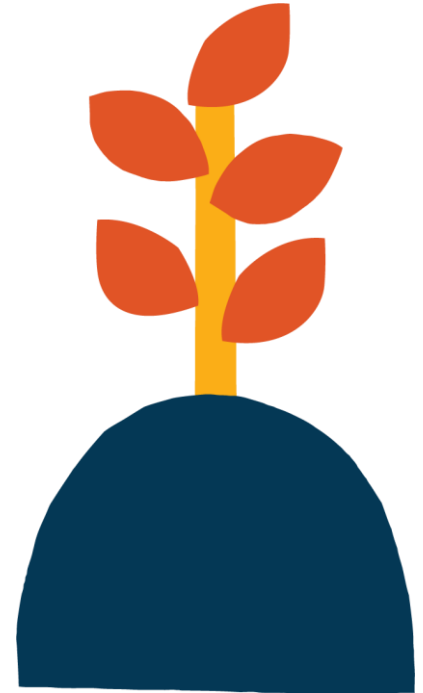


Practical Considerations for Water Reuse Systems

Ian Toevs

May 22, 2025



Terminology / Water Classification

Reclaimed water

- Implies the water source is domestic wastewater (sewage)
- Used for aquifer recharge, streamflow augmentation, on-site uses, etc.

Agricultural Industrial Process Water

- Food processing SIC only
- Agricultural use cases (i.e. irrigation)

Industrial Reuse Water

- Land application (irrigation) etc.

Land Treatment of Wastewater

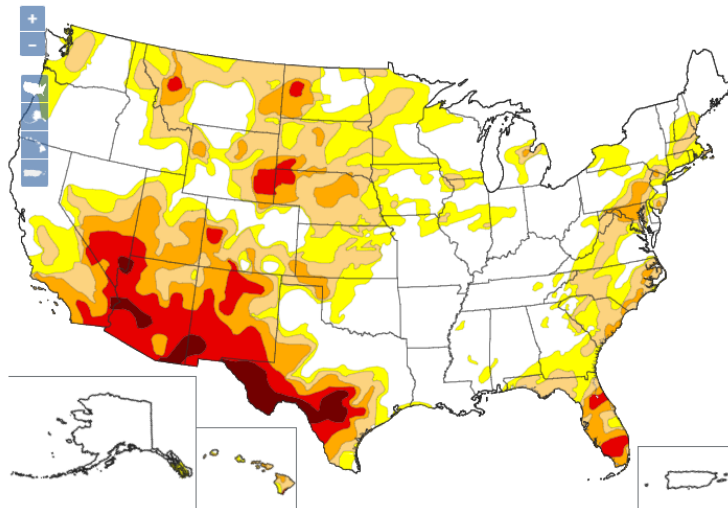
- Land application (land treatment)
- Permitted through State Waste Discharge program

Process reuse

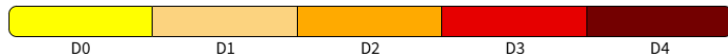
- Water remains inside the factory “box”

Why Reuse Water?

U.S. Drought Monitor



U.S. Drought Monitor



Source(s): NDMC, NOAA, USDA
Data Valid: 04/29/25

Drought.gov

Water scarcity

Drought risk mitigation

Future growth

Wastewater management
(where does it go)

Define Use Case

What is the necessary water quality?



LANDSCAPING /
IRRIGATION



REUSE IN
INDUSTRIAL
PROCESSES



INDUSTRIAL
SYMBIOSIS



DIRECT POTABLE
REUSE



AQUIFER
STORAGE /
RECHARGE

Business Case Considerations



CapEx



OpEx



Residuals management

What?
How?
Where?
How much?



