Coast-to-Coast: Creative Water Reuse Across the Country

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Boston, MA

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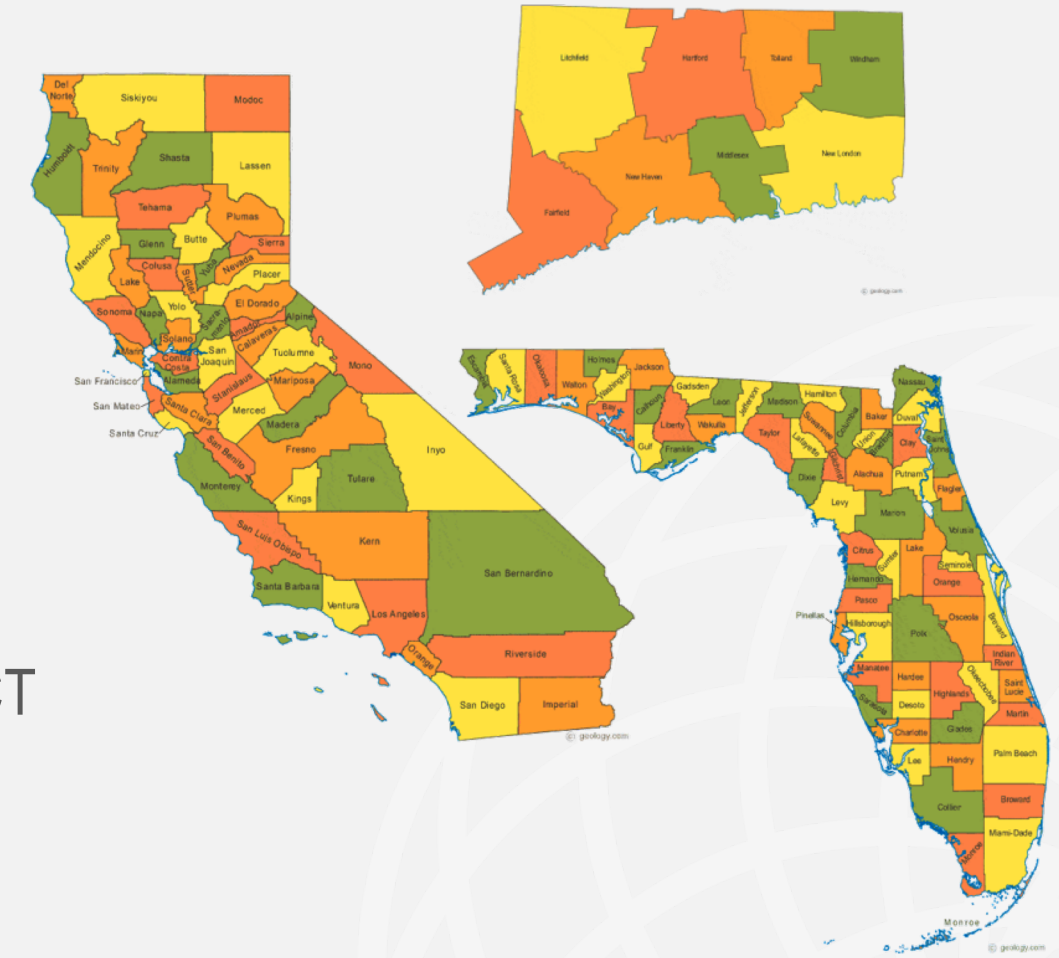
WORKING FOR WATER QUALITY

