



Potable Reuse Advancements and How Arizona is Getting Prepared

University of Arizona Cooperative Extension

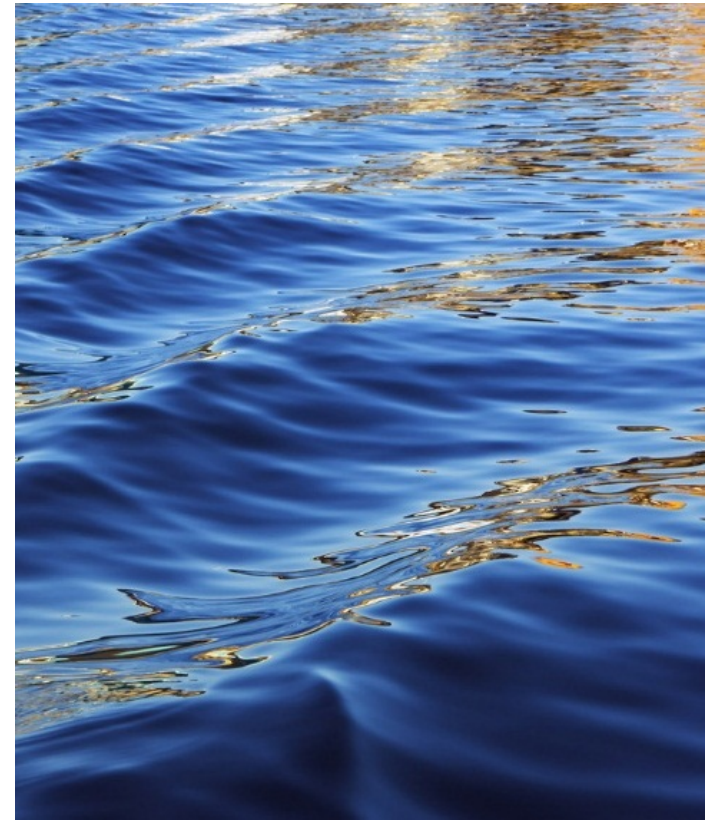




WATER REUSE
ARIZONA



Potable Reuse...
The Time Has Come

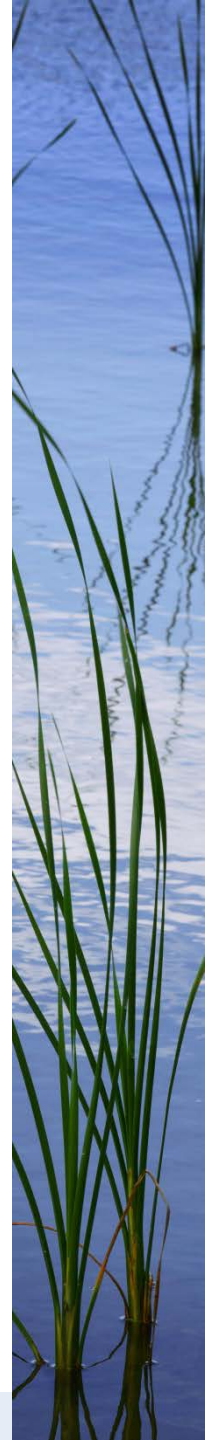
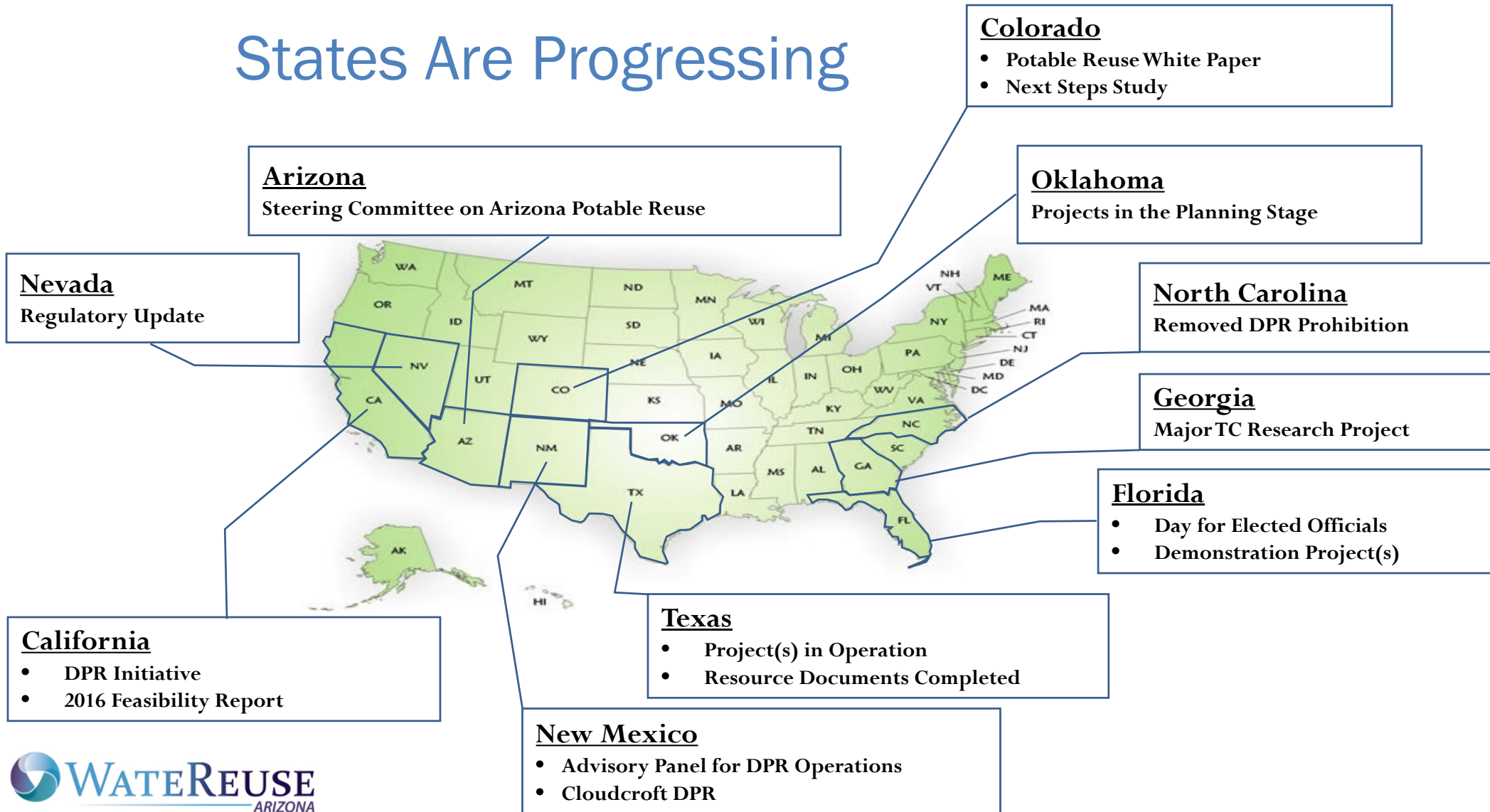


