Technical Feasibility and Permitting Requirements for ASR Projects

Water Law in Eastern Washington Conference

Spokane, WA

May 15-16, 2024

GSI Water Solutions, Inc.

Presentation Outline

What is ASR?

- General concept
- Uses and benefits
- Key factors in ASR feasibility
- History of ASR in WA and OR

Permitting ASR in WA and OR

- General overviews
- Similarities and differences

Case Study – City of Kennewick, WA

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Presentation Focus

ASR Supply

- Approved drinking water supply source (surface water or groundwater)
- ~~Stormwater~~
- ~~Reclaimed water~~

Recharge

- Direct injection
- Single well
- ~~Surface infiltration~~
- ~~Spreading basin~~

Underground Storage

- Approved drinking water supply source (surface water or groundwater)
- ~~Stormwater~~
- ~~Reclaimed water~~

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What is ASR?

What is ASR?

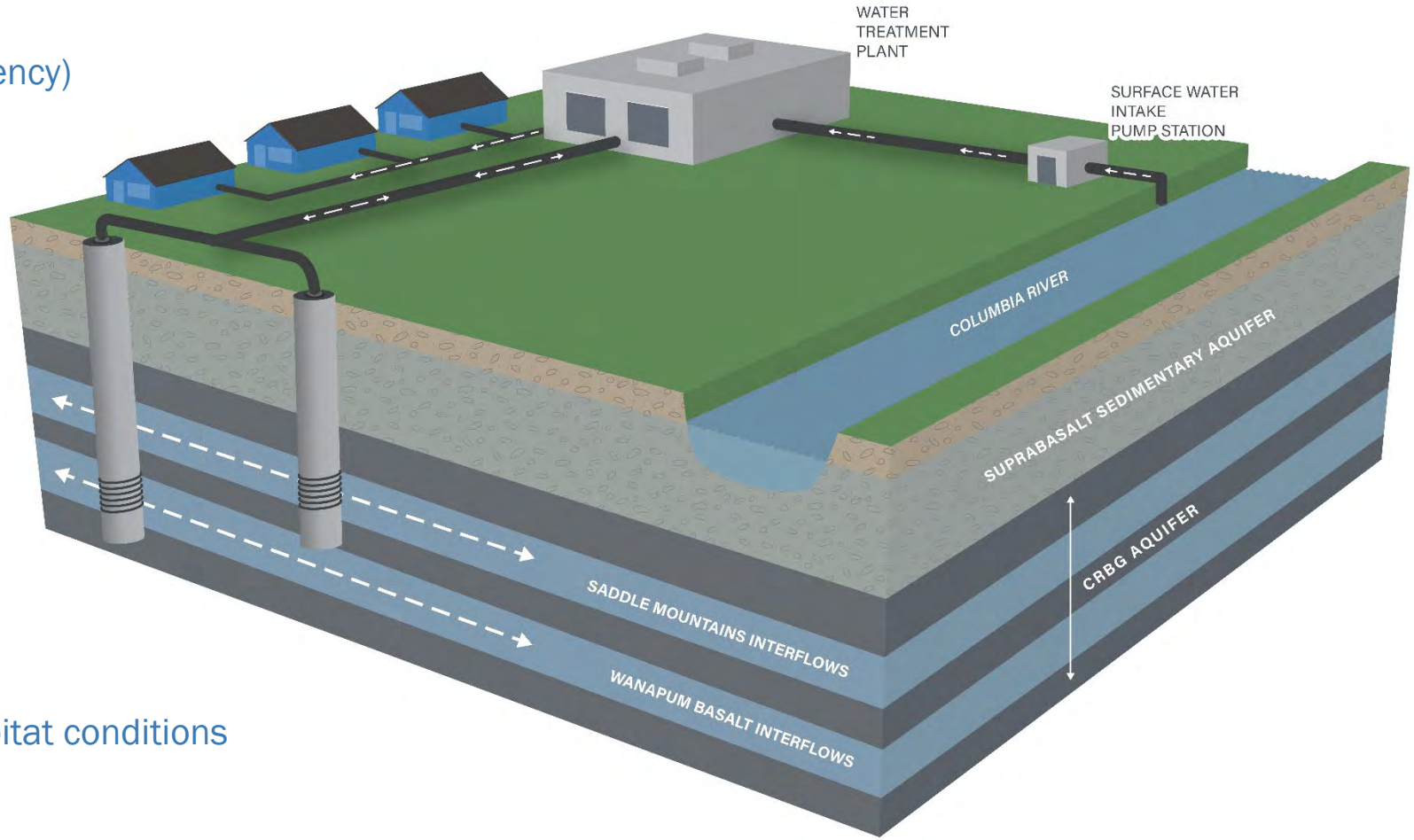
- Water supply management strategy
- Surplus water stored in a suitable aquifer for later recovery