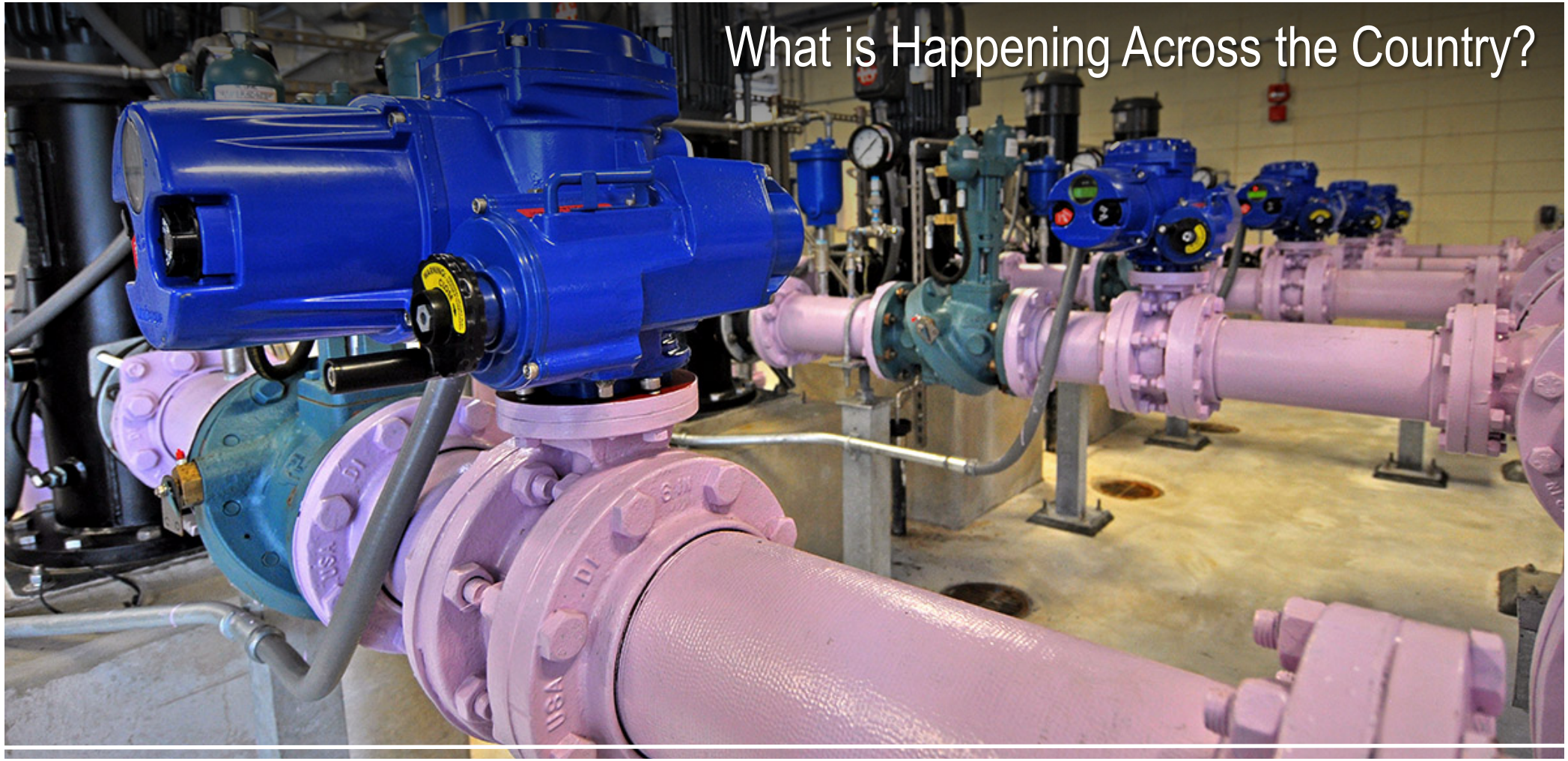
COMMITMENT & INTEGRITY DRIVE RESULTS

Agenda

- The Water Reuse Landscape
- Project Drivers for Reuse
- Examples of Reuse from Different States
  - Water Conserv II, Orlando, FL
  - Victorville WWTP, Victorville, CA
  - Los Angeles, CA
  - University of Connecticut, Storrs, CT



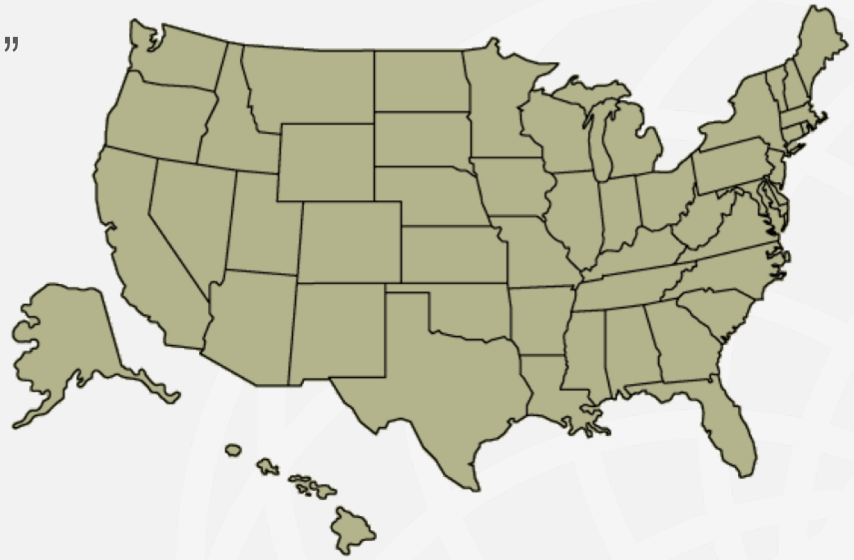
The Water Reuse Landscape



The Water Reuse Landscape

A Brief History of Major Water Reuse Regulation in the US

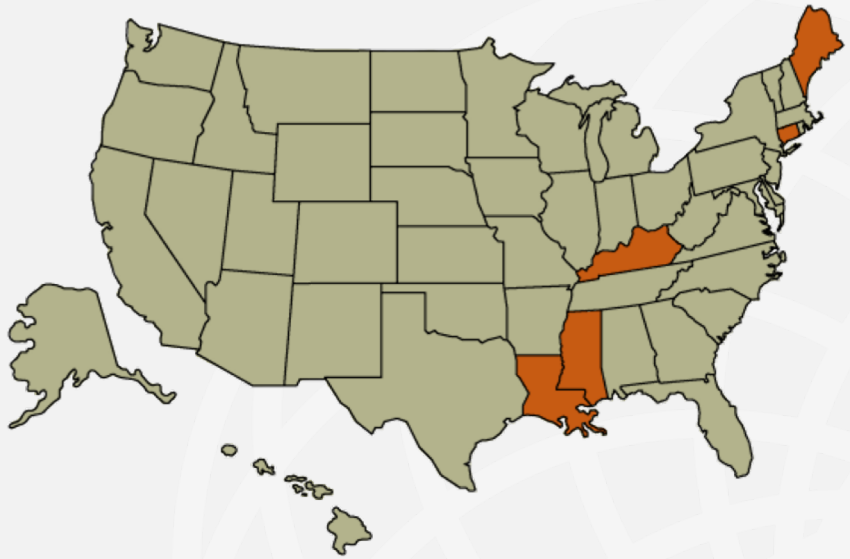
- 1918 – California - First Water Reuse Regulations
- 1983 – Florida "Land Application of Domestic Wastewater Effluent in Florida"
- 1986 – Arizona "Arizona Environmental Quality Act"
- 1990 – Texas "Administrative Code Chapter 310"
- 1991 – California "Water Recycling Act"
- 1992
  - *Washington "Reclaimed Water Act"*
  - *EPA "Guidelines for Water Reuse"*
- 2000s – Many states follow



The Water Reuse Landscape

A Brief History of Major Water Reuse Regulation in the US

- 5 states still don't have reuse guidelines / regulations
  - Kentucky, Mississippi, Louisiana, Connecticut, Maine



Statistics on Water Usage

- US Water use is 210 Billion gallons per day
  - Public supply, irrigation, power, etc.
- Since 1950, water use has tripled while the population has doubled
- US Population to increase by 30% by 2060

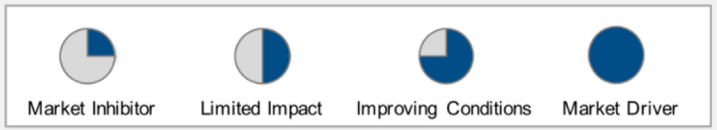
Statistics on Wastewater

- >33 Billion gallons of wastewater treated daily
- 12 Billion gallons of treated wastewater is discharged directly to an ocean or estuary daily

