



# Embracing Water Supply Sustainability - *The Role of Reuse in our Water Supply Portfolios*

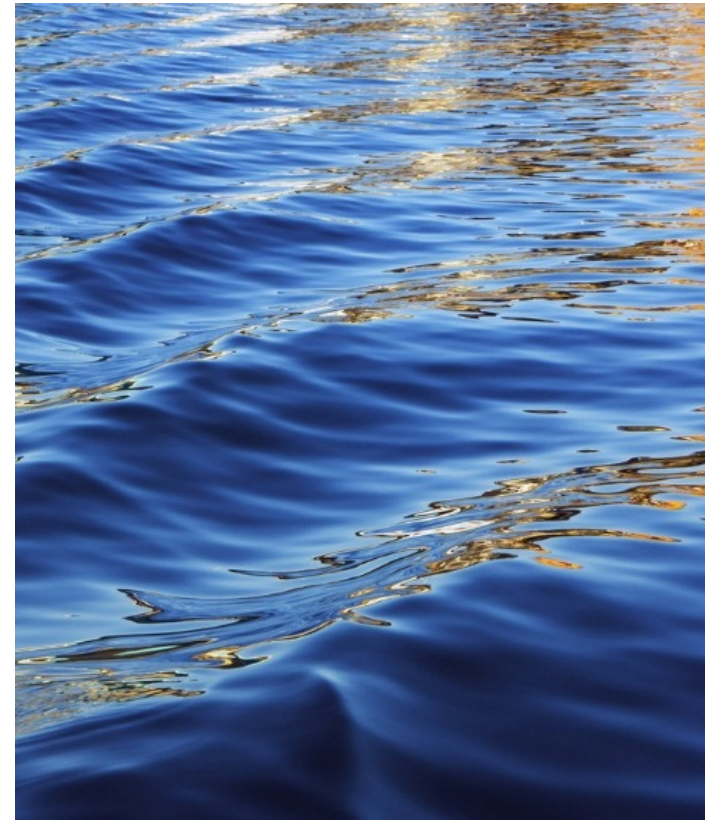
Arizona Water Reuse 2015 Symposium

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WaterReuse Association  
WaterReuse Research Foundation





Thinking about Water  
Differently



# Water Scarcity Risks



Nearly **2 billion people** live where access to clean and safe water is increasingly limited



By 2030, there will be a **40% gap between water supply and demand**



In 2014, the global water crisis rose to a **top-three business risk** for impact and likelihood



**70% of companies surveyed** identify water as a substantive business risk

## US-based Fortune 500 companies:

**94%**

face potential physical challenges

**69%**

face reputational risks

**80%**

say it will affect their decisions on where to locate facilities

**60%**

indicate water will affect business growth and profitability within five years

SOURCES: World Economic Forum

2013 CDP Water Report

Bridging Concern with Action: Are US Companies Prepared for Looming Water Challenges?, Pacific Institute and VOX Global 2014 survey of US-based Fortune 500 companies



# Water is Food

- 30% of US water footprint is from meat consumption
- 2,000 gallons of water = 1 gallon milk
- 5,200 gallons of water = 2 lbs of coffee
- 2,900 gallons of water = 1 quarter pounder
- 250 gallons of water = 2 lbs of wheat



# Water is Power

- Based on 2004 data-136 Billion gallons water used per day for cooling
- 2010 estimate approaches 200 Billion gallons per day
- Tampa Electric Company – why look at alternative water supplies?
  - Certainty in water availability
  - Wastewater discharges
  - Positive Public perception through conservation
  - Partnership with local municipalities
  - Help address cooling reservoir water quality
- Palo Verde Nuclear Generating Station
  - 60,000 AFY/53 MGD



# Water is Commerce

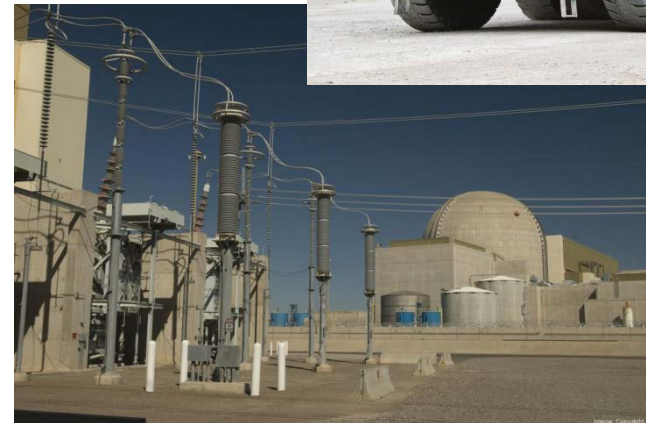
- 75,000 gallons of water to produce one ton of steel
  - Car = 2,150 pounds of steel = 80,000 gallons of water
- 1 to 2.5 gallons of water = 1 gallon of gasoline
- 24 gallons of water = 1 pound of plastic
  - 2x as much water to produce a plastic water bottle as the amount in the bottle
- 1,320 gallons of water = 1 pound of cotton
  - 700 gallons of water = 1 cotton shirt
  - 2,900 gallons of water = 1 pair of blue jeans
- Industrial water consumption makes up 22% of global water use





# Local Connection:

- Fortune 500 Companies
  - Avnet - \$25.5B
  - Freeport McMoRan Copper and Gold - \$20.9B
  - Republic Services Inc. - \$8.4B
  - PetSmart - \$6.9B
  - Insight Enterprises - \$5.1B
- Fortune 1000
  - Swift Transportation
  - Apollo Education Group
  - Pinnacle West Capital
  - First Solar
  - Amkor
  - On Semiconductor
  - Taylor Morrison Home Corp
  - Sprouts Farmers Market



## Local Connection

- Computer and electronic equipment (computer microchips) and electronic components, including communication systems, are Arizona's most important manufactured goods.
- Transportation equipment (space vehicles, helicopters, turbine engines, guided missiles) and chemicals are also important.
- Fabricated metal products (structural and sheet metals, window and door frames), food products (soft drinks, baked goods, animal feeds, dairy products), machinery (for metalworking, electronics, agriculture) and primary metals.
- Nation's leading producer of copper.





## Local Connection:

### Crops

- Biggest crop – lettuce (20%)
- 10<sup>th</sup> top cotton-producing state
- Hay and greenhouse and nursery production each generate about 1 / 2 of the revenues provided by cotton.
- Cantaloupes account for about 2% of the state's crop revenues.
- Other important crops are barley, potatoes, and wheat.