ASR Uses

- Storage (e.g., seasonal, long-term, emergency)
- Water supply
- Improve water quality
- Hydraulic barrier
- Ecological purposes

ASR Benefits

- Low-cost, natural storage option
- Help meet peak summer demands
- Restore groundwater levels
- Enhance wellfield production
- Improve or protect water quality
- Secondary and emergency source option
- Enhance instream flows
- Improve watershed functions and fish habitat conditions



Key Feasibility Factors

High quality, reliable, and legally authorized **water supply** source

Properly designed **well** and suitable **aquifer** system

Geochemical compatibility

Water **conveyance/infrastructure**

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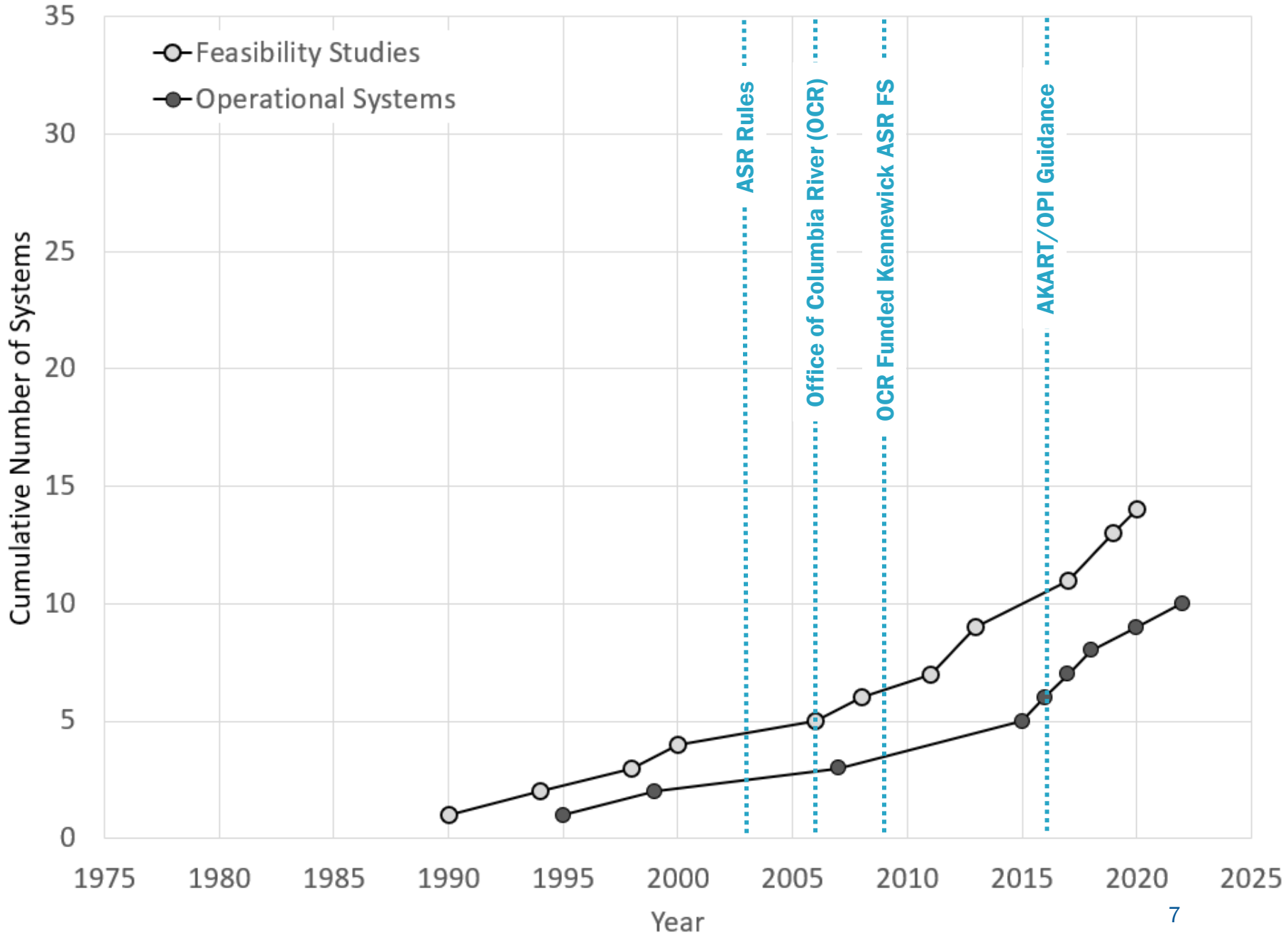
WA ASR History