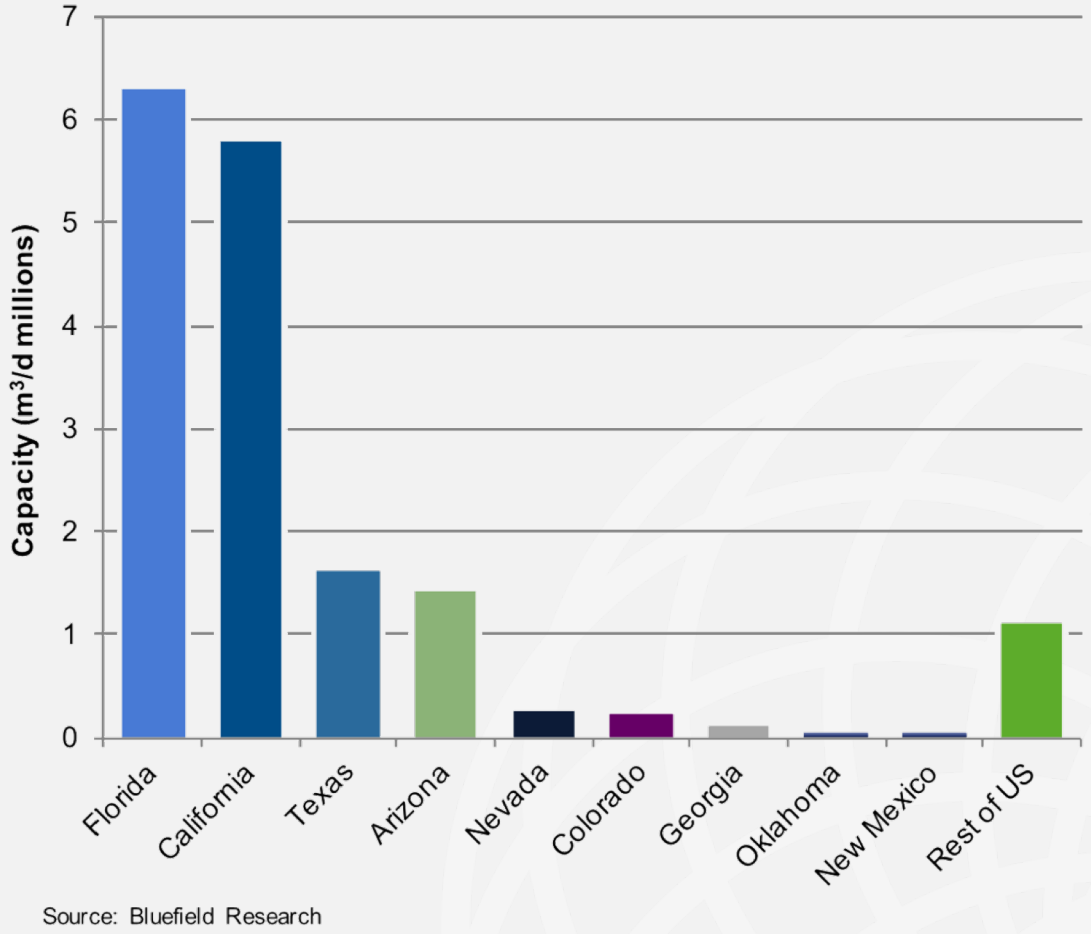
The National Water Reuse Landscape

Attractiveness of Reuse by state

	Policy Drivers	Available Funding	Historical Experience	Water Scarcity	Market Attractiveness
California					High
Florida					High
Texas					High
Arizona					Medium
Colorado					Medium
Georgia					Medium
Oklahoma					Medium
Nevada					Low
New Mexico					Low