### Livestock

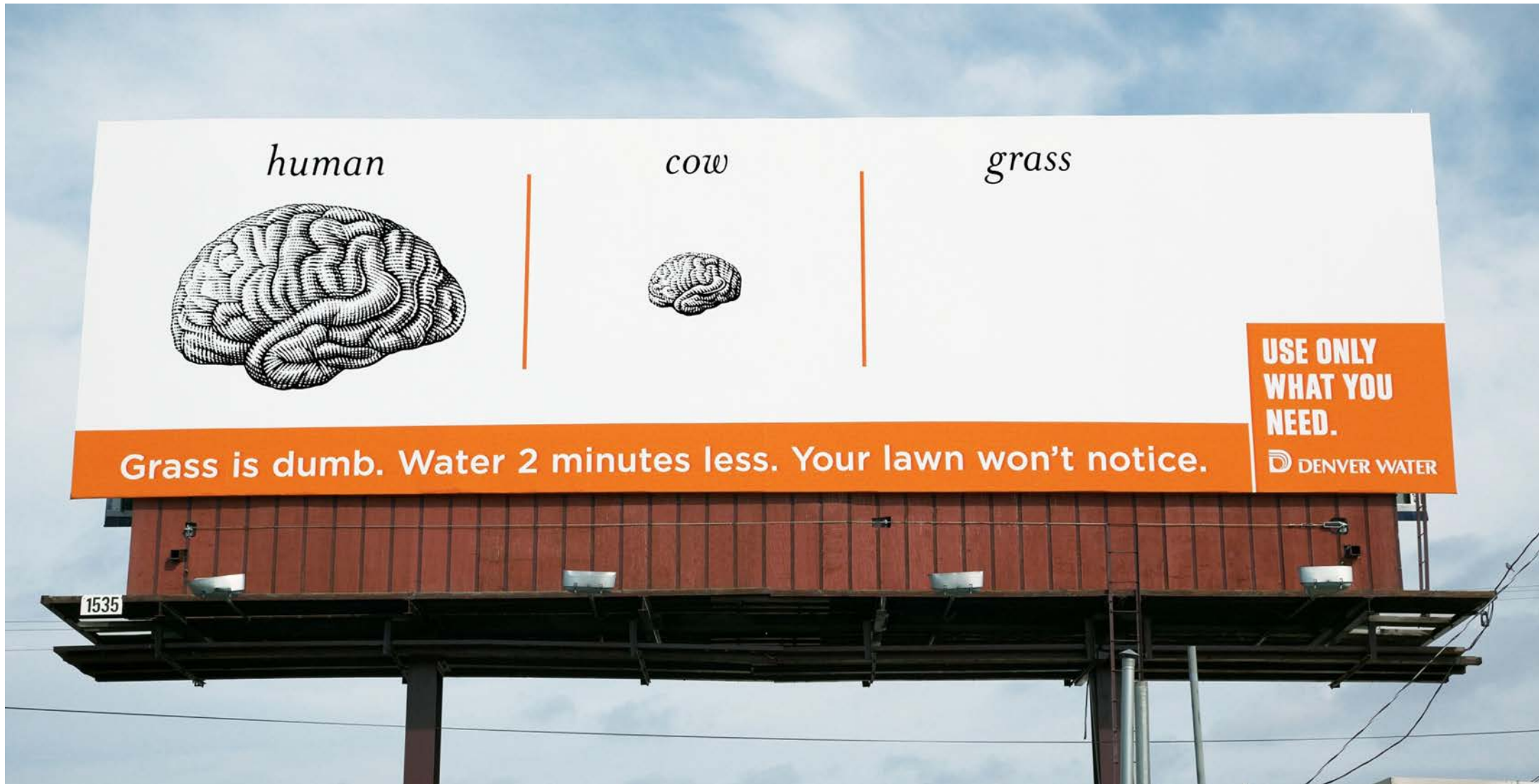
- Beef cattle, including calves are the leading source of Arizona farm income, followed by dairy products.



# The Risk of No Water

- Society must recognize that water is crucial and deserves attention for the overall success of our
  - Communities
  - Economy
  - Regional independence
- Societal acceptance of sustainability
  - Water is absent from the discussion







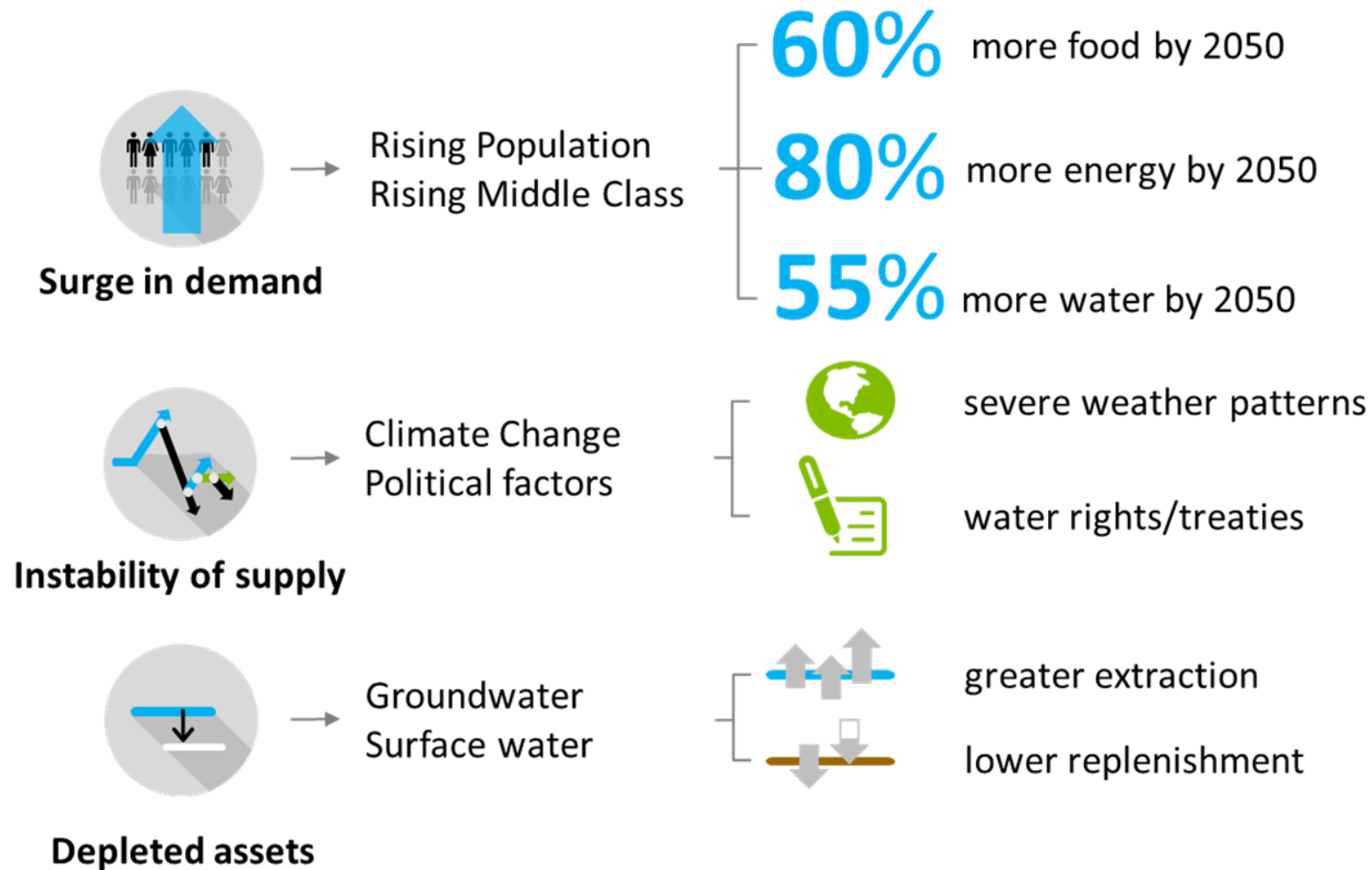
# THE OFFICIAL SPRINKLER OF SUMMER 2013.