The “D’s” of Discussing Potable Reuse

30 Years Ago:	Deny (or) Delay
15 Years Ago:	Depend
5 Years Ago:	Disguise
Today:	Direct Dollars Delivered

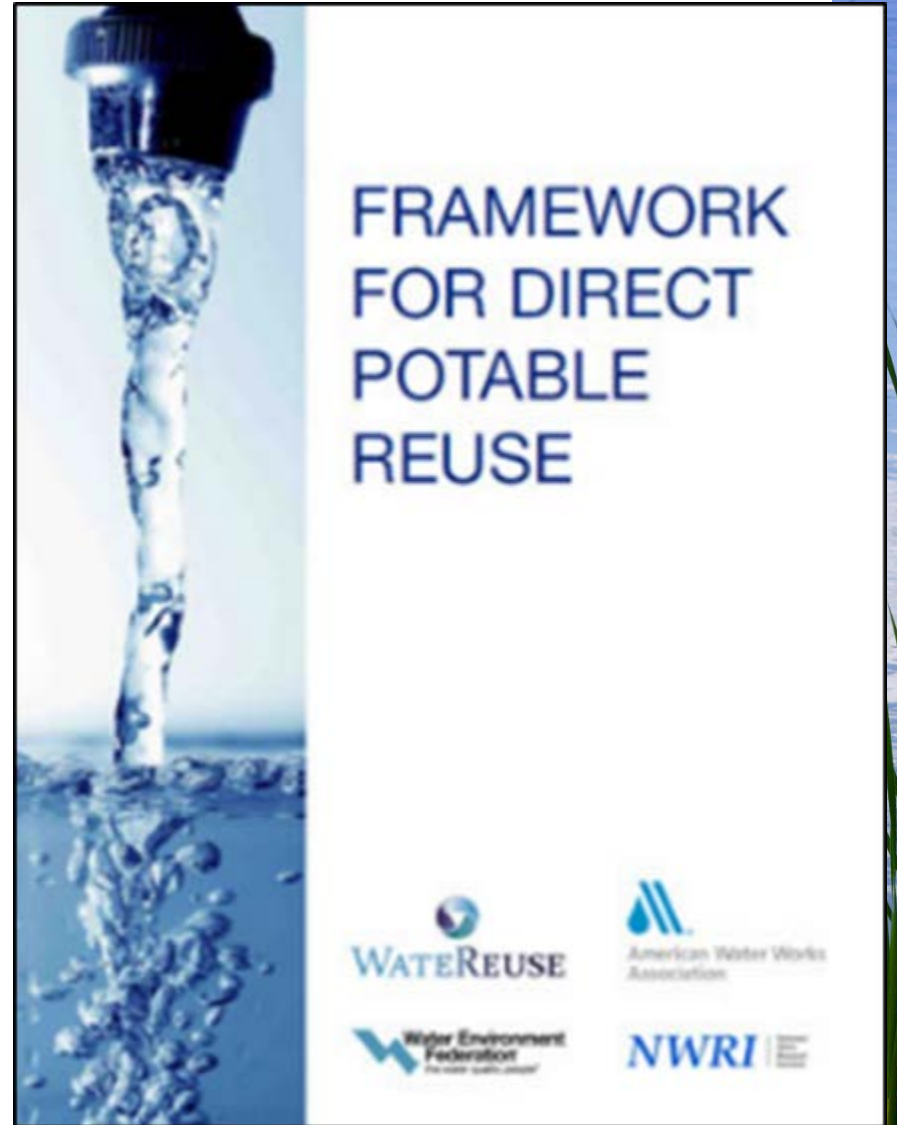


States Are Progressing



Framework for DPR

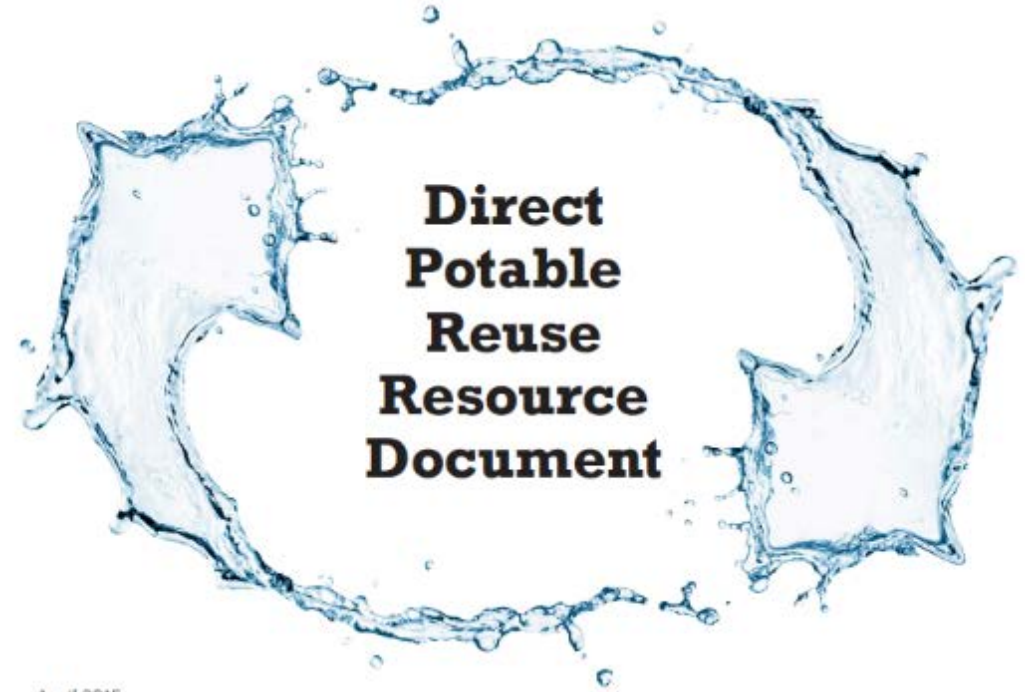
- Published by WaterReuse (2015)
- Sponsors: WaterReuse, AWWA, and WEF
- Developed by an NWRI Expert Panel
- Available at www.watereuse.org



Texas Experiences

- Operational DPR project(s)
- Direct Potable Reuse Resource Document
- General Approach: Individual Permits

FINAL REPORT



April 2015

TWDB Firm Registration No. F-13



TWDB Contract No. 1248321508
Volume 1 of 2

In conjunction with:

EOA, Inc. • Lloyd Gosselink Attorneys at Law • Nellor Environmental Associates, Inc. • Separation Processes, Inc. • Soller Environmental, LLC • Trussell Technologies, Inc. • Dr. Jörg Drewes, Technical University of Munich • Dr. Steven Duranceau, University of Central Florida • Dr. Desmond Lawler, University of Texas at Austin • Dr. Shane Snyder, University of Arizona • Dr. George Tchobanoglous, University of California at Davis



EXPERT PANEL
FINAL REPORT



Evaluation of the Feasibility
of Developing Uniform
Water Recycling Criteria
for Direct Potable Reuse