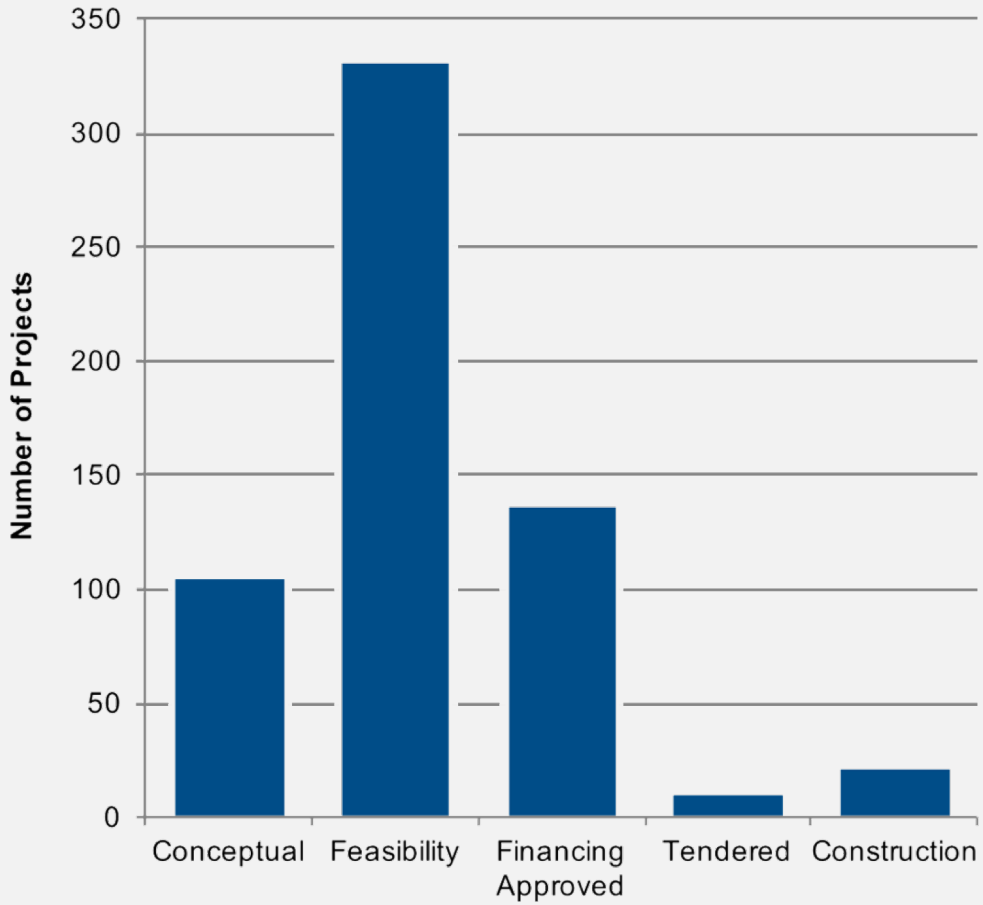
Water reuse capacity by state



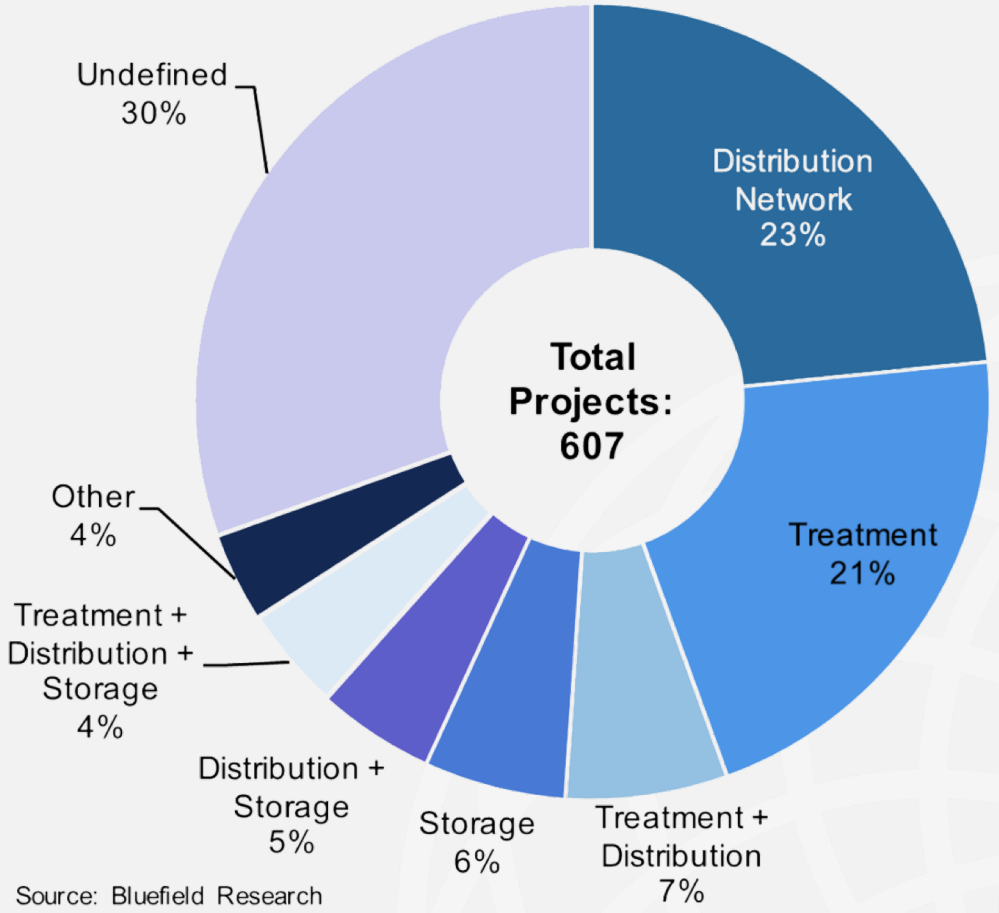
Source: Bluefield Research

The National Water Reuse Landscape

Water reuse projects by phase



Types of water reuse projects



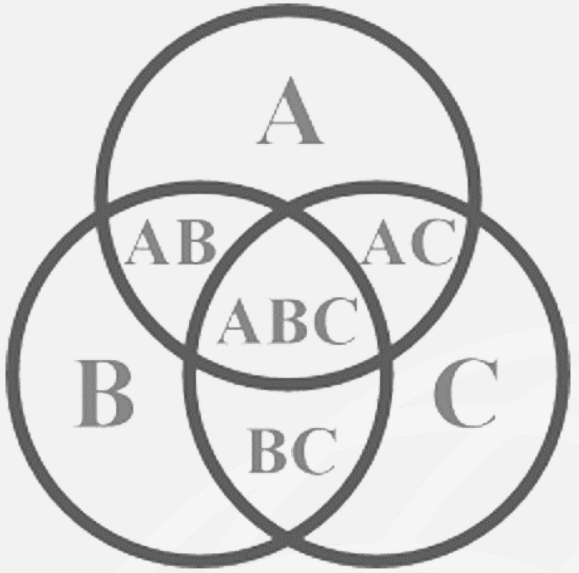
Source: Bluefield Research

Drivers for Reuse

When Does Water Reuse Make Sense?

A. Water scarcity

- Limited water sources
- Frequent droughts & weather variability
- Sustainability goals limiting usage



But also…

B. Economic conditions

- Water purchased from public utility
- Need to fund additional sources
- Grant opportunities

But also…

C. Supportive regulations

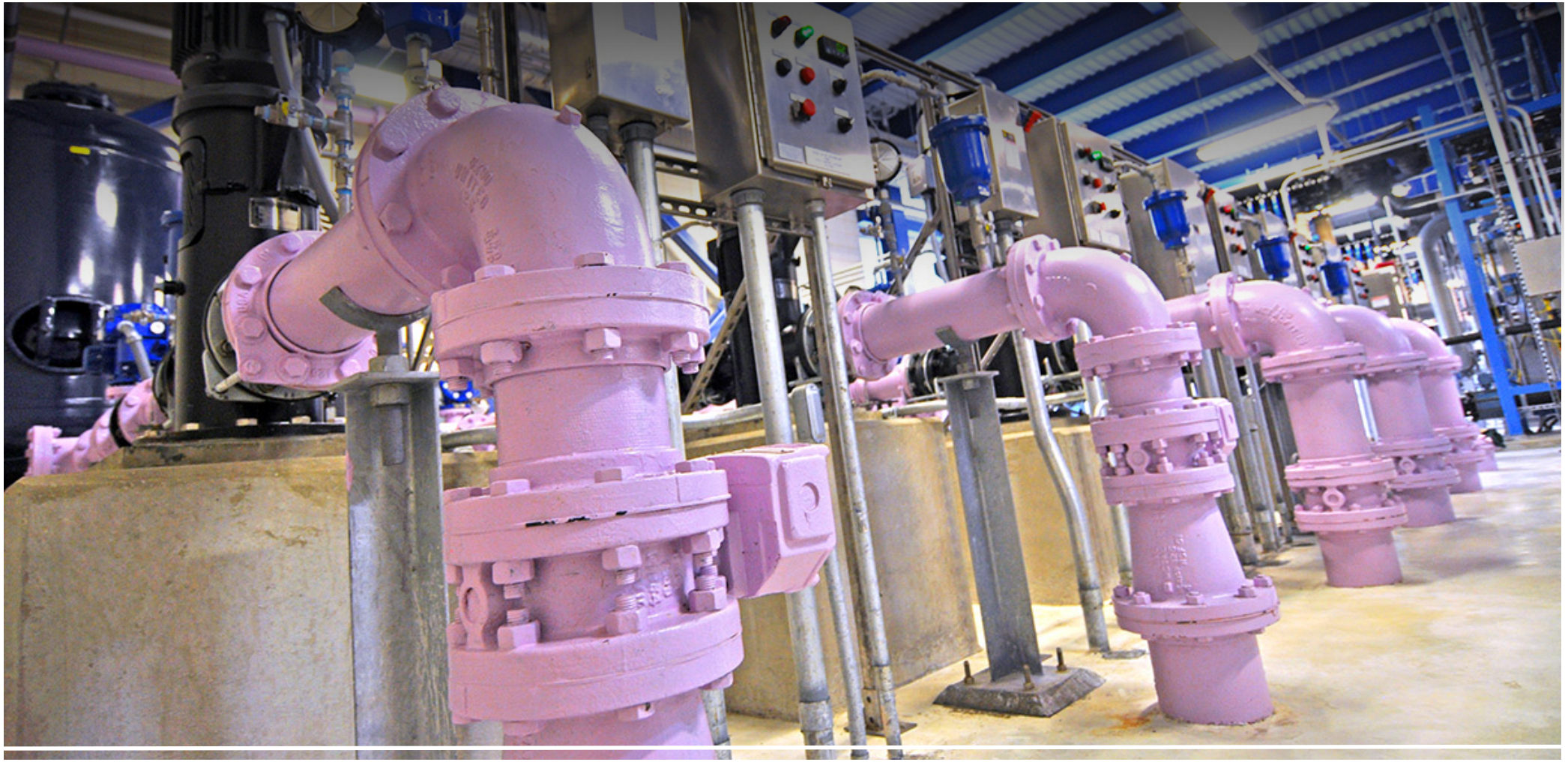
- Regulatory constraints limiting water withdrawal
- Permitting limitations for discharge
- Statewide reuse mandates