**USE  
EVEN  
LESS.<sup>SM</sup>**

 **DENVER WATER**

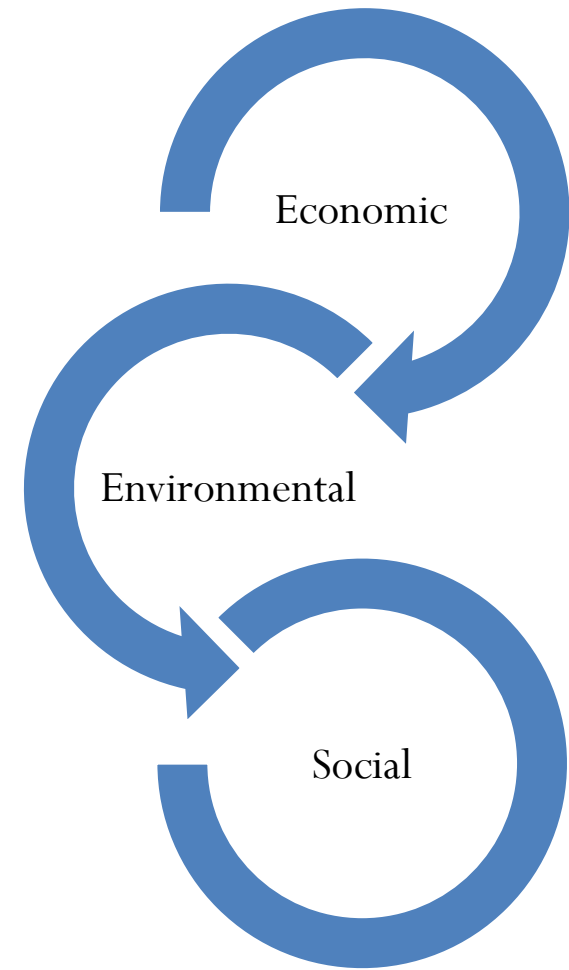
# Factors Driving Water Reuse Today



# Reuse

Provides local, climate-independent, sustainable supply for the environment, agriculture, industry AND people

- The need has never been greater
- Existing treatment systems are protective





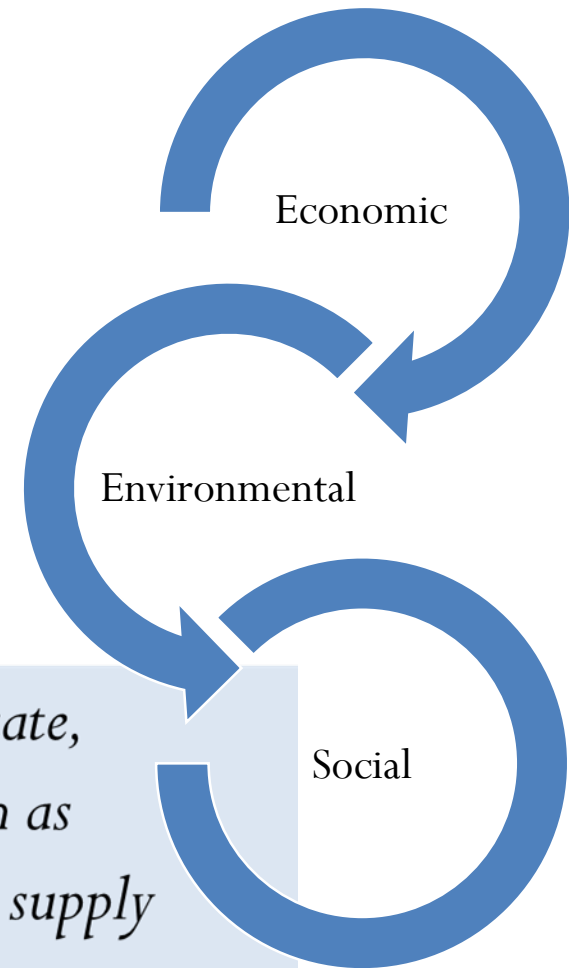
# Reuse

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*No one strategy can solve the future water needs of the state, so the portfolios include different mixes of strategies, such as conservation, reuse, agricultural transfers, and new water supply development.*

*Colorado Water Conservation Board, 2012*



The Full Spectrum -  
*determined based on local  
needs.*



Potable Reuse

Food Crop  
Irrigation  
Wetland/  
Habitat  
Restoration



Urban  
Irrigation  
Industrial  
Reuse





# Monterey Regional Water Pollution Control District- Agricultural Reuse

- World's largest water recycling facility designed for raw food crop irrigation – 30MGD with tertiary treatment
- Originally designed as a salt water intrusion barrier, this agency supplies reuse for 12,000 acres of prime farm land.



- Products from these farms include the largest artichoke supplier in the world, as well as many other vegetables and fruits.



# West Basin's Designer Waters



1

Tertiary Water

Landscape Irrigation



2

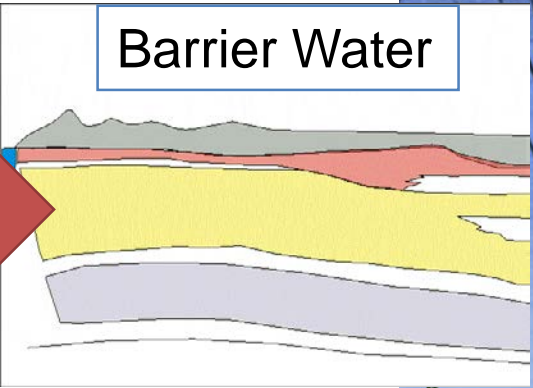
Nitrified Water

Cooling tower



3

Reverse Osmosis:  
Barrier Water



4

Reverse Osmosis: Single  
Pass

Low Pressure Boiler feed



5

RO: Double Pass

High Pressure Boiler feed





# Lott Clean Water Alliance



## East Bay Public Plaza Reclaimed Water Wading Stream

- Interactive water feature designed to mimic a natural stream from waterfall to Bay including “groundwater seeps”
- Class A Reclaimed Water (100MGD for facility)
- Attracts hundreds of families and visitors during the summer.

# Big Spring Water Supply Augmentation

- Facility mixes reuse with water from lakes to produce a high-quality drinking water.
- Facility received advanced secondary reuse and treats approximately 16 MGD with microfiltration, reverse osmosis, and ultraviolet disinfection.
- This is blended with 21 million gallons per day filtered from traditional sources.