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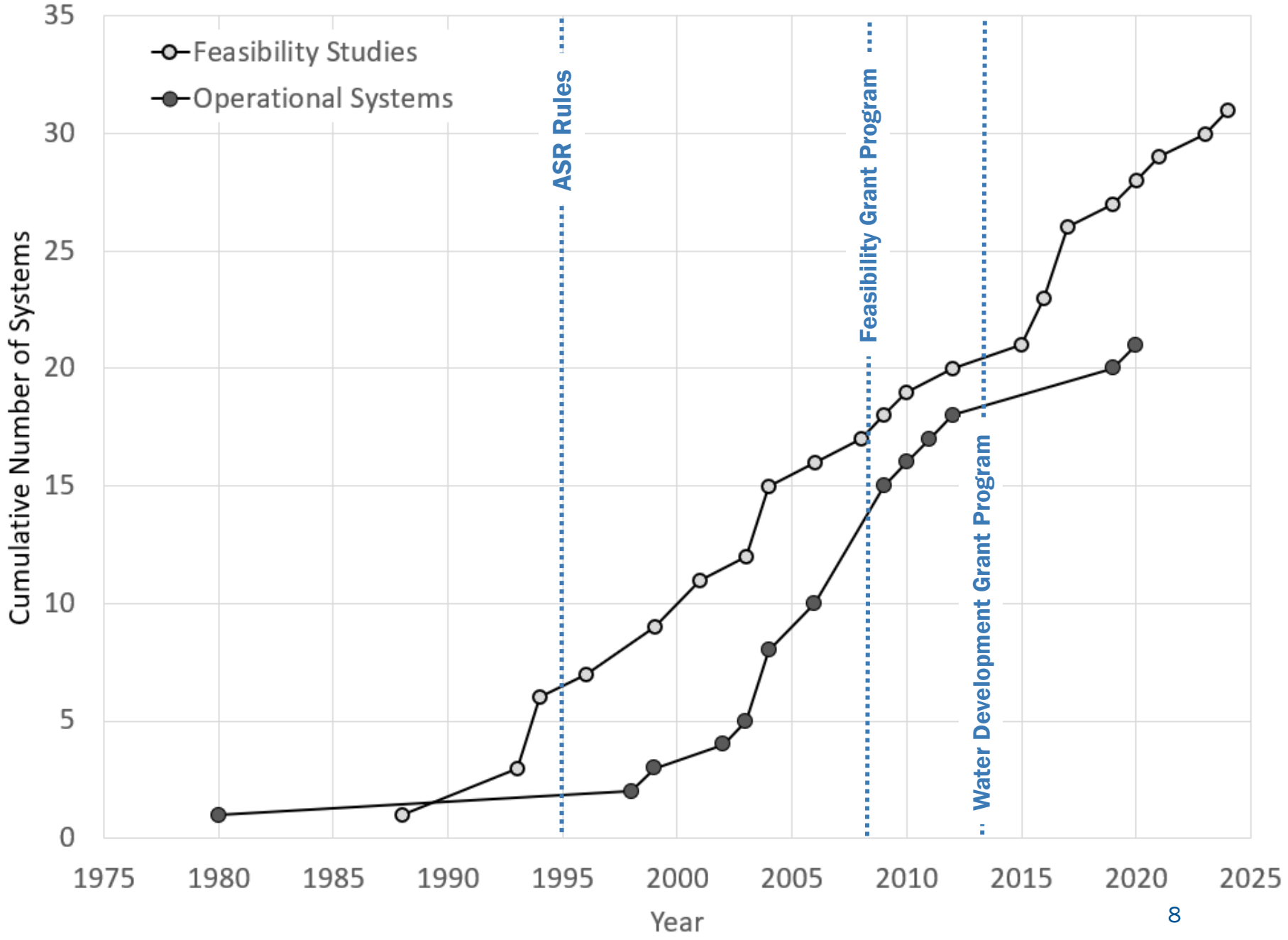
OR ASR History