Sponsored by
California State Water Resources Control Board



California Regulations

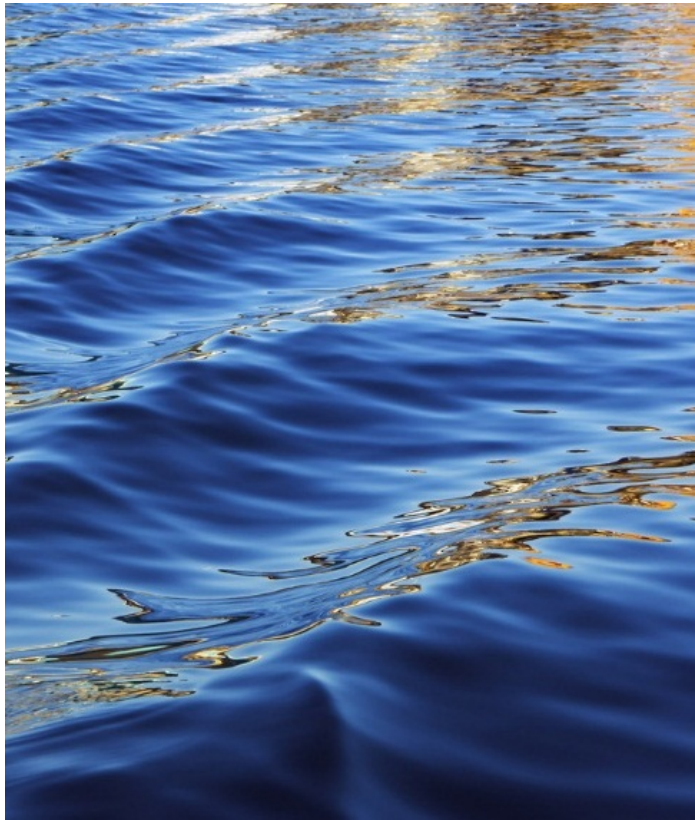
- **Groundwater replenishment (final)**
- **Surface water augmentation (draft)**
- **Expert Panel Report on Feasibility of Developing DPR Criteria for California (draft)**
- **Prescribed approach (RO)**



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Potable Reuse...
Is Arizona There Yet?



“Stuck in the Middle with You”



Prescribed
Treatment



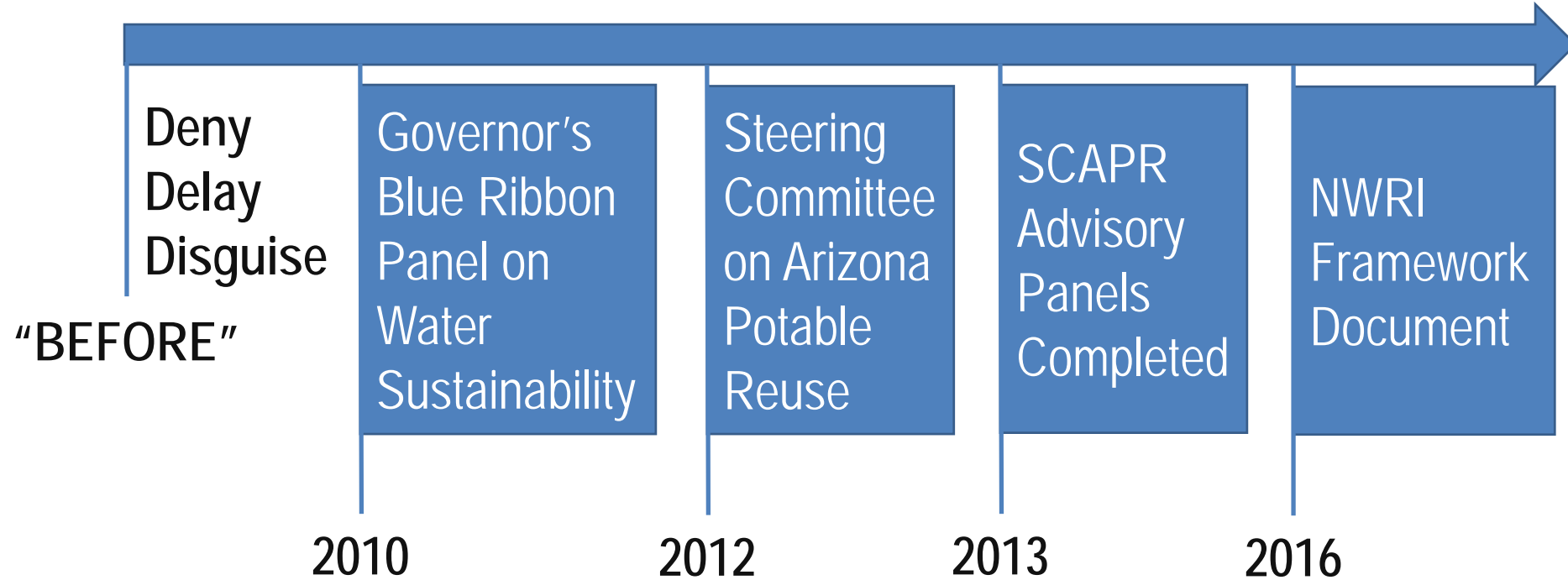
Performance
Basis



Case-by-Case
Permitting



Potable Reuse in Arizona – A Continuing Conversation



SCAPR Phase I Key Outcomes

1. Potable Reuse is “on the table” in Arizona
2. IPR projects are in place – and more on the way
3. A flexible regulatory framework is needed
4. Prime concerns:
 - Unregulated contaminants
 - Process monitoring/reliability
 - Brine management / avoidance
 - **Defining “safe”**



Purpose of Report:

Provide recommendations regarding the development of regulations on DPR in Arizona

Scope of Work:

Based on input from stakeholders, develop a document that provides specific recommendations on the range of topics needed for implementing DPR in Arizona





Goals

- Develop science-based recommendations
- Protect public health
- Provide a path for permitting DPR projects in Arizona



Why now?