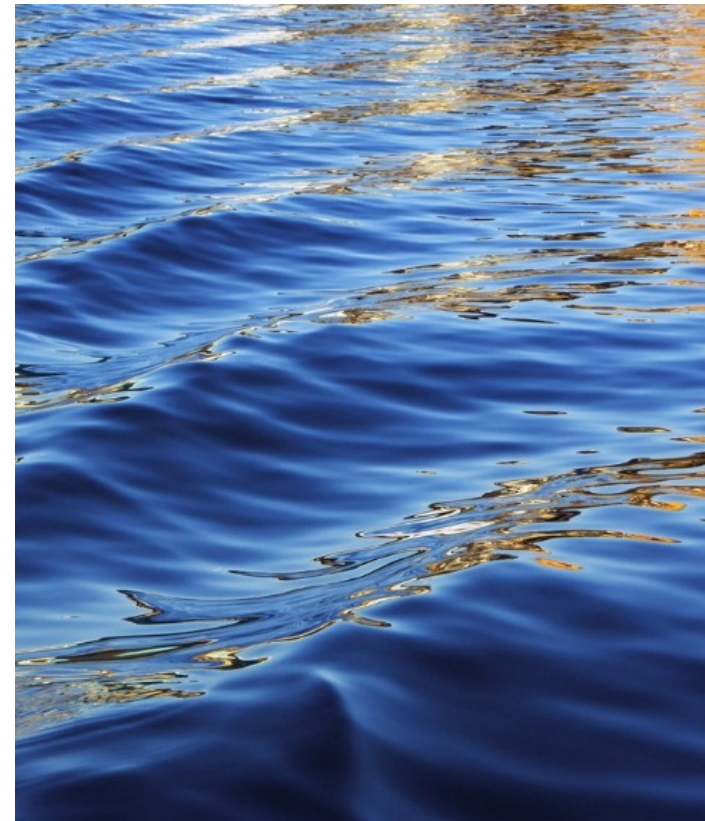


# The Right Water for the Right Use

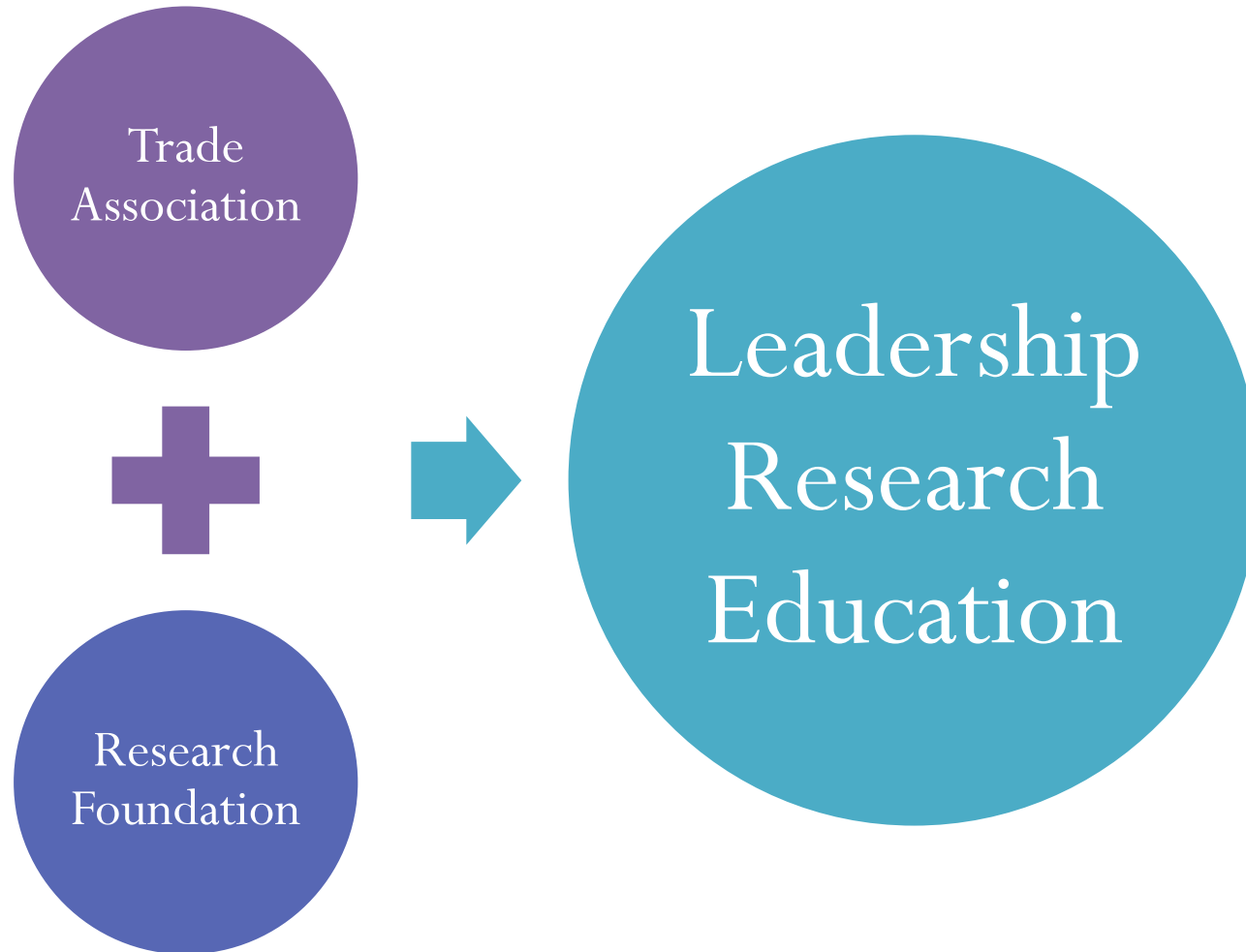




# WaterReuse's Role



# The WateReuse Story





# Our Focus:

*The Right Water for  
the Right Use*



## Leadership

- Funding Advocacy
- Policy Development and Implementation

## Research

- Applied
- Timely
- Robust

## Education and Outreach

- Message development
- Tool development
- Tiered Campaigns

## Advocacy and Leadership

- Close relationship with water industry associations
- Be the go-to voice on recycling and reuse policies
- Provide education and member networking designed to further the implementation of reuse project throughout the US and Internationally.



