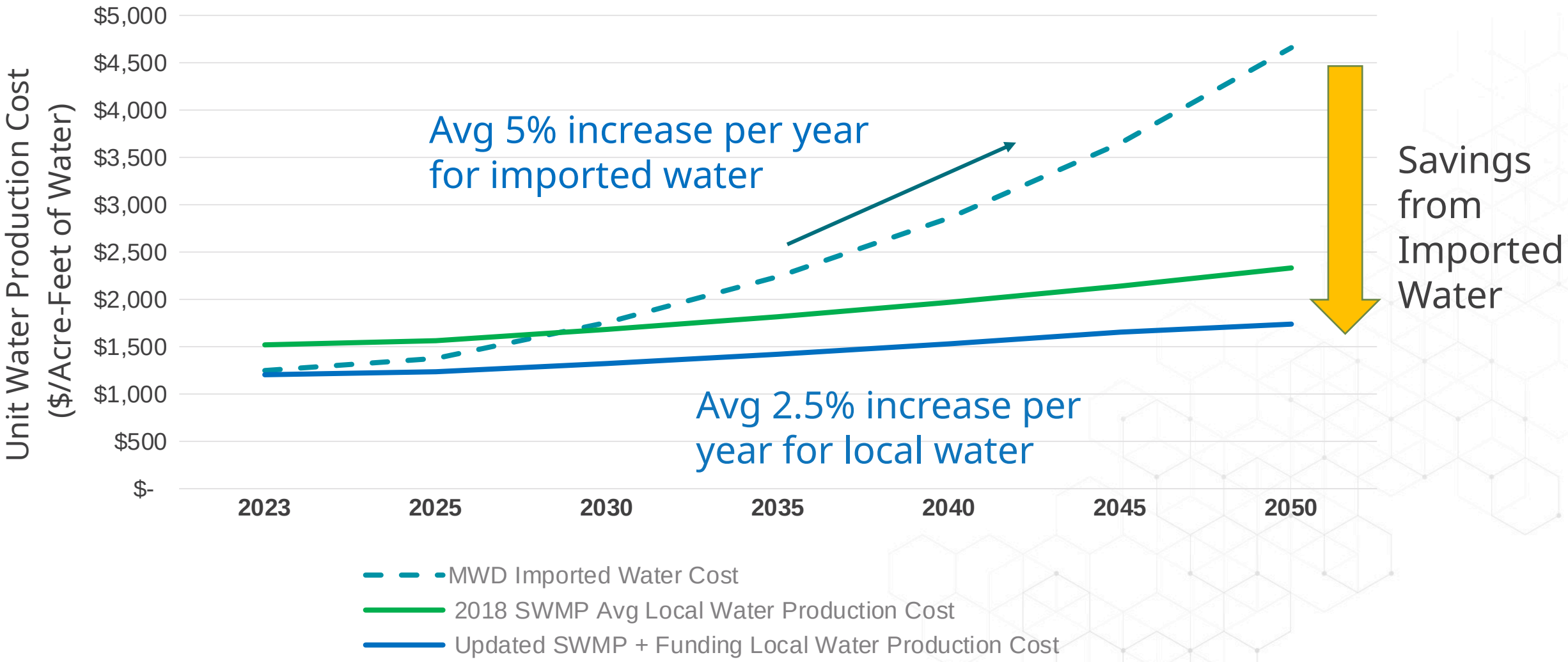
- Greywater from showers and lavatories to be captured and treated to NSF 350 standards
- Meet irrigation demand onsite

Net Zero Water Strategy: Drought Conditions

- In times of drought, the system will be topped up with well water



Cost Benefit to Our Customers



Regulations and Policies to Promote Green and Sustainable Development

Overview of Regulations

- ✓ Water Recycling
  - ✓ On-site reuse
  - ✓ Non-potable Reuse
  - ✓ Indirect Potable Reuse
  - Direct Potable Reuse Coming Soon …
- Stormwater Harvesting and Rainwater Capture
  - Best Management Practice
  - LA County Dept of Public Health Guidelines
  - Formal regulations still in development