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Permitting ASR in WA and OR

WA ASR Permitting General Overview

ASR Laws and Regulations

- Chapters 90.03, 90.44, 90.48, 90.54 RCW
- Chapters 173-157, 173-200, 173-218 WAC
- Chapter 246-290 WAC

State Agencies Involved

- Permitting authority is Ecology, in coordination with WDOH and WDFW

Permitting Pathway

- Preliminary permits (drill and test; store and recover)
- Temporary permit
- Report of examination
- Reservoir permit (20 years, max of 50)
- Proof of Appropriation → Certificate

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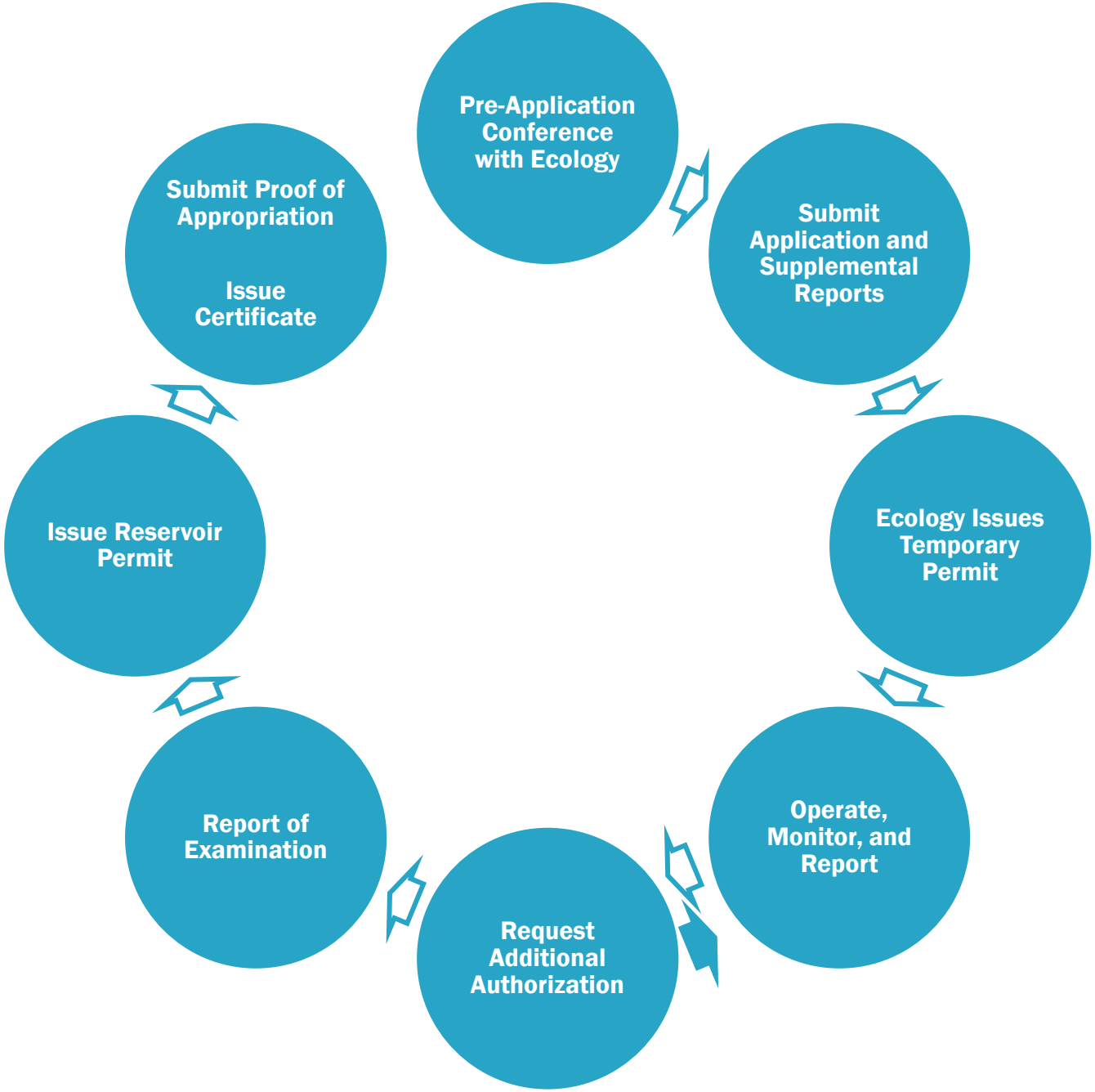
WA ASR Permitting General Overview