# Outreach



Number of Outreach Pieces to Date: 1000+

- Includes reports, presentations, proceedings, peer-reviewed publications



*WorldWater: Water Reuse and Desalination*

- Produced quarterly, highlights WRRF research and other hot topics of the industry



Webcast Program

- 60-90 minute internet broadcast on current research
- Second Thursday of each month
- Free to Subscribers/Members; open to the public

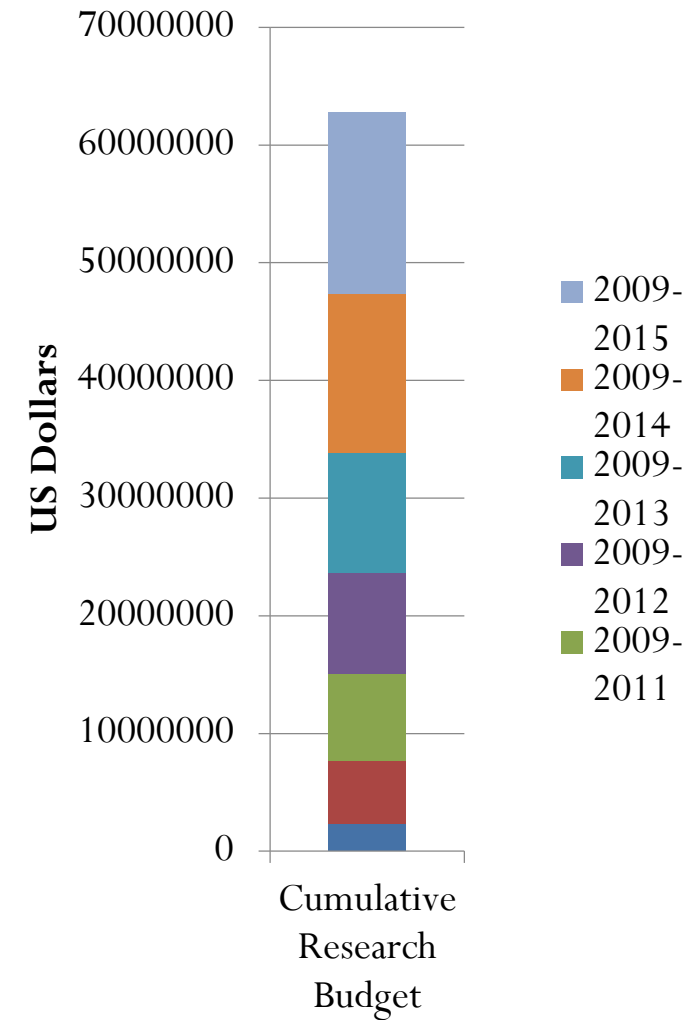


# Research Categories

- Potable Reuse
- Business Economics/Triple Bottom Line
- Industrial Reuse
- Policy & Engagement
- Desalination
- Agricultural Reuse