Local Regulations & Policies Driving Sustainable Development

- Water Neutrality
- Recycled Water Ordinance
- Urban Runoff Capture
- Water and Wastewater Capacity Studies
- Water and Wastewater Fees/Rates
    - Capital facility fee = one time buy-in cost
    - Ongoing collection & treatment cost

Waterproofing LA

A Building Scale Perspective

Eric Hough, PMP
Chief Commercial Officer
Epic Cleantec


WALDORF ASTORIA

CASE STUDY

WALDORF ASTORIA BEVERLY HILLS

LOCATION
Beverly Hills, CA

SIZE
308,992 sq ft

HOTEL KEYS
170 rooms

CERTIFICATION
LEED Gold

COLLECTION SOURCES
Greywater (showers, laundry)

SYSTEM CAPACITY
1,200 gal/day

END USES
Irrigation

ANNUAL REUSE
438,000 gal/yr

WALDORF ASTORIA BEVERLY HILLS

DESIGN CONSIDERATIONS

After challenges with the previously installed water reuse system, the hotel's owner asked Epic Cleantec to remove the old system and replace it with the OneWater™ system.

This process did not come without challenges:

- Retrofit
- Space constraints
- Challenges with sewer discharge
- Dual plumbing
- Regulatory requirements & basis of design


B2


2
0
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COR

WALDORF ASTORIA BEVERLY HILLS

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FUTURE PROOFING FOR POLICY

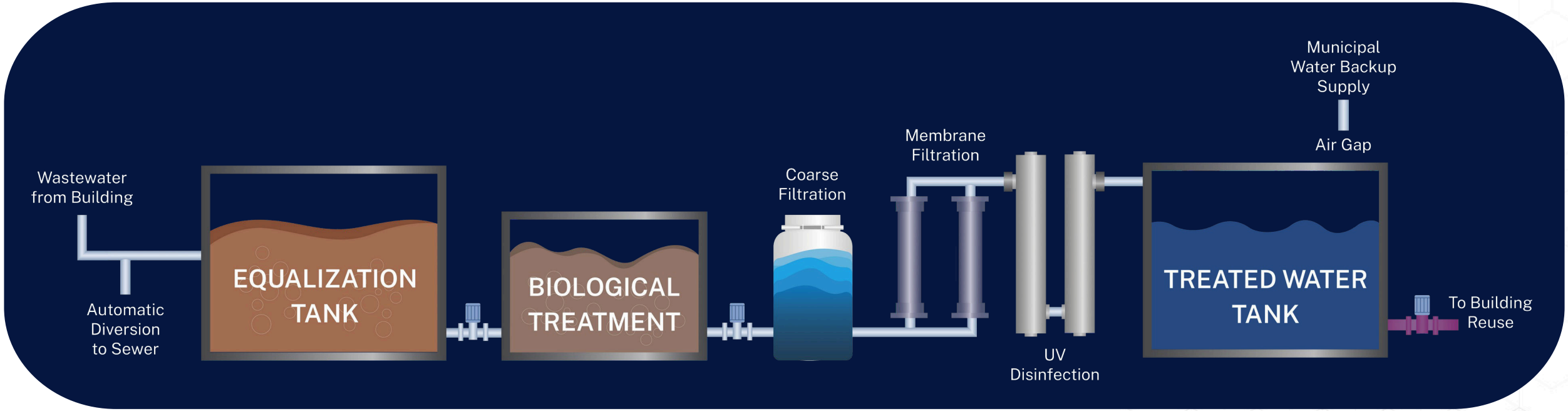
SB966 is changing what future (and past) reuse systems will look like

- Moves to risk-based framework with pathogen removals or log reductions
- Prescriptive requirements for treatment train:
  - Biological treatment for greywater and blackwater
  - MBR – UV – Chlorine treatment
- Requires advanced controls for continued process verification and off-spec response to ensure water quality
- Codifies use of non-potable water for laundry and decorative fountains
- **Legacy systems are required to comply**