Another Key Driver…

D. Political Will

Examples from Around the US

Southeast | West | Northeast

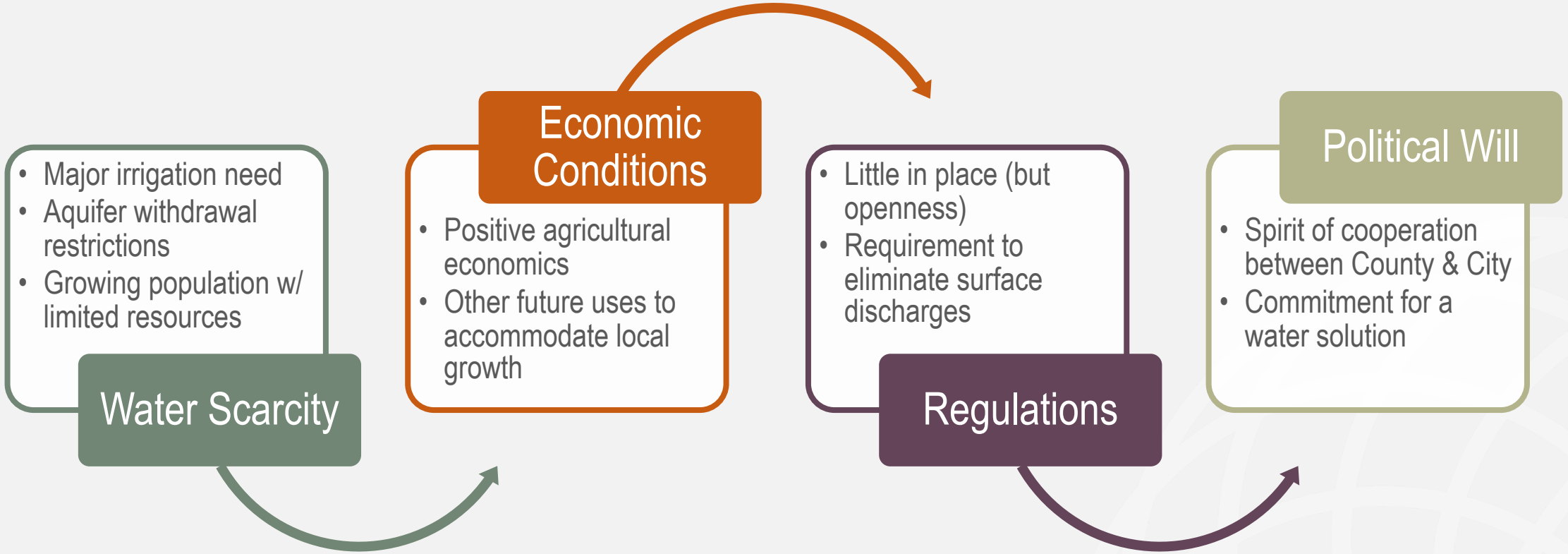


The Water Conserv II Story in Florida

- Winter Garden, 20 miles north of Orlando
- ~3,000 acres of citrus with irrigation needs
- Early 1980s
- State requirement to eliminate discharge of wastewater to Shingle Creek by 1988

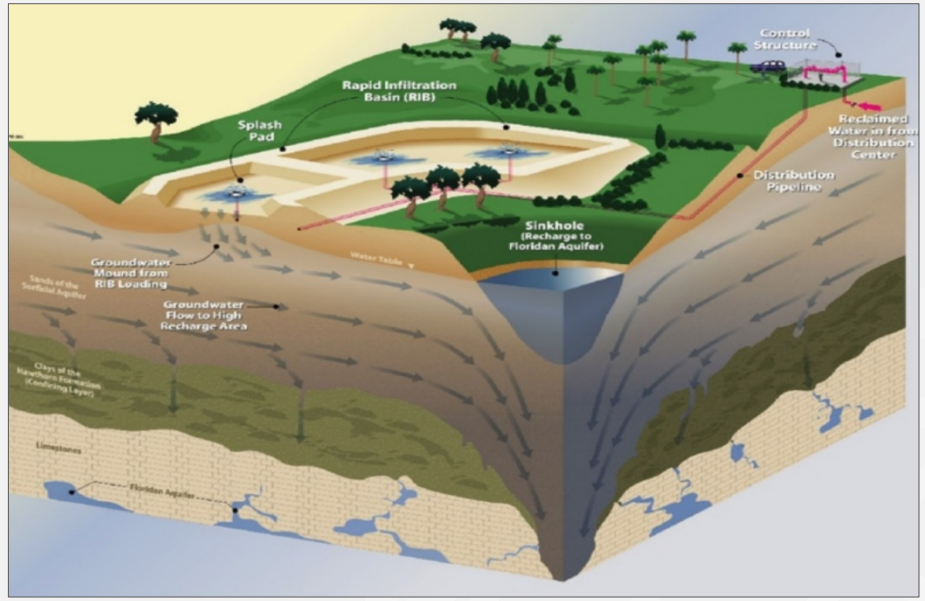
COMMITMENT & INTEGRITY DRIVE RESULTS

The Driver for Water Conserv II (Florida)



Water Conserv II (Florida)

- Agreement forged in 1983 – precipitated new State regulations
- Operations began in 1986
- Designed for average flow of 50 mgd, peak of 75
- Recycled water used for irrigation and aquifer recharge via rapid infiltration basins
- First reuse project in FL to irrigate crops for human consumption



Water Conserv II (Florida)

- Current customers include:
  - ~3,000 Acres of Citrus
  - 3 municipalities for residential irrigation
  - 12 foliage/landscape nurseries/tree farms
  - 59 agricultural customers
  - 3 golf courses
  - 1 National golf center
  - 1 equestrian center

  - Housing is exploding!