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OR ASR Permitting General Overview

ASR Laws and Regulations

- ORS 537.531 to 537.534
- OAR 690-350-0010 to 690-350-0030
- OAR 333-061 and 340-040

State Agencies Involved

- Permitting authority is OWRD, in coordination with ODEQ, OHA, and ODFW

Permitting Pathway

- ASR Limited License – available for 5 years and renewable
- Final ASR permit – Long-term permanent authorization available after project has grown into full rates/volumes

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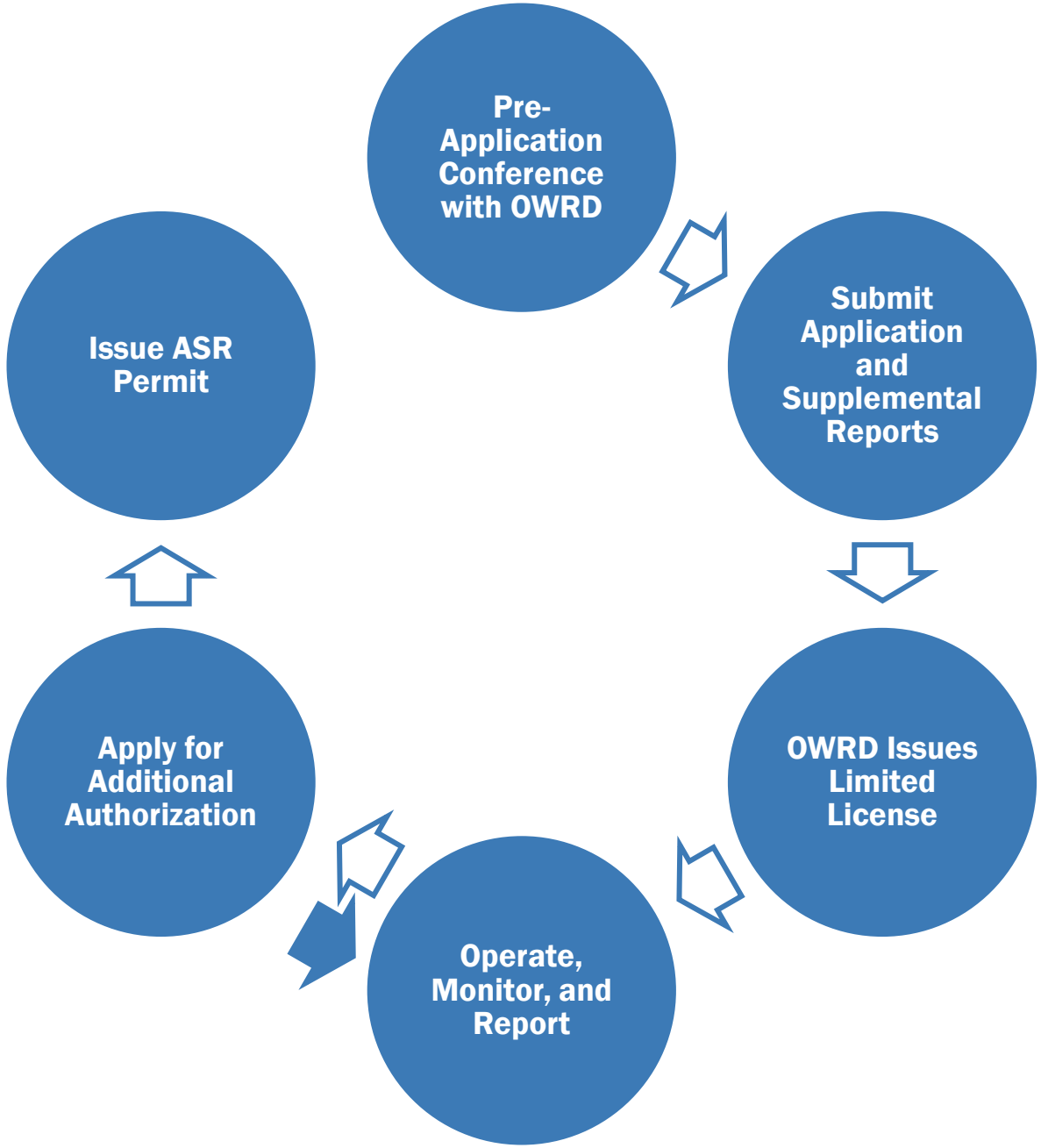
OR ASR Permitting General Overview