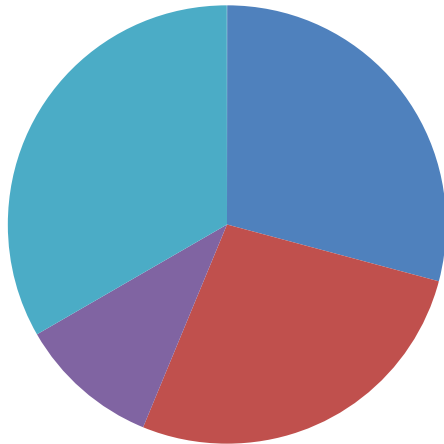


## WRRF Cumulative Research Funding 2009-Present

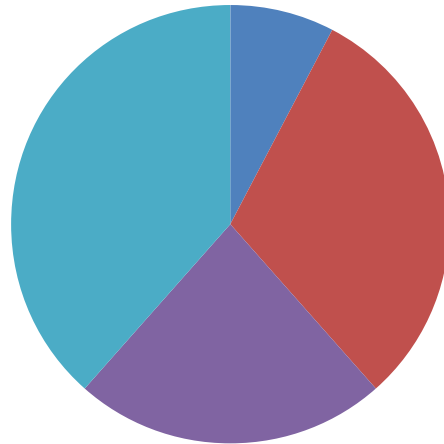


# WRRF Research Focus Areas

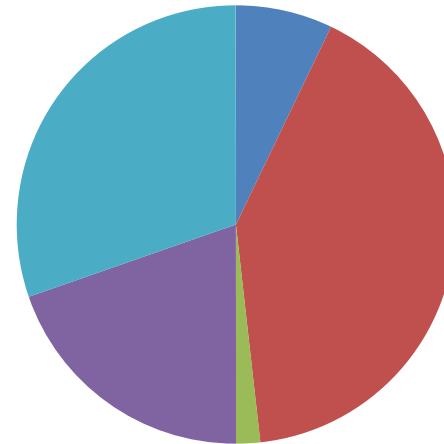
2001 - 2004



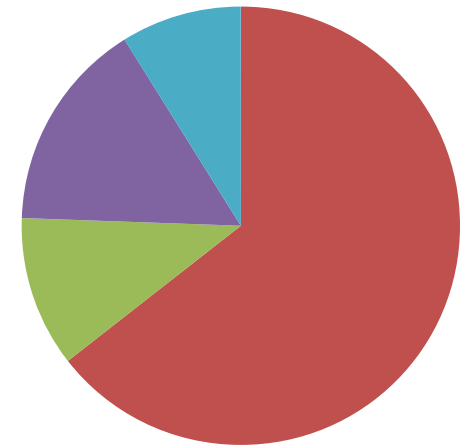
2005 - 2008



2009 - 2012



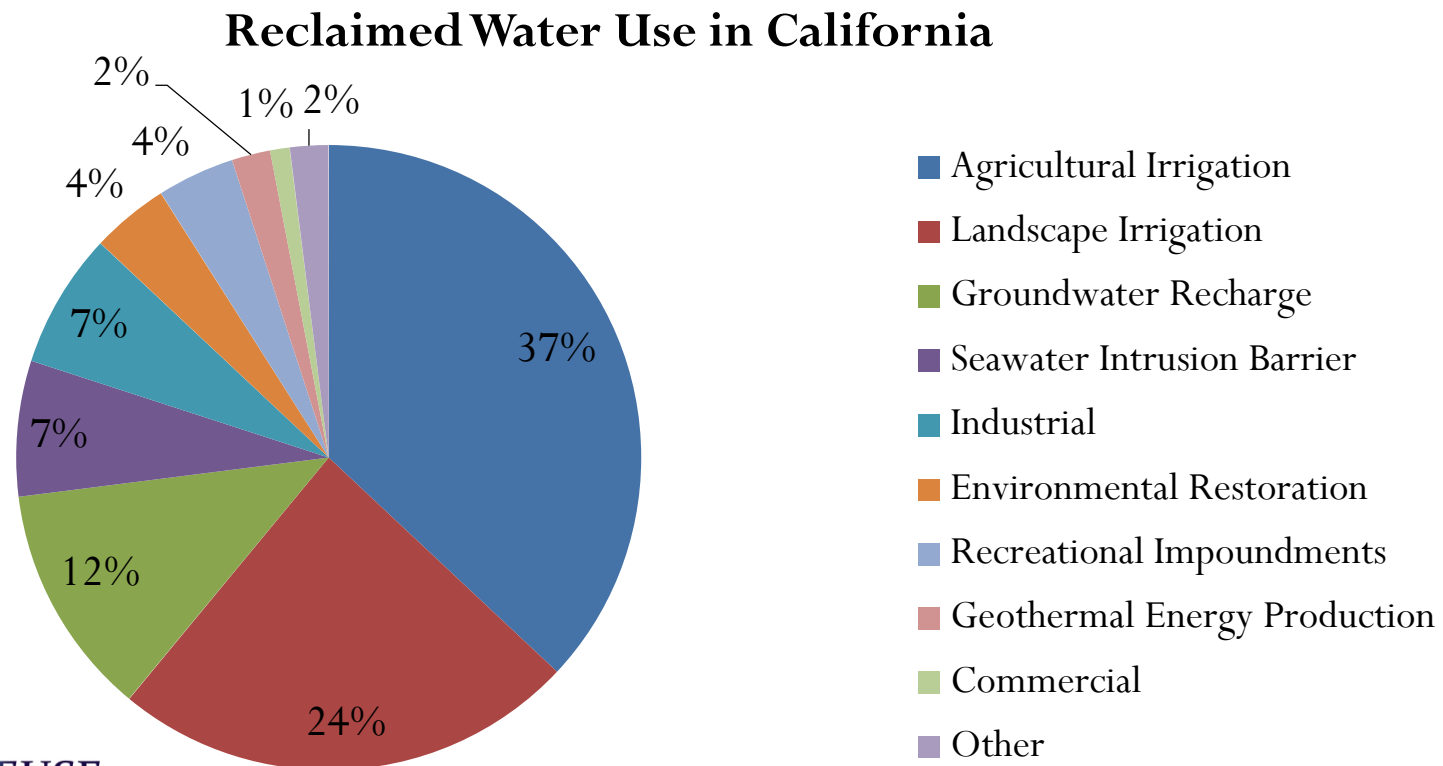
2013 - Present



- Non-Potable Reuse
- Potable Reuse
- Industrial Reuse
- Desal/Salinity Mgmt
- Social Science

# Fit-for-Purpose Model: the right water for the right use

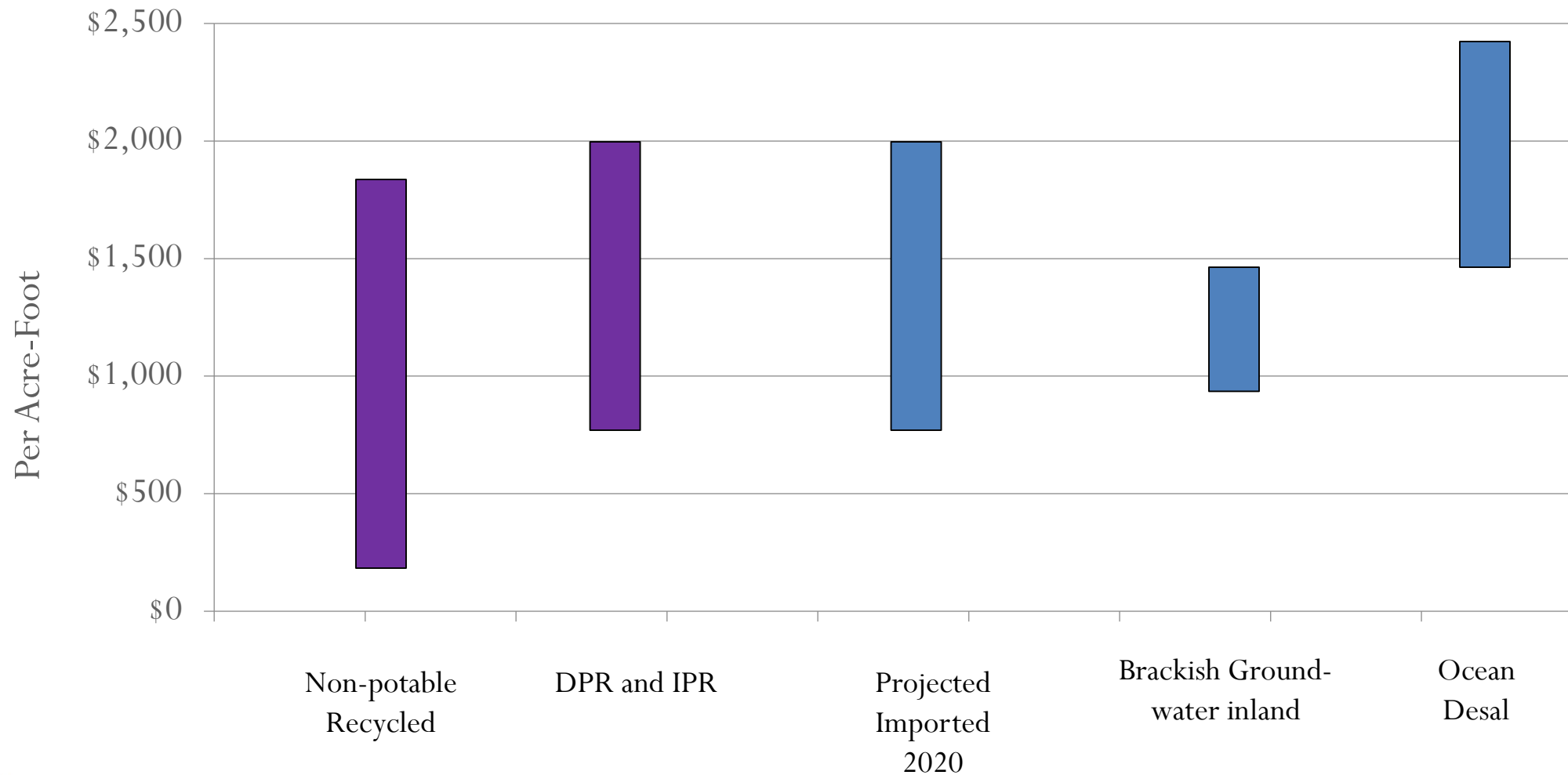
Goal of matching the level of treatment to its intended use without expending unnecessary funds, energy, greenhouse gas (GHG) emissions, and other pollutants, while minimizing other environmental and social costs.