Water Conserv II – Largest Reuse Project in World

- 71 Rapid infiltration basins
- 185 Acres
- 100 Miles of pipe

- 30th Anniversary in 2016
- W&C operating facility
  - 18 full time staff
  - $16M of capital projects

The Project at a Glance…

Water Conserv II, Winter Garden, Florida	
Owner	City of Orlando / Orange County
Capacity	50 MGD (avg), 75 MGD (peak)
Primary treatment technology	Conventional activated sludge (w/ BNR)
Tertiary treatment technology	Disk filters
Disinfection technology	Chlorine disinfection
Water use	Irrigation, aquifer recharge
Year commissioned	1986
Cost	$40M
Current Operator	Woodard & Curran
# of Operations staff	18 operators

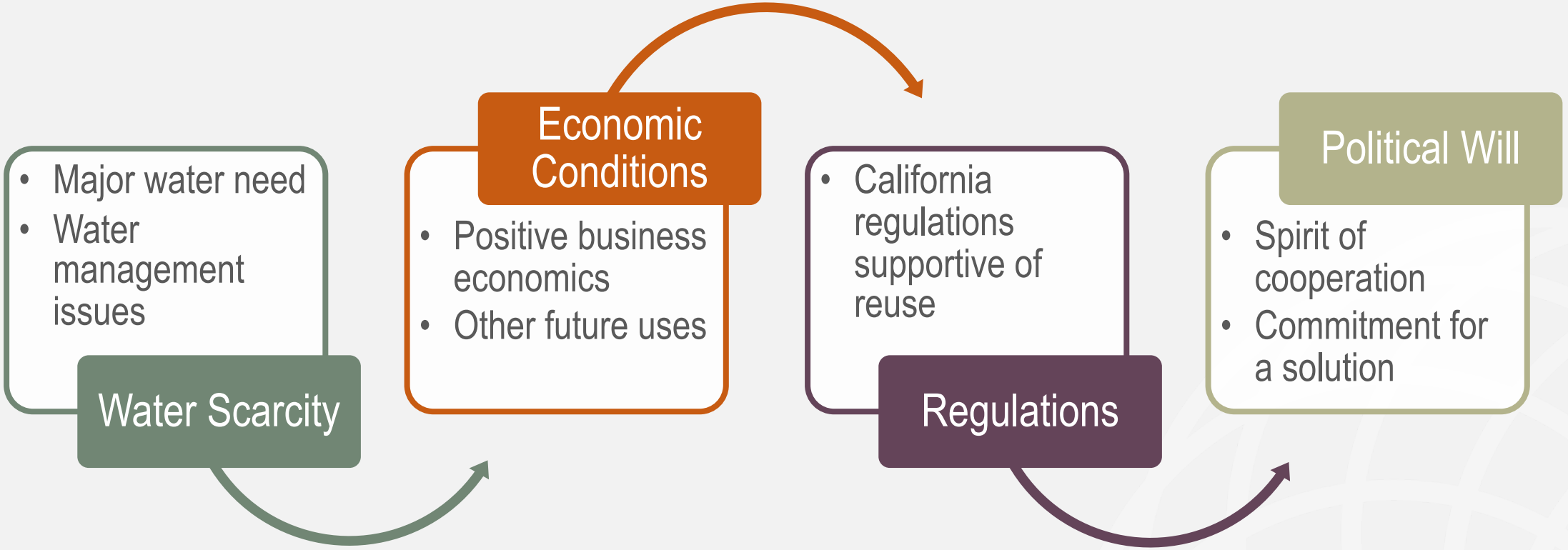
Water Conserv II (Florida)

- Benefits
  - Eliminated discharge to surface waters
  - Turned a liability into an asset for beneficial use
  - Proven, beneficial & cost effective year-round reclaimed water reuse
  - Reduced the demand on the Floridan aquifer
  - Aquifer replenishment

The Victorville Story in California

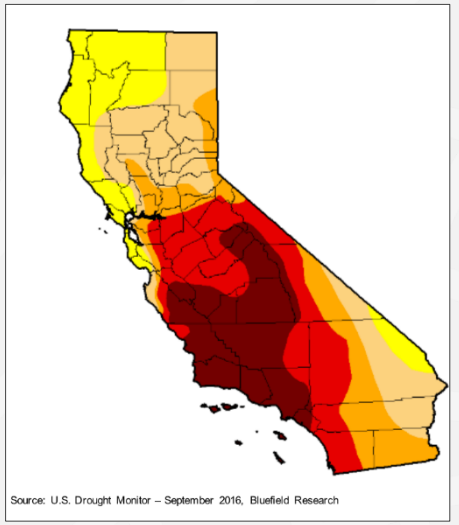
- City looking for economic development
- Interest from large beverage company
  - Great location for Western distribution
- 2.5 MGD combined industrial/sanitary facility

The Drivers for Victorville (California)

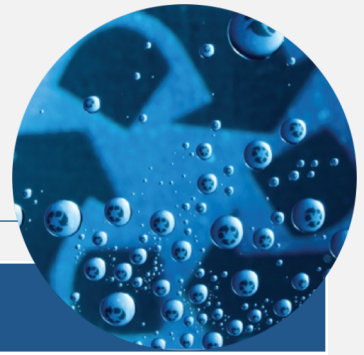


Victorville, CA

- Advanced economic development goals
- P3 - Able to leverage private & public money
- Design/build/operate maximized funding
- Addressed regional drought issues
- Plant expansion for additional water uses ongoing
- High Desert Power Plant - 830 MW
  - Up to 4,000 AFY
  - Up to ~2,500 GPM