ADEQ Reclaimed Water Rulemaking

Revisions Needed

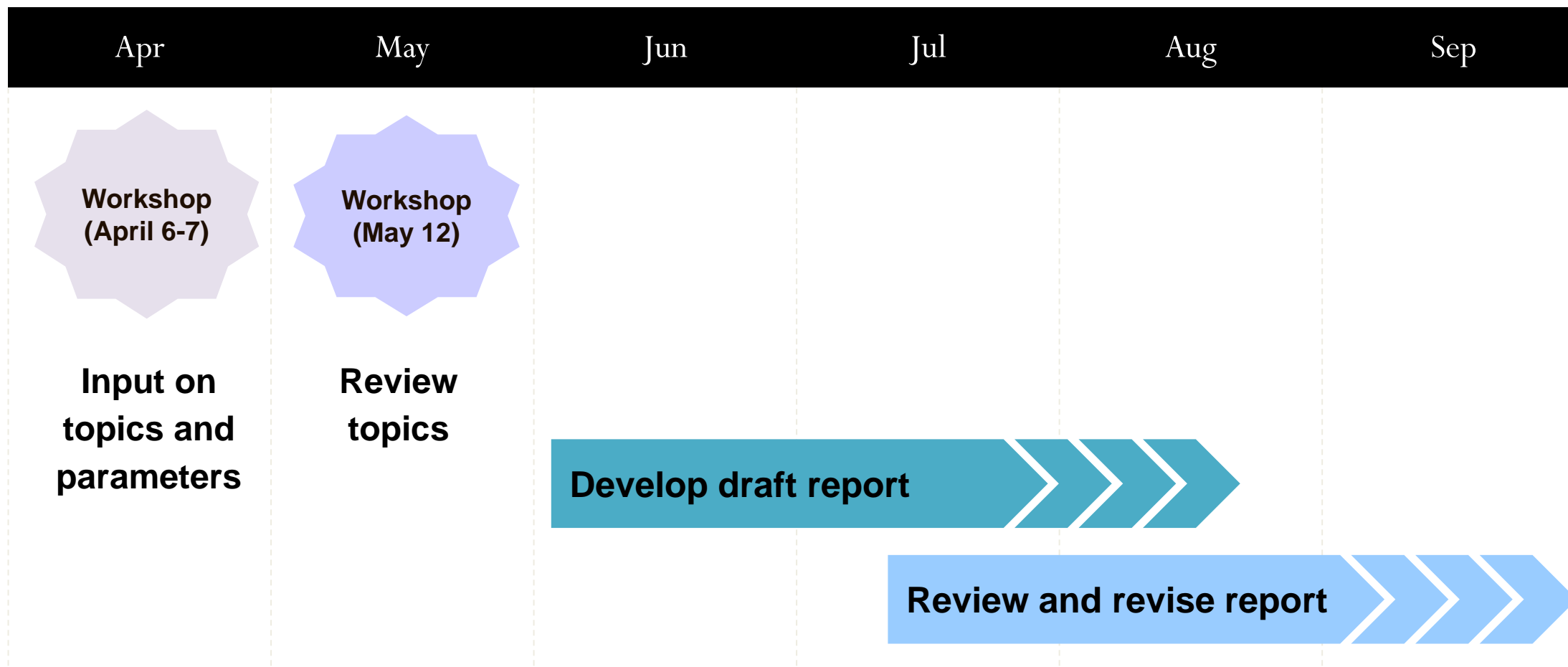
- **Process to revise Arizona rules on reuse of reclaimed water and gray water**