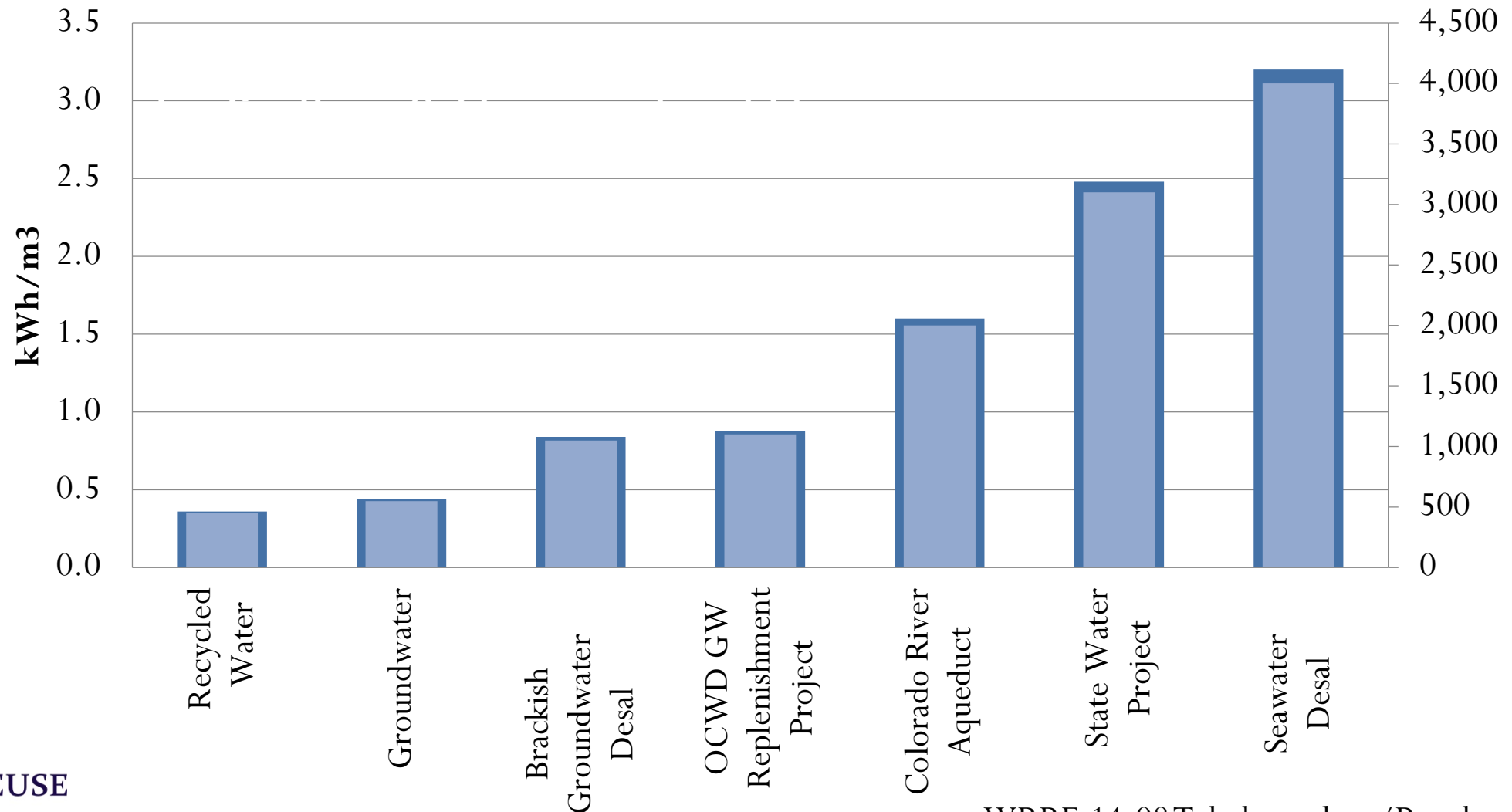
**Each end-use of water has its own specific quality needs. When practical, water should only be treated to that specific level to avoid unnecessary expenses.**



# Cost Comparison of Reuse and other supplies



# Energy Requirements of Reuse and other supplies



# Agricultural Reuse

## WRRF-15-08 State of Irrigated Agricultural Water Reuse - Impediments and Incentives

- Objectives:
  - Identify potential for irrigated agricultural uses of recycled water
  - How to address and overcome impediments and provide incentives to achieve greater recycled water use for agriculture.
- ➔ This will inform policymakers and the agricultural community so they can work collaboratively to address this issue