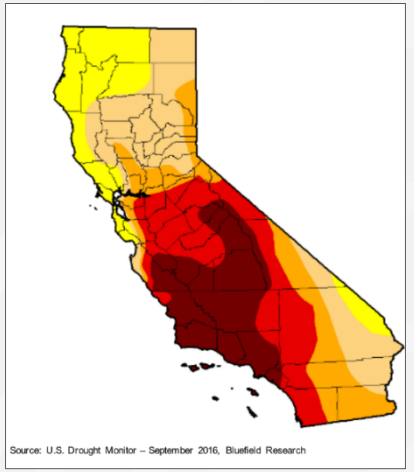
The Project at a Glance…



City of Victorville, California	
Owner	City of Victorville
Capacity	2.5 MGD (1 MGD industrial / 1.5 MGD sanitary)
Primary treatment technology	UASB reactor (industrial) / Activated Sludge (sanitary)
Tertiary treatment technology	MBR
Disinfection technology	UV
Water use	Cooling water, irrigation, percolation ponds
Year commissioned	2010
Cost	$46 million
Current Operator	Woodard & Curran
# of Operations staff	4 operators

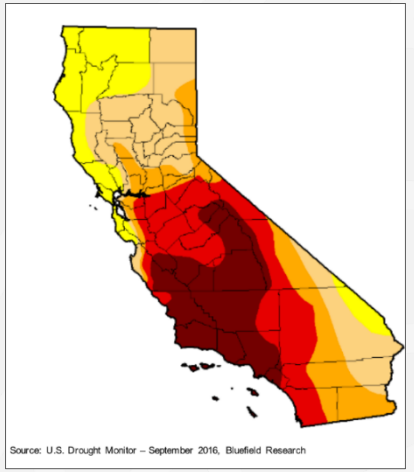
The Los Angeles Groundwater Replenishment Story

- Recycling stared in mid-1970s
- Drought in late-1980s, early ‘90s
- Project opposed in 1990s
- 2010 - Initiated extensive outreach
- 2017 - EIR approved
- 2019 - Initial phase on-line
- Investigating additional potable reuse opportunities



Los Angeles Groundwater Replenishment Project

- Long-term water plan
  - Increase reliability
  - Reduce dependence on imported water
- Initial phase 5,000 AFY (4.5 MGD)
- Up to 30,000 AFY (~27 MGD)
  - Irrigation & GW injection (10k AFY)
  - Environmental flows (20k AFY)
- Master Plan identified additional flow by 2035
  - +20,000 AFY of non-potable
  - +30,000 AFY of potable reuse

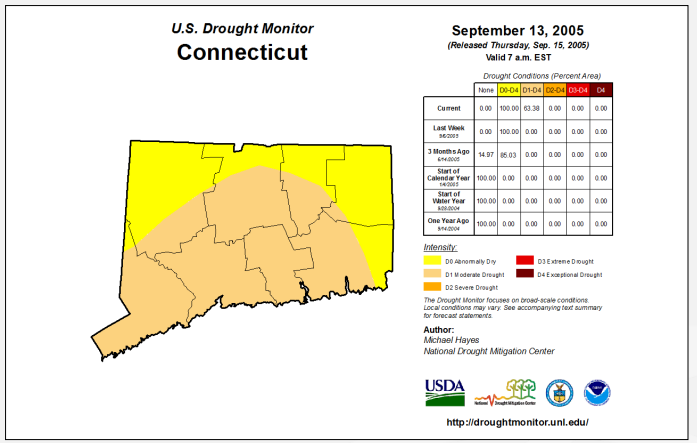


The University of Connecticut Story

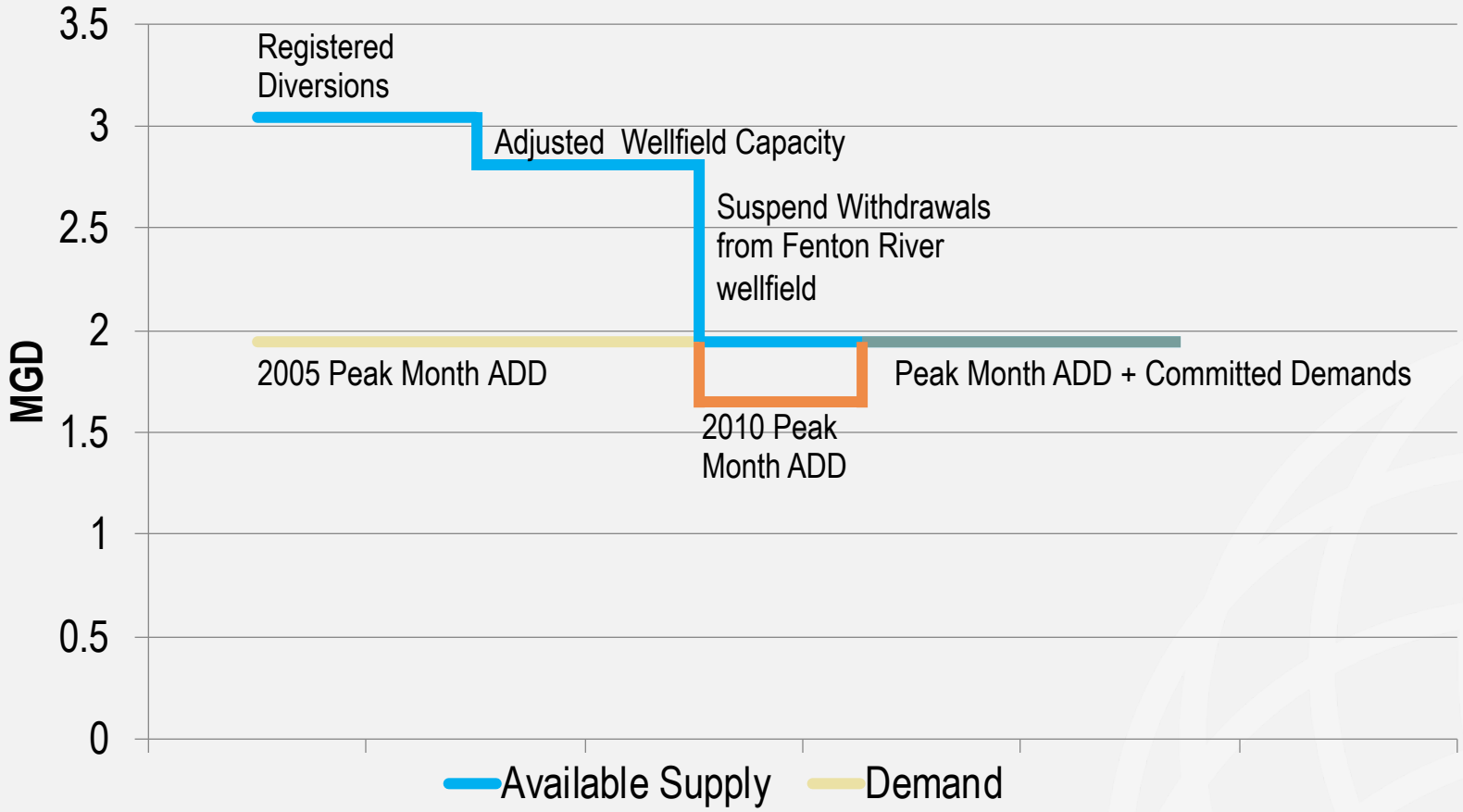
- Rapid campus growth 1995-present
- Major investment in University from State
  - $2.3 billion planned over 20 years
- Drinking water from well-field near Fenton River
- University owns WWTP on campus