New Info Available

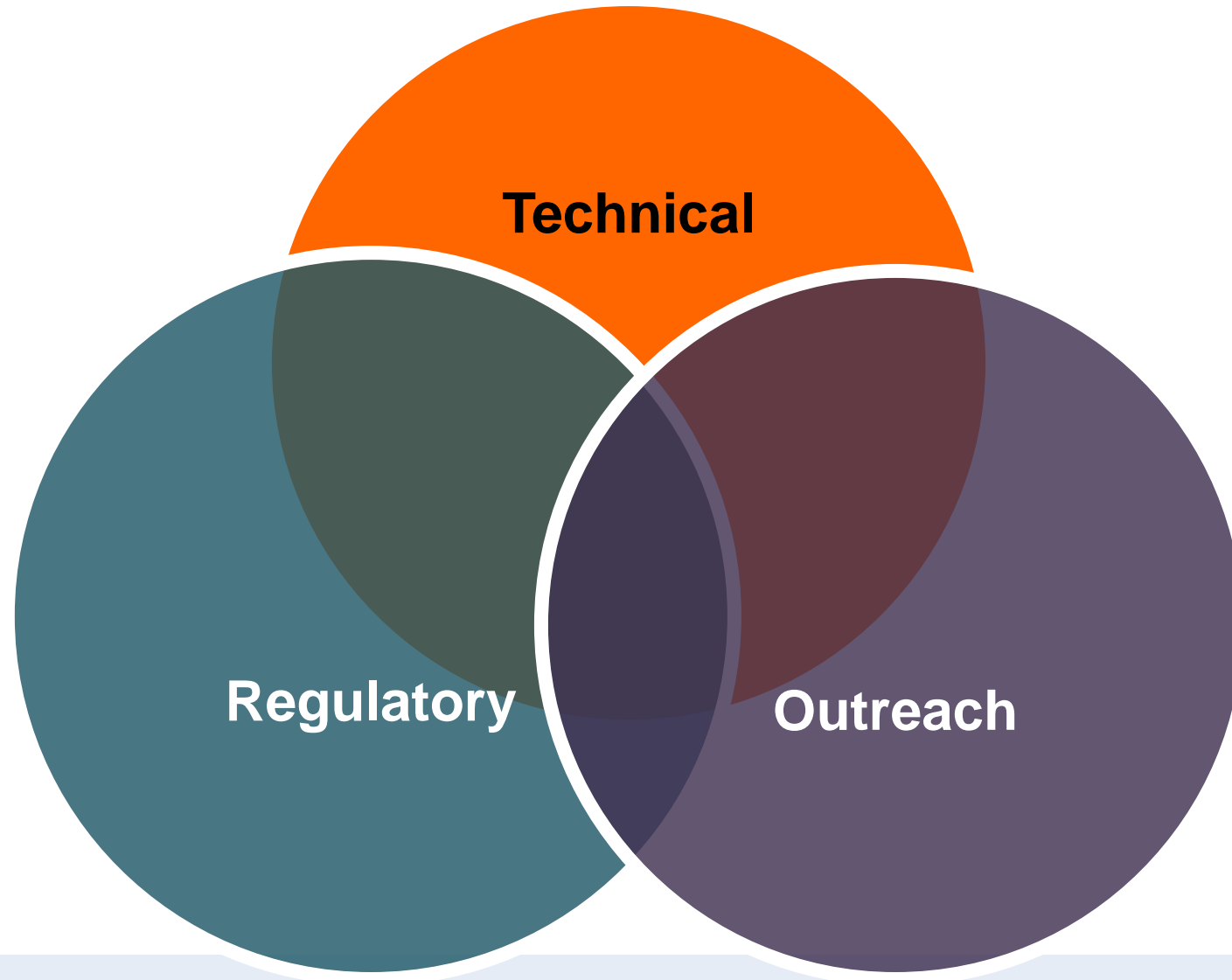
- **ADEQ last updated its reuse rules in 2001**
- **Expansion in reuse of treated wastewater**
- **Research and technology have moved forward**
- **New uses of reclaimed water have been proposed**



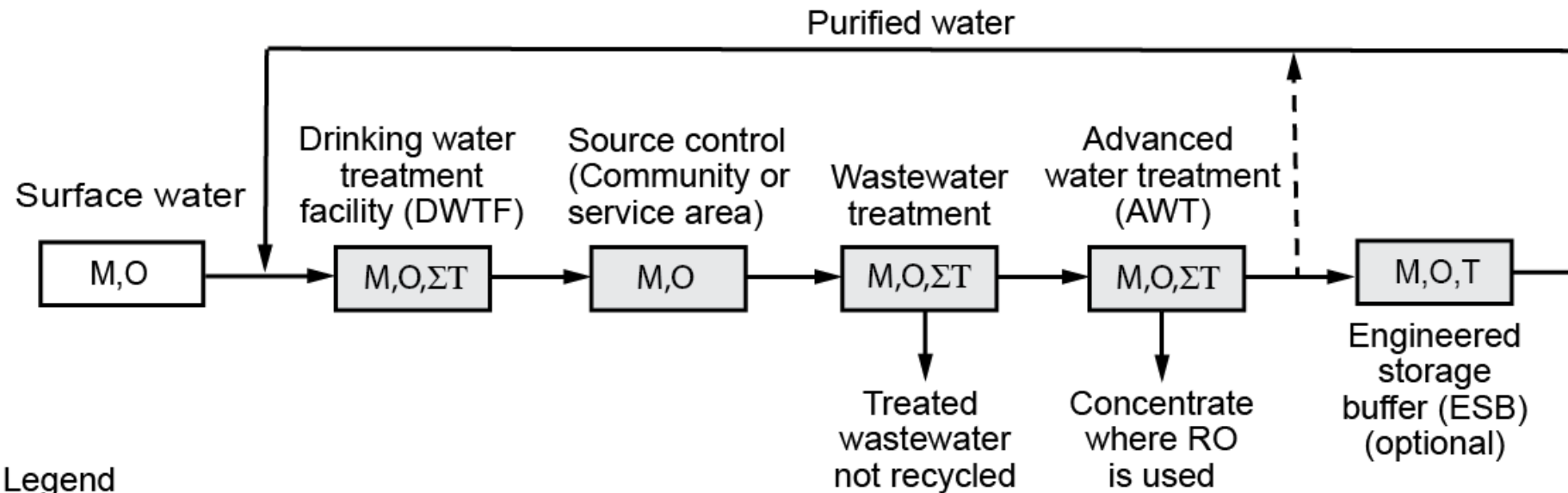
Framework Activities



Key components of DPR



Technical, Operational, and Management Barriers



Legend

- M = Management barrier
- O = Operational barrier
- T = Technological barrier
- ΣT = Sum of multiple technical barriers

NWRI Report under Development



The image shows a hand pointing to a central blue hexagon labeled 'INNOVATION'. This hexagon is part of a larger network of interconnected hexagons, each containing a related term: 'Idea', 'Development', 'Technology', 'Research', 'Experiment', 'Improvement', 'Creativity', and 'Concept'. The background is a blurred image of a person in a dark suit.