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Permitting Similarities

ASR Permitting Process – WA and OR

Step	Washington	Oregon
Pre-Application Conference	Optional (highly recommended)	Required
Submit Application and Supplemental Reports	Required	
Authorization	Required – Preliminary and Temporary Permits	Required – Limited License
Operate, Monitor, and Report (*i.e.*, pilot testing)	Required	
Continued Authorization	Request additional Temporary Permit	Apply to extend Limited License
Report of Examination	WA-Specific	---
Permit	Reservoir	Final
Certificate	WA-Specific	---

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Permitting Differences

ASR Permitting Process – WA and OR

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ASR Application Requirements

Submittals and *Supporting Information*	**Washington** (Chapter 173-157 WAC)	**Oregon** (OAR 690-350-0020)
Application	Required – Reservoir Permit Application	Required – Limited License Application
General Information	*Applicant and Authorized Agent information*	
Source Water	*Type and availability • Legal access/authorization • Diversion/withdrawal rates, durations, and volumes • Water quality*	
Groundwater System and Storage Aquifer	*Hydrogeologic conceptual model • Groundwater characteristics • Estimated storage volume • Potential area affected by ASR activities*	
Water Quality Standards	*Source water compliance with antidegradation policy • Recovered water compliance with drinking water quality standards*	
Geochemical Compatibility	*Potential adverse geochemical impacts on water quality, aquifer performance, and ASR well performance*	
Land Use, Environmental Assessment, Mitigation Plan	*Potential adverse environmental impacts • Proposed actions*	
Proposed System Design and Operations, Testing, and Monitoring Plans	*Well construction • Pipes/valves • Recharge/recovery rates, volumes, and schedules • Water quality/quantity monitoring plans • Water level monitoring plan • Recovery percentage • Annual reporting*	

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Differences and Potential Challenges

Antidegradation	
• Maintain existing and future beneficial uses of groundwater source • Protect against degradation of groundwater quality	
Washington	**Oregon**
Contaminants reducing existing quality shall not be allowed, except where it can be demonstrated that: • OPI will be served, and • Contaminants provided with AKART prior to entry Is AKART met? Do project benefits exceed potential risks?	• Employ technically feasible, practical, and cost-effective methods to reduce concentrations • OWRD may set specific limits between 50 and 100% of drinking water MCLs or groundwater quality MMLs • Constituents having SMCLs may be injected up to drinking water standards • Constituents associated with disinfection (e.g., DBPs) may be injected up to drinking water standards

AKART = All known, available, and reasonable methods of prevention, control, and treatment
DBPs = Disinfection byproducts
MCLs = Maximum contaminant levels
MMLs = Maximum measurable levels
OPI = Overriding public interest
SMCLs = Secondary maximum contaminant levels

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Differences and Potential Challenges

Recovery Percentage	
• How much of the stored water can be withdrawn from an ASR system? • Recovery percentage = total volume of water recovered from storage ÷ total volume of water recharged	
Washington	**Oregon**
• Applicant must provide an estimate of the recovery percentage • Can be revised as additional data becomes available through multiple ASR cycles	• Establishes 95 percent recovery percentage • Allows pilot testing to demonstrate achievability (e.g., no injury to existing water users and no net change in storage)