The University of Connecticut Story

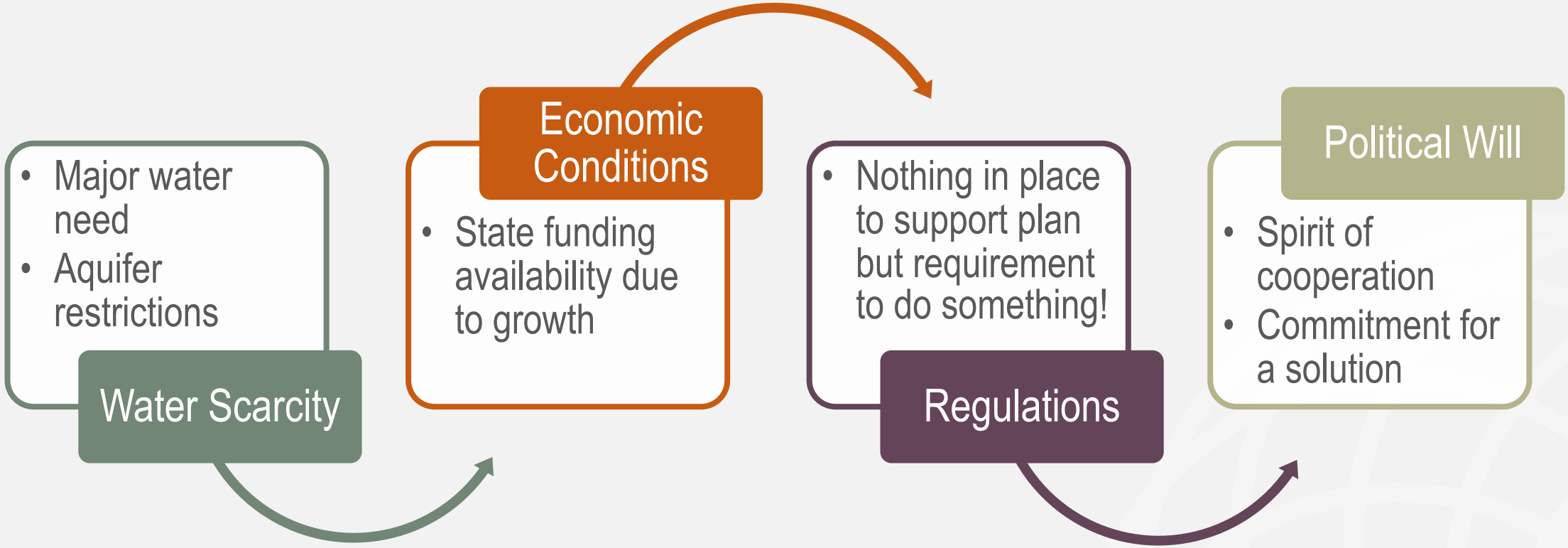
- Drought in 2005
  - A segment of the Fenton River along the UConn well field is desiccated
- State mandates UConn reduce water withdrawal rates by 1/3
- University implements conservation, sustainable design standards, reduces withdrawals
  - Not enough conservation available to meet goal



Water Supply vs Usage



The Drivers for the University of Connecticut



University of Connecticut

- The Reclaimed Water Facility
  - 3 redundant process trains
  - Vertical Turbine Pumps/VFDs
  - 500 Micron Auto-strainer
  - 0.1 Micron Microfiltration Membranes
  - A two pass Trojan UV unit
  - Processed water is stored in a 1 MG storage tank
- Processed water goes to the Central Utility Plant for steam generation and cooling tower operations

University of Connecticut

- Water Quality Results
  - Fecal Coliform Test Results - 0.00 Colonies per 100 mL
  - Biochemical Oxygen Demand - Average 0.70 mg/L
  - Total Suspended Solids - Average 0.88 mg/L

The Project at a Glance…

UCONN Water Reclamation Facility, Storrs, CT	
Owner	State of Connecticut
Capacity	1 MGD
Primary treatment technology	Oxidation ditch
Tertiary treatment technology	Microfiltration (membrane)
Disinfection technology	Ultraviolet and Chloramines
Water use	Cooling water
Year commissioned	2012
Cost	$28M
Current Operator	Woodard & Curran
# of Operations staff	4 operators

University of Connecticut

- Challenges
  - Lack of reclaimed water standard in CT
    - Can't use water for irrigation
  - Closed loop system
    - Need to add potable water to system to prevent problems at the CUP

Project Drivers Summary

	UConn	Conserv II	Victorville	Los Angeles
Water Scarcity	Reduced supply Increased demand	Reliable ag supply need Water source for growth	Limited, variable supplies Reduced quality	Imported water reliability Sustainable groundwater
	☑ ☐	☑ ☐	☑ ☐	☑ ☐
Economic Conditions	State (university) funding	Strong ag economics Local growth	Water/WW management for economic growth	Long-term supply certainty
	☑ ☐	☑ ☐	☑ ☐	☑ ☐
Regulations	No reuse regulations	Discharge prohibition No reuse regulations	CA reuse regulations CEC approvals	CA GRRP regulations approved in 2014
	☐ ☒	☑ ☐ ☐ ☒	☑ ☐	☑ ☐
Political Will	☑ ☐	☑ ☐	☑ ☐	☑ ☐

Thank you!

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