**Draft
Guidance
Framework
Document**

Chap. 1: Introduction

Overview

- **Water reuse in AZ**
- **Nonpotable reuse**
- **Planned potable reuse**
- **Potable reuse**
 - **IPR**
 - **DPR**
- **Terminology**

Studies

- **NRC Report 1998**
- **NRC Report 2012**
- **Risks from microbial and chemical constituents**

Organization

- **Chapter summaries**
- **Recommended resources**

Chap. 2: Public Health Considerations

Overview

- **Public health considerations**
- **Drinking water regulations**

Pathogens

Pathogen reduction criteria:

- **TCEQ approach**
- **NWRI Expert Panel/WRRF 11-02 approach**
- **Calif. IPR approach**

Chemicals

Targets:

- **MCLs**
- **Trace organics**
- **TOC**
- **1,4-dioxane and NDMA**
- **DBPs**

Chapter 3: Potable Reuse Recommendations



Topics

1. Rescind DPR prohibition
2. Applications
3. Outreach
4. Source control
5. Water quality classes
6. Microbial control
7. Log removal targets
8. Chemical control
9. Wastewater treatment

10. Advanced Water Treatment
11. Employ BADCT
12. Treatment performance
13. Long-term monitoring
14. Critical Control Points
15. Facility operations
16. TMF Capacity
17. Other considerations

Regulation

Permit

Guidance

4. Source control

Regulation

Permit

Guidance

- **What?** Control of the discharge of constituents (chemicals) into a wastewater collection system that:
 1. Can impact wastewater treatment.
 2. Are difficult to treat.
 3. May impair the water quality entering an advanced treatment facility.
- **Why?** Beneficial, efficient, and cost effective strategy for managing chemicals by keeping them out of the wastewater system.
- **Specific recommendations:**
 - Understand the sewershed and sources of chemicals.
 - Minimize discharge of harmful or difficult to treat chemicals.
 - Improve wastewater water quality. Provide public with confidence.

7. Log Removal Targets

- Comply with the following minimum log removals (including SWTR credits for the PSW) starting from the raw wastewater (California):
 - 12-log reduction of enteric virus,
 - 10-log reduction of *Giardia* cysts, and
 - 10-log reduction of *Cryptosporidium* oocysts
- Log removals can be adjusted based on an approved pathogen removal study of the wastewater treatment plant that assigns conservative log reduction credits (Texas)
- Apply credits to wastewater facility, advanced water treatment facility, and drinking water facility based on regulatory review.

8. Chemical Control

- **What?** Chemicals in wastewater must be removed to appropriate levels.
- **Why?** Chemicals in recycled water include both regulated and unregulated chemicals. Chemicals are typically chronic (nitrate is a notable exception). Trace organics (e.g., CECs) are often discussed.
- **Specific recommendations:**
 - Meet all MCLs and any additional state requirements (regulated chemicals)
 - Meet relevant health criteria established for unregulated chemicals.
 - Monitor for surrogates and indicators of treatment (performance monitoring) and water quality (verification monitoring).
 - Possibly use TOC as a measure for unknown chemicals.

10. Advanced Water Treatment (AWT)

- **What?** Involves unit processes (a range exists) for treating wastewater effluent to produce a drinking water source of supply.
- **Why?** Must meet regulatory review (pathogens and chemicals) and public scrutiny.
- **Specific recommendations:**
 - Define the objectives (pathogen log removals and chemical control).
 - Do not list specific treatment trains (avoid the notion of prescribed trains).
 - Instead, provide lists of advanced treatments and the capabilities.
 - Use of pilot testing and/or demonstration studies.
 - Track research and field experience. Understand reliability (performance of treatment).
 - Role of “environmental storage buffer”

14. Critical Control Points

- **What?** Point in the treatment train (i.e., a unit treatment process) that is designed to reduce, prevent, or eliminate a human health risk and for which controls exist to ensure the proper performance of that process.
- **Why?** Systematic approach to inform the effective operation of AWTF through performance-based monitoring (augment end-of-pipe monitoring)
- **Specific recommendations:**
 - Identify hazards
 - Identify CCPs
 - Identify monitoring procedures
 - Identify corrective actions and procedures