Untreated alternative water source	Use type	Enteric virus	Giardia	Cryptosporidium
Onsite wastewater	Indoor	8.0	6.5	5.5
Onsite wastewater	Outdoor	7.5	5.5	5.0
Stormwater	Indoor	7.0	5.5	4.5
Stormwater	Outdoor	6.5	4.5	4.0
Greywater	Indoor	6.0	4.5	3.5
Greywater	Outdoor	5.5	3.5	3.0

WALDORF ASTORIA BEVERLY HILLS

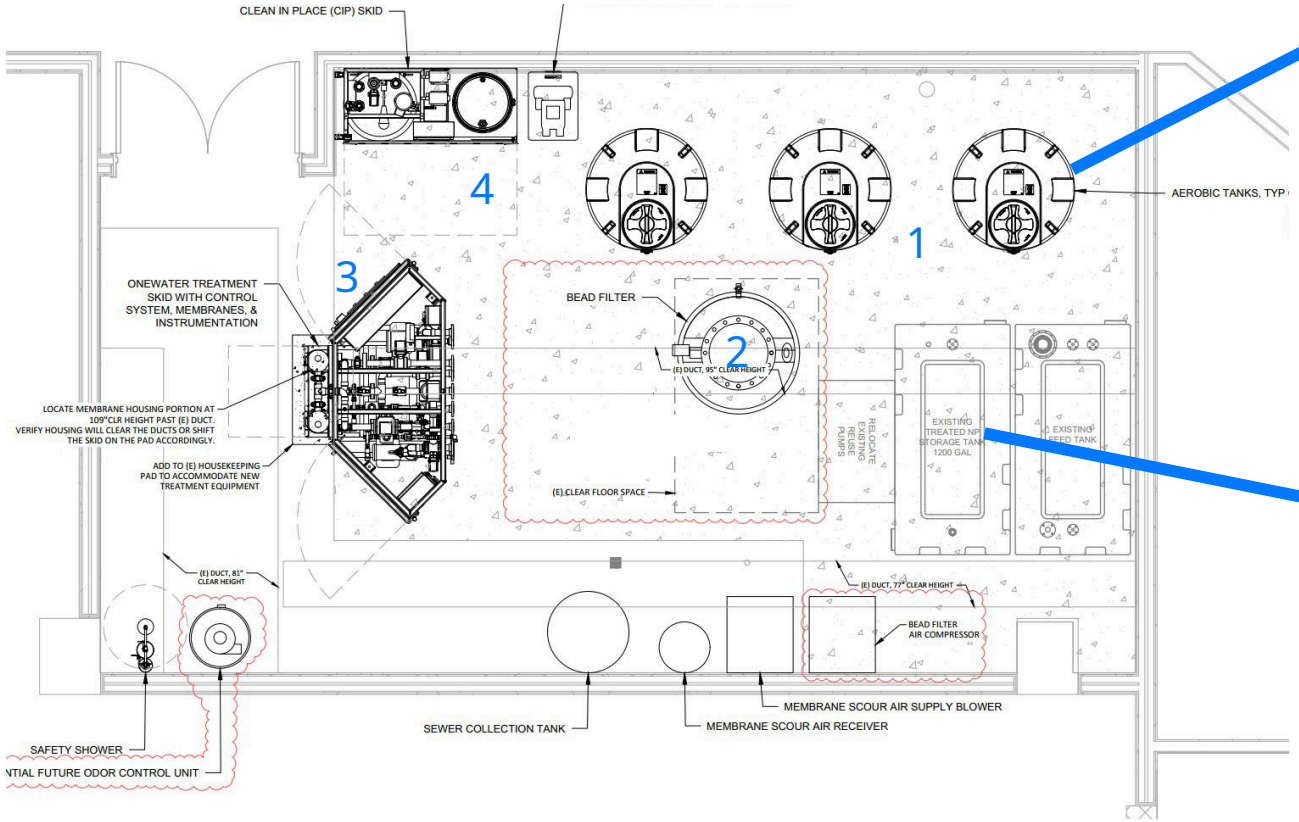
Greywater Treatment Process



1. EQUALIZATION
2. BIOLOGICAL TREATMENT
3. COARSE FILTRATION
4. ULTRAFILTRATION MEMBRANES
5. ULTRAVIOLET DISINFECTION
6. TREATED WATER STORAGE TANK