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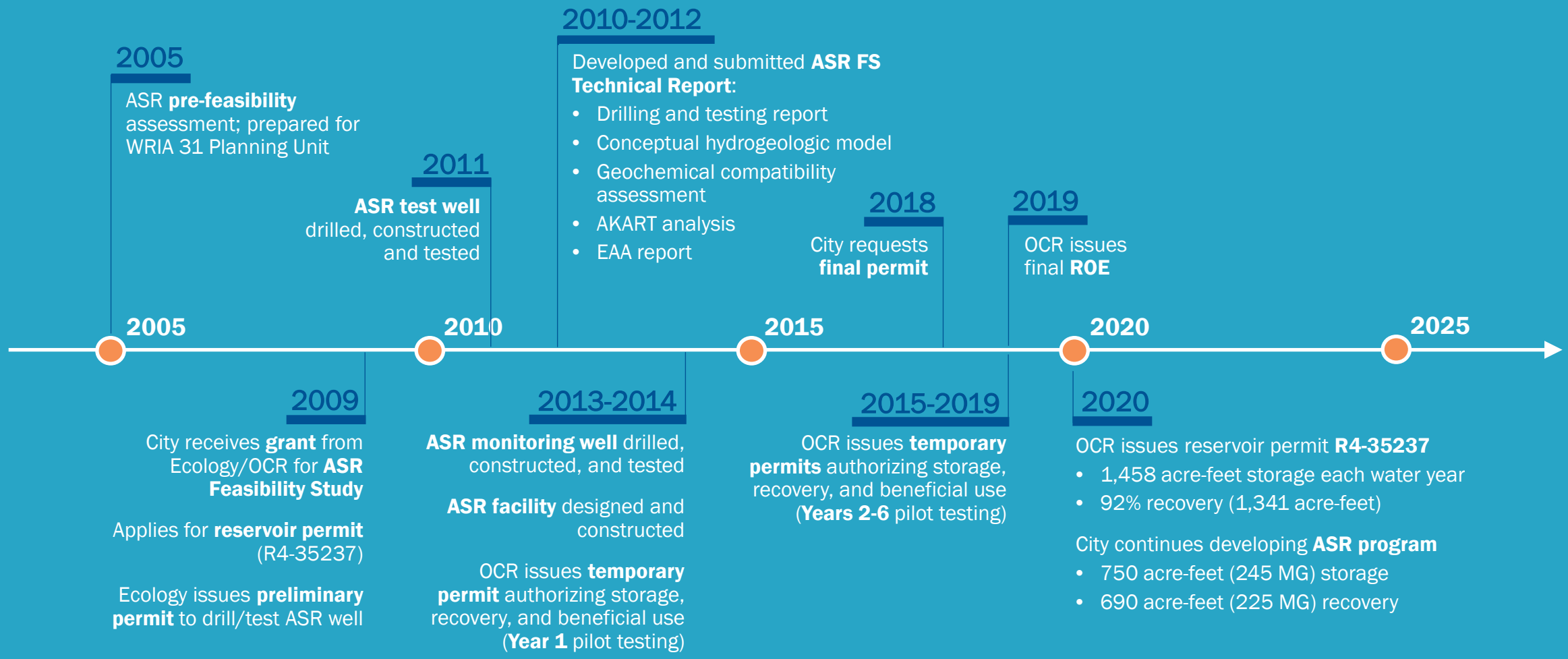
Case Study – City of Kennewick WA

Kennewick ASR-1 Program Development History



City of Kennewick ASR-1 Program

R4-35237 Permit Summary

Provision	Description
Recharge / Recovery rate	1,800 gpm / 2,080 gpm
Recharge / Recovery volume	1,458 acre-feet / 1,341 acre-feet (475 MG / 437 MG)
General Operations	• Recharge: October thru May • Storage: ~1 month • Recovery: May thru October
Source water rights	3897-A, S4-25479C, S4-30976P
Annual recovery percentage	92%
Carryover storage	Allowed. Reduced by 8% each successive year that residual recharge water remains as carryover storage
Development schedule	• Complete project: 12/31/2038 • Put water to full beneficial use: 12/31/2039 • Options to extend permit; not to exceed 50 years

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City of Kennewick ASR-1 Program

R4-35237 Permit Summary

Provision	Enforcement Limits
Source Water Quality (POC is ASR-1 prior to recharge)	Notify Ecology: • >50% MCL THM (>0.040 mg/L) • >50% MCL HAA5 (>0.030 mg/L) Notify Ecology and collect confirmation samples: • >75% MCL THM (>0.060 mg/L) • >75% MCL HAA5 (>0.045 mg/L) Two consecutive confirmation samples >75% MCL: • Cease recharge and not resume until plan in place to reduce concentrations
Groundwater Quality (POC is ASR-MW-1)	

ASR-1 = City's ASR injection/recovery well
ASR-MW-1 = City's ASR monitoring well
HAA5 = Total haloacetic acids
mg/L = milligrams per liter
POC = Point of compliance
THM = Total trihalomethanes

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City of Kennewick ASR-1 Program