16. TMF Capacity

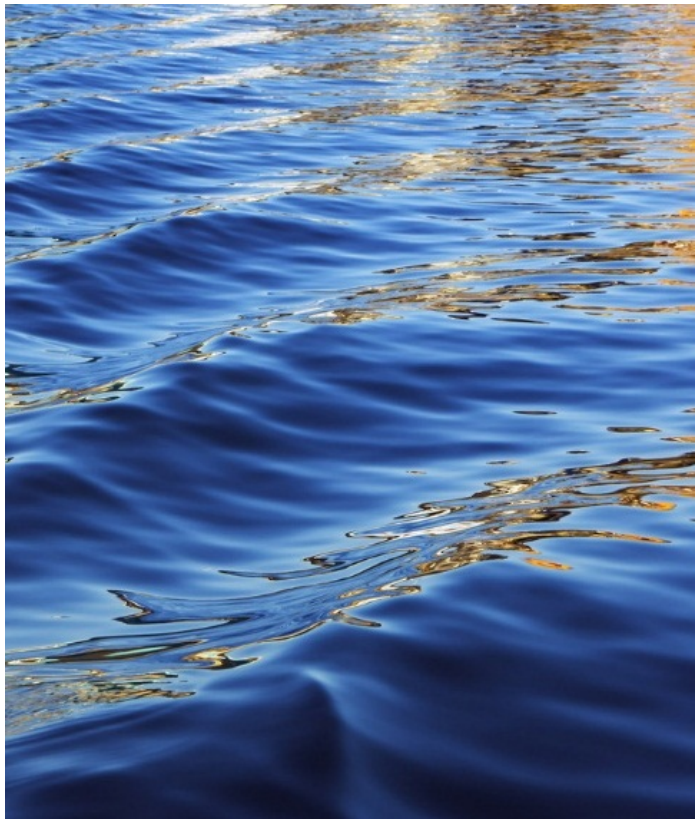
- **What?** Technical, Managerial, and Financial Capacity – ability of a water utility to provide safe and dependable water (required by SDWA)
- **Why?** Regulators can assess a utilities potential or existing weaknesses to provide safe and reliable advanced treated water.
- **Specific recommendations:**
 - Build on existing capacity develop program for PWSs
 - Expand current TMP program to address DPR
 - Ability to review small systems



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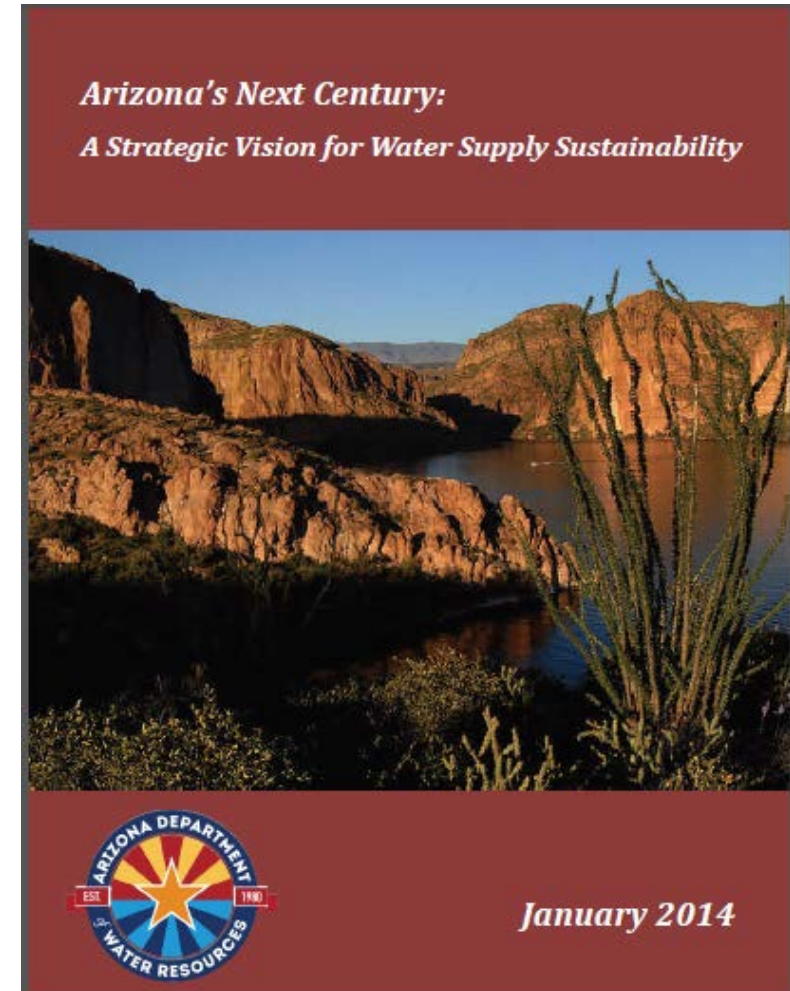


Conclusions



Focus on Solutions

- The need within 25-100 years is **0.9 to 3.2 MAF**
- “As demands increase and water supplies become more stretched, the need to explore and invest in **direct potable reuse for drinking water supplies** will become **necessary.**”



Recycled Water in Arizona: Right Water for the Right Use