WALDORF ASTORIA BEVERLY HILLS

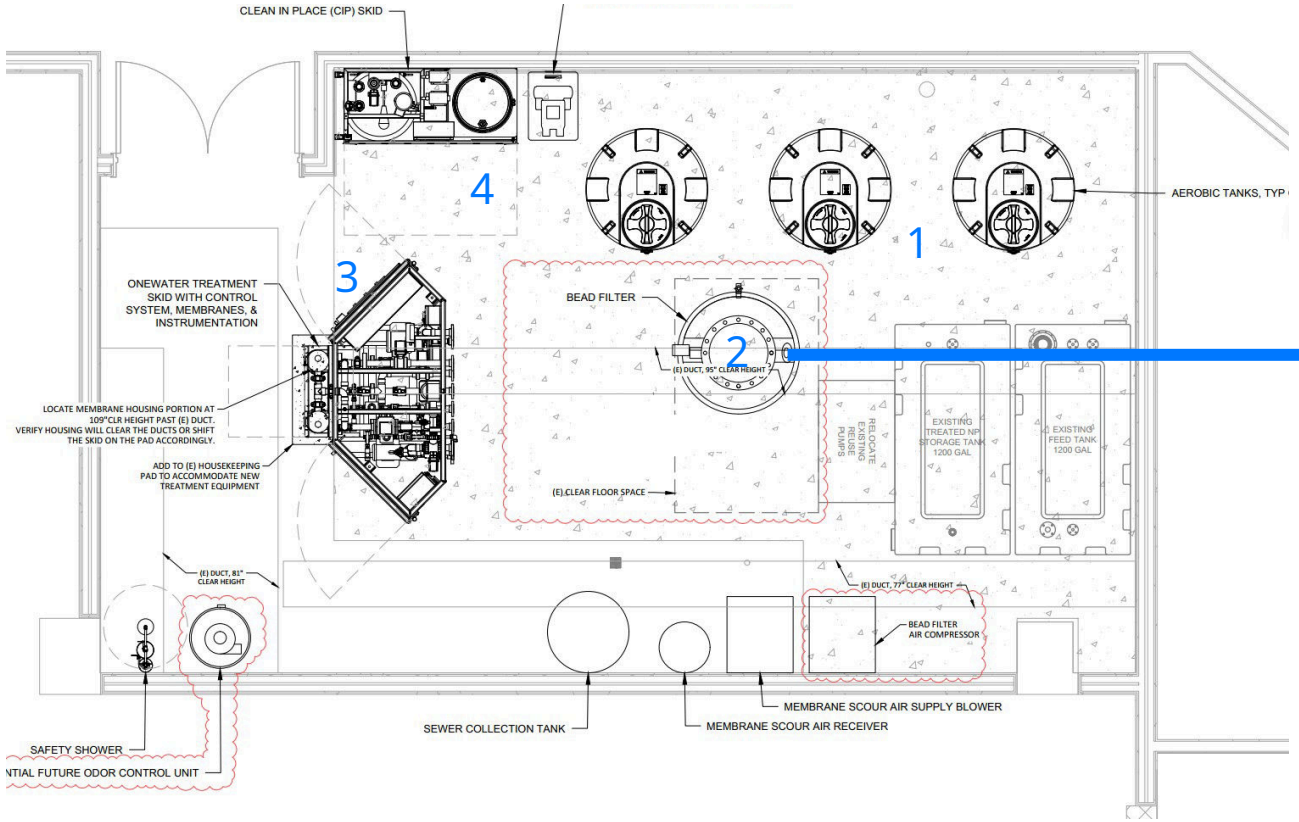
Greywater Treatment Room Layout



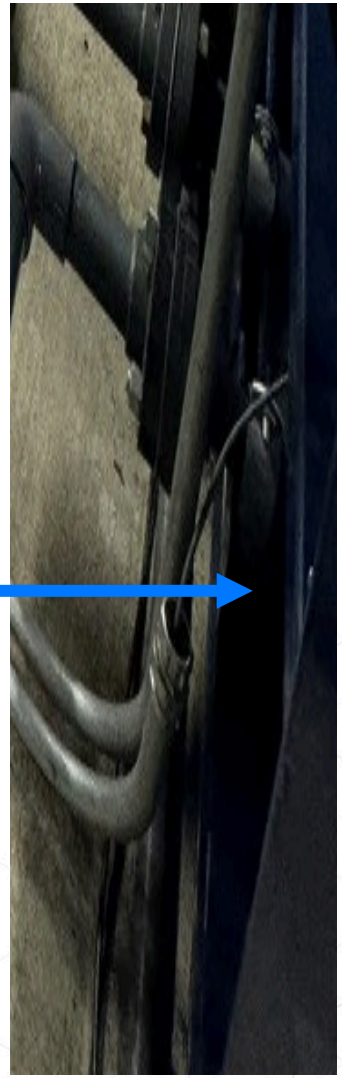
1. Tanks

WALDORF ASTORIA BEVERLY HILLS

Greywater Treatment Room Layout



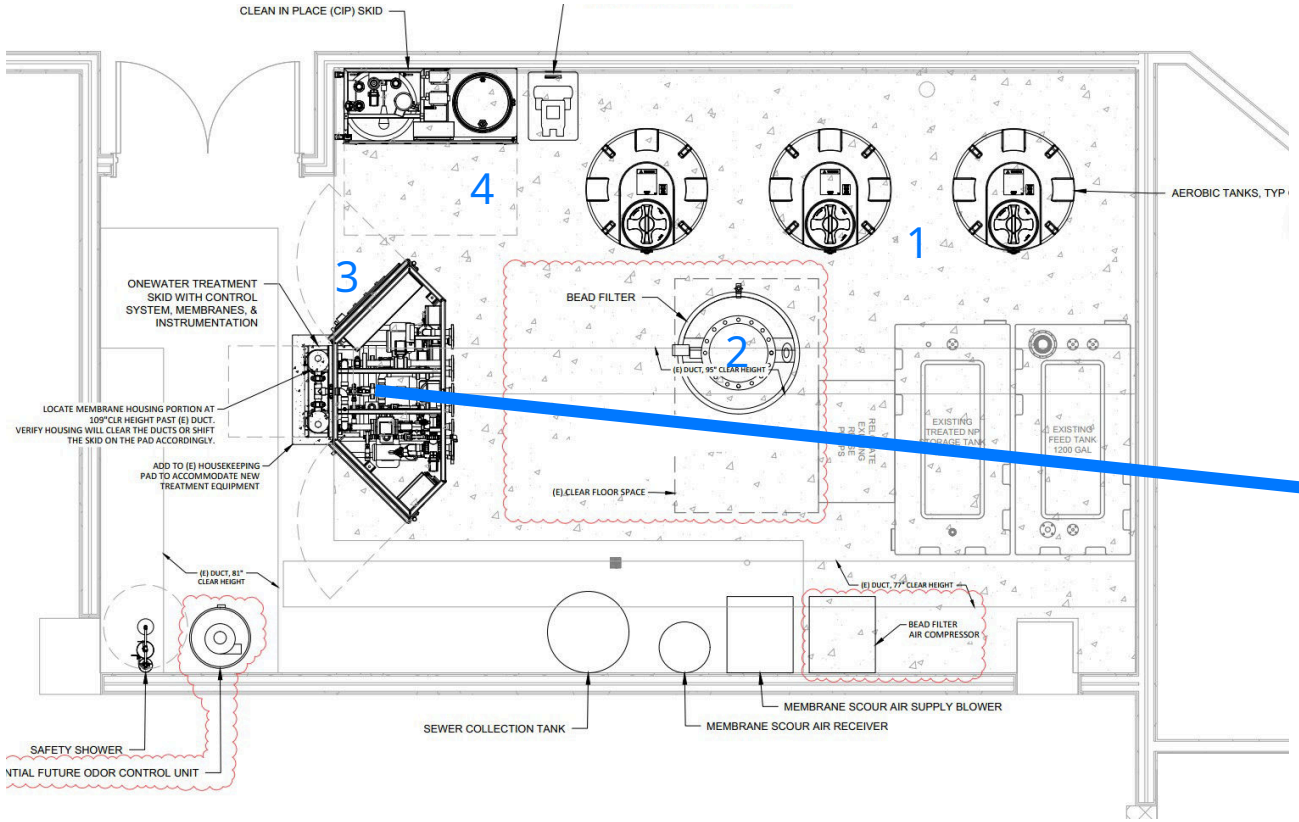
2. Prefilter



WALDORF ASTORIA BEVERLY HILLS

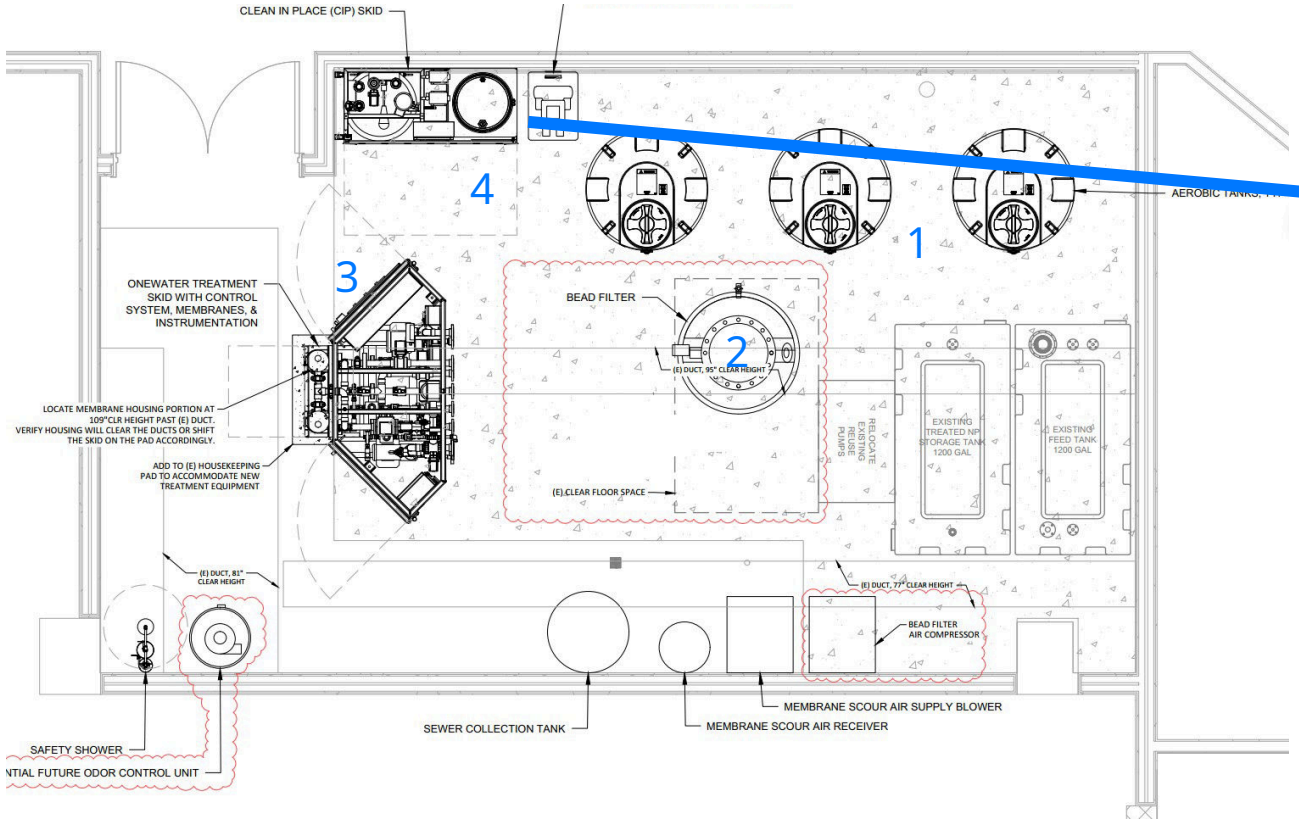
Greywater Treatment Room Layout

3. OneWater™ Greywater Reuse System



WALDORF ASTORIA BEVERLY HILLS

Greywater Treatment Room Layout



4. CIP Skid

DECENTRALIZED REUSE

RECYCLE UP TO 95% OF A BUILDING'S WASTEWATER

- Blackwater
- Greywater
- Rainwater / Stormwater
- Condensate

WASTEWATER CAN TRANSFORM INTO THREE OUTPUTS

WATER

Recycled water for non-potable reuse

ENERGY

Recovered heat energy

SOIL

High-quality soil amendments

NATIONWIDE WATER INCENTIVE PROGRAMS

Program Name	Type	Location	Amount	Qualification Details