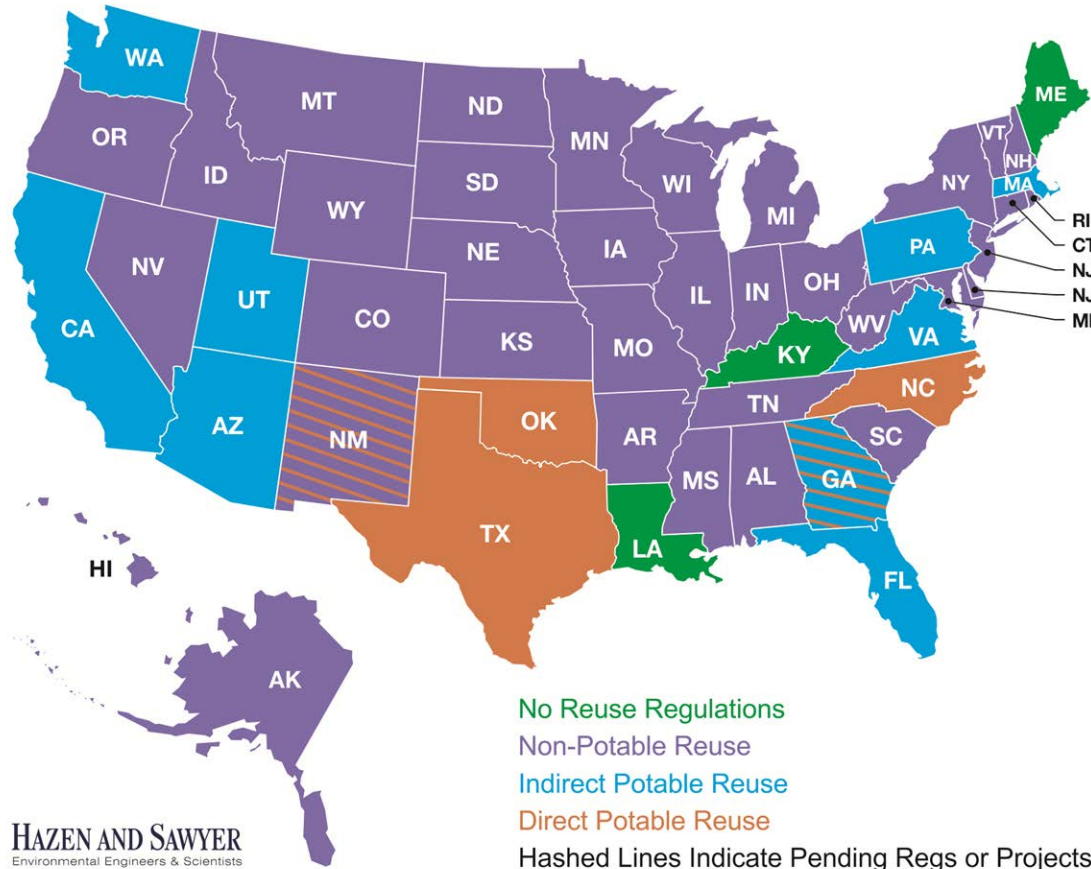
RFP expected fall 2015





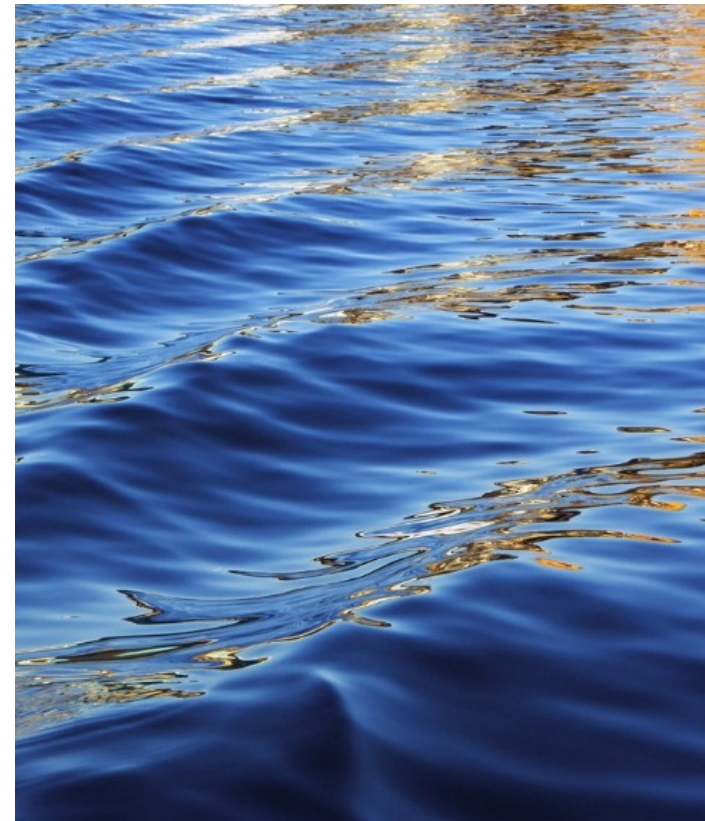
- Model Legislation
- The Cost of “No Water”

- Brine Management
- Treatment alternatives





# Public Engagement



# Tools

- “Public perception and acceptance can be positively transformed when people are engaged through educational tools and processes.” WRRF 13-02
- Committed to developing educational tools that can be used by members and community leaders to inform stakeholders about the practice of treating water to fit the purpose.
- Partnership with Australian Water Recycling Centre of Excellence
  - Adapt and expand the education products from their research on education and engagement.



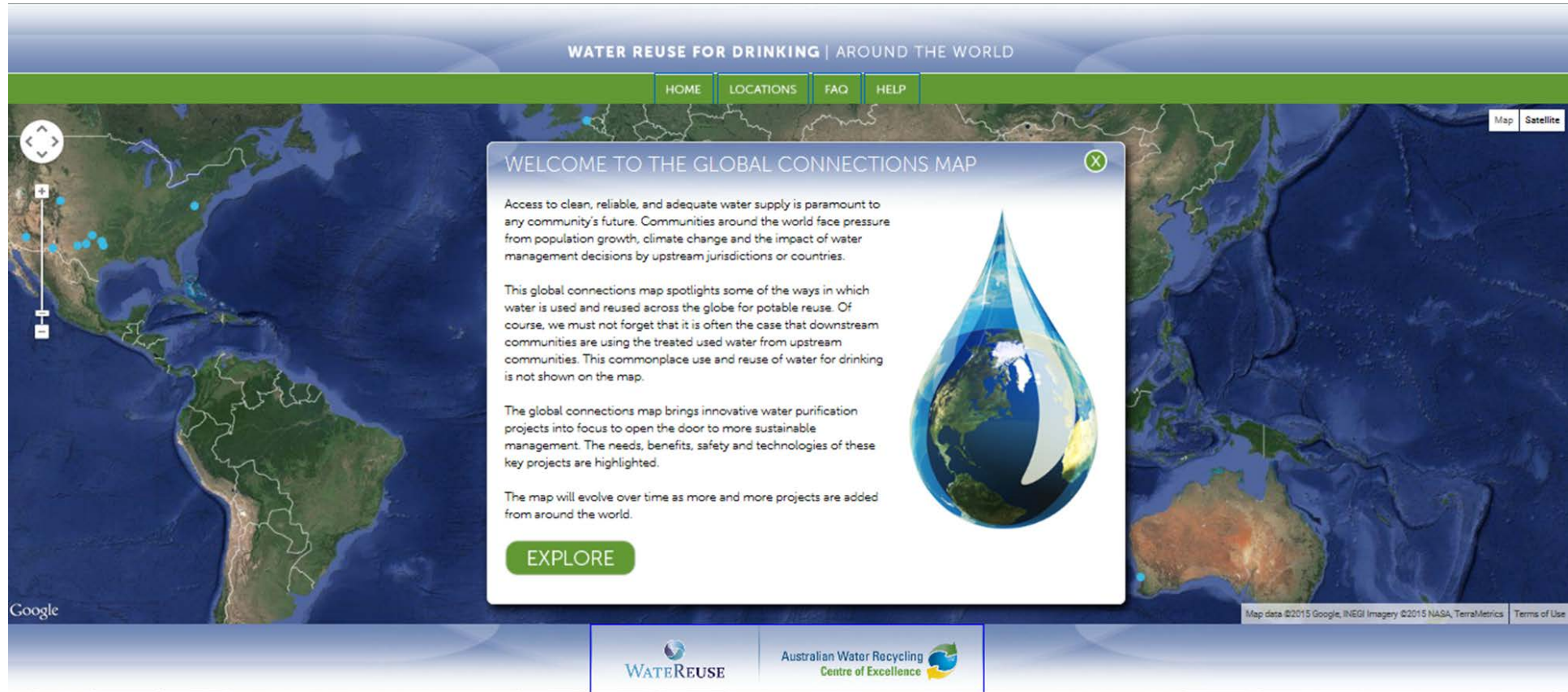


# Animations Treatment Videos



# Global Connections Map

## FAQs

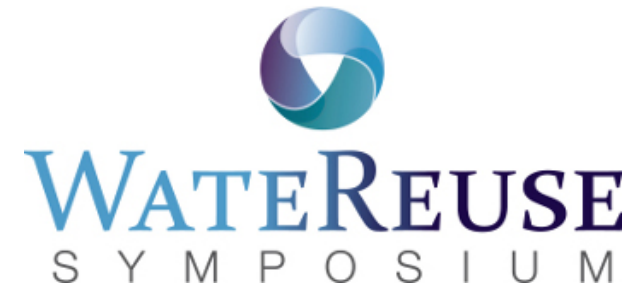


**Dr. David Cunliffe**  
Principal Water Quality Advisor  
Department of Public Health, South Australia



**Dr. Shane Snyder**  
Professor of Environmental Engineering  
University of Arizona





[www.watereuse.org/symposium](http://www.watereuse.org/symposium)





I'LL HAVE A GLASS  
OF YOUR LAKE MEAD 2007  
AND SHE'LL HAVE A GLASS OF YOUR  
ARIZONA VINTAGE AQUIFER.  
AND BRING US A BOTTLE OF  
YOUR FINEST RECYCLED  
EFFLUENT 2020.

OF COURSE...  
COULD I  
INTEREST YOU IN  
A GLASS OF OUR  
DESALINATED  
PACIFIC  
2018?





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