- Operational Scale Results
  - No observed net negative change in storage from year-to-year
  - DBPs below detectable limits in water recovered from storage
  - No DBPs generated during storage
  - No observed hydraulic, well performance, or thermal storage zone development limitations
  - ASR continues to be a key component in managing and optimizing the City's water supply resources
- Benefits
  - Uses an otherwise unfavorable aquifer for municipal storage/supply
    - Background groundwater temperature > 80°F
    - Water recovered from storage < 65°F
  - Favorably shifts water withdrawals from the Columbia River
  - Adds redundancy to the City's existing water supply sources

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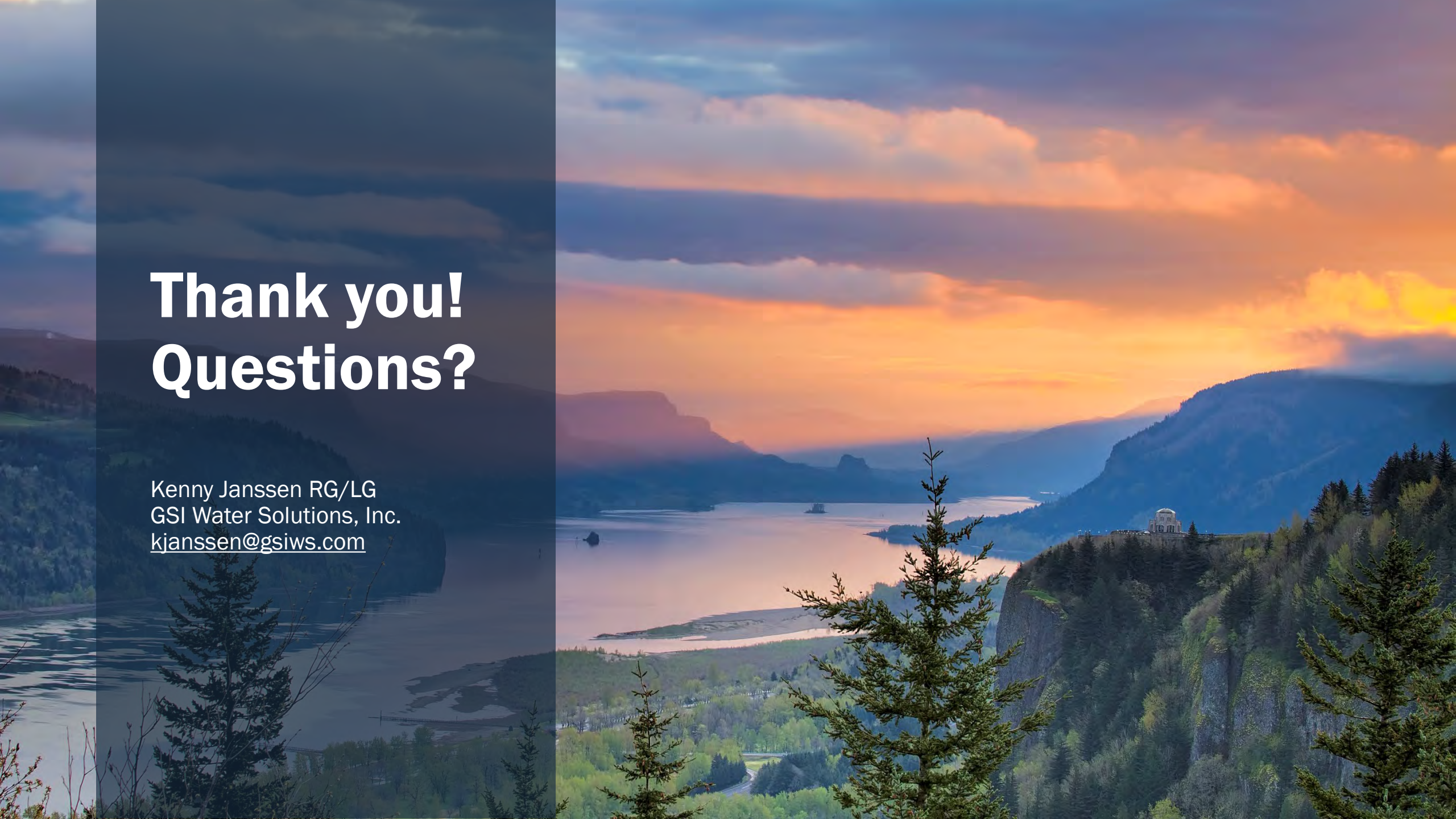

Thank you!
Questions?

Kenny Janssen RG/LG
GSI Water Solutions, Inc.
kjanssen@gsiws.com