Onsite Water Reuse Program	Grant	San Francisco, CA	up to $1,000,000	Projects that are voluntary, go above and beyond baseline compliance, or reuse brewery process water
LADWP Technical Assistance Program	Grant	Los Angeles, CA	up to $2,000,000	Projects that replace at least 50,000 gallons of potable water over two years
Water Efficient Technology (WET) Program	Rebate	Santa Clara County, CA	up to $100,000	Projects saving at least 74,800 GPY of potable water
Water Wise Rebates	Rebate	Sacramento, CA	up to $50,000	Installation of new water saving technologies
Water Savings Incentive Program (WSIP)	Incentive	Southern California	Varies	Any non-residential project that saves at least 10M gallons of water
Onsite Water Reuse System	Incentive	Austin, TX	up to $500,000	Projects that reuse 1M GPY+ of potable water
Commercial Custom Rebate Program	Rebate	San Antonio, TX	Varies	Water savings expected must exceed 1 million gallons per year
WaterSMART Small-Scale Water Efficiency Projects	Grant	Nationwide locations	up to $100,000	Available to nonprofits, tribes or governments in eligible states
Clean Water State Revolving Fund (CWSRF)	Loan	Nationwide locations	Varies	Low interest loans for water reuse projects
Capacity Charge Reductions	Rate Reduction	Nationwide locations	up to $500,000	Some cities will agree to reduce upfront water and wastewater capacity charges in proportion to the anticipated flow reductions
Water Conservation and Reuse Grant Pilot Program	Grant / Rebate	New York	Varies	25% water fee discount to customers who install water reuse systems that reduce the building's water consumption by at least 25%. A 76% wastewater fee discount is also offered for properties that discharge less than 25% of their flow.
The Water Infrastructure and Innovation Act (WIFIA)	Credit	Nationwide	Varies	Federal credit program administered by the EPA for eligible water and wastewater infrastructure projects, including water reuse. Qualifying WIFIA applicants must provide matching funds from another source.

TACKLING THE YUCK FACTOR

How we can change the conversation around wastewater from “yuck” to “yes”

EPIC CLEANTEC x RECYCLED WATER BEERS
Beers made from recycled greywater

KOHLER x ABSTRA™ TILES
Tiles made of 99.5% recycled sludge

DC WATER x BLOOM SOIL
Soil conditioner made from human waste

FIREFLY GREEN FUELS x JET FUEL
Aviation fuel made from human waste

HOMEBIOGAS x BIODIGESTER
Methane gas made from organic waste

JANICKI x OMNIPROCESSOR
Drinking water made from toilets

Connect With Us

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