Operator expertise

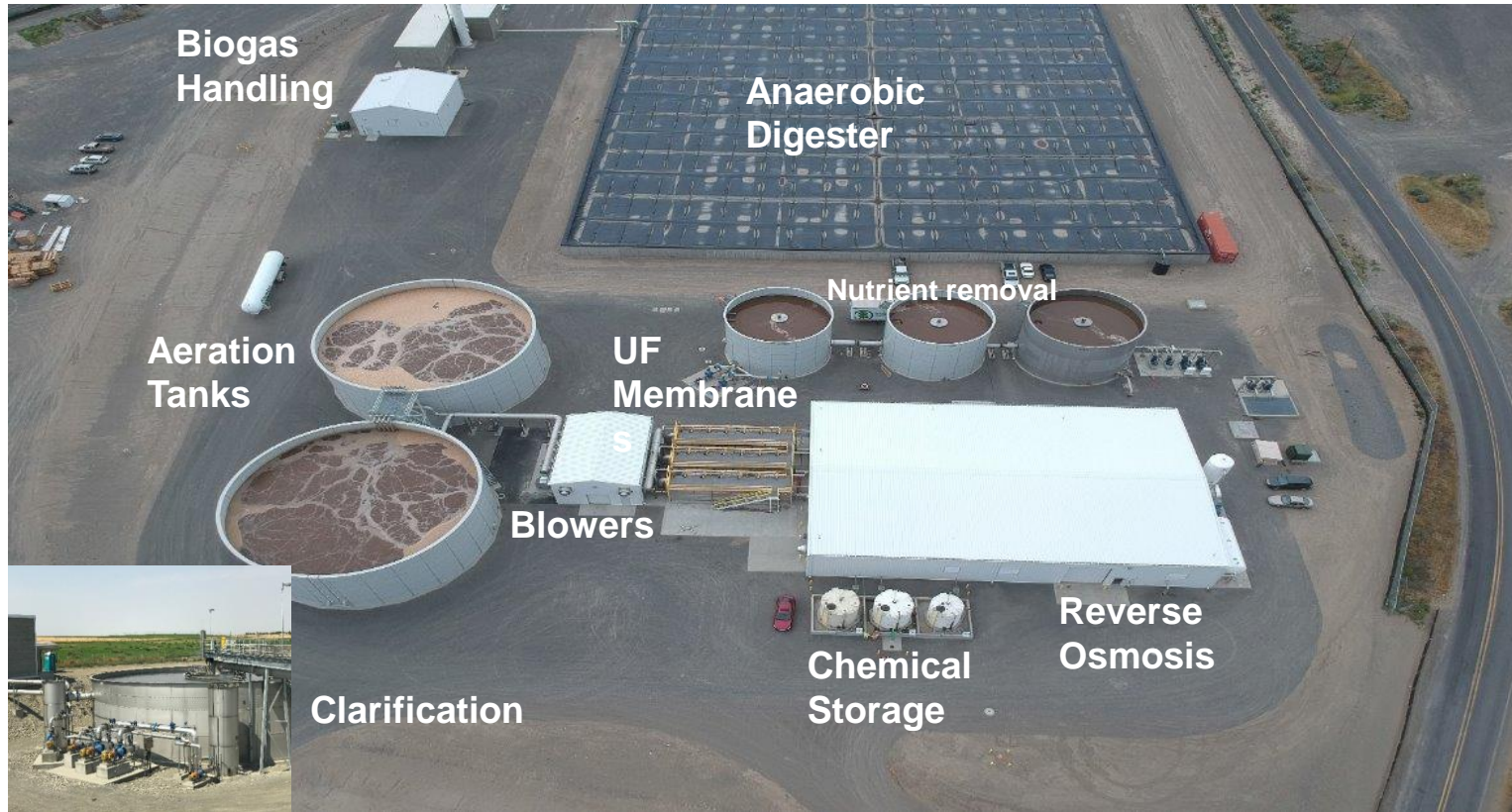
Availability of qualified operators
Capability to build expertise



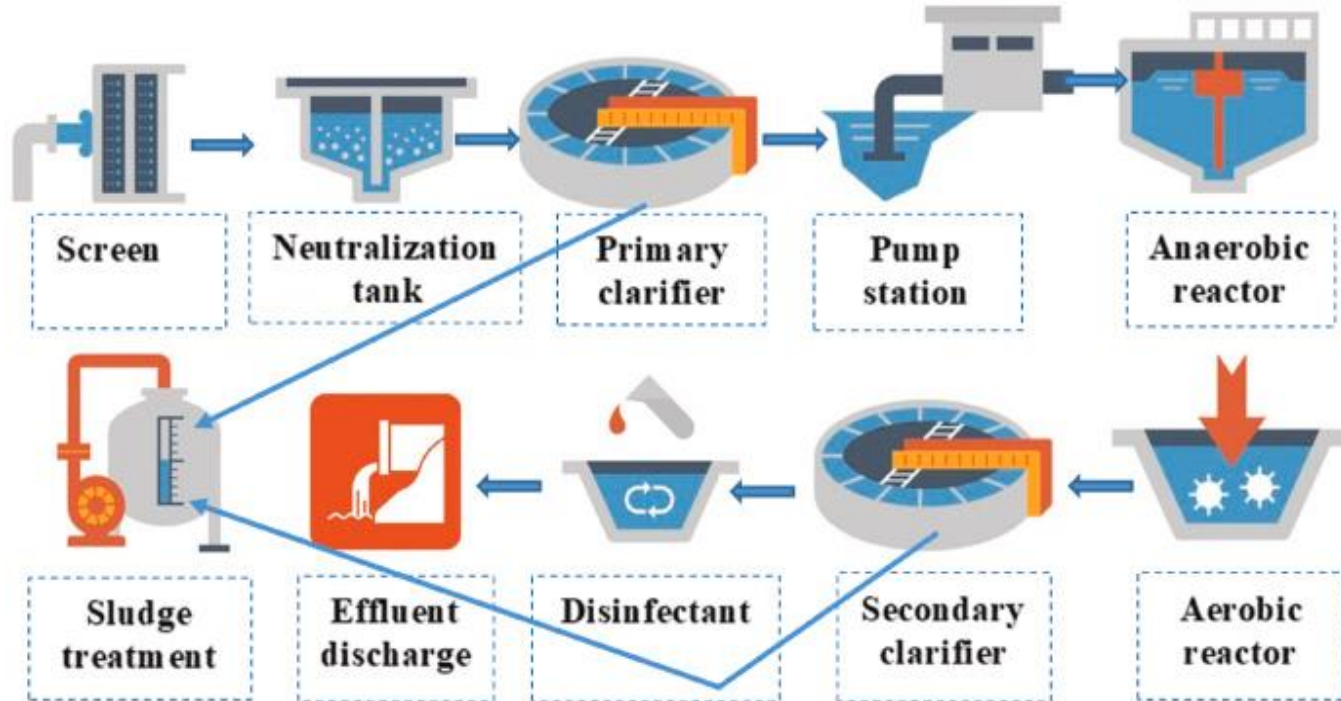
Sustainability impacts

Reduced water consumption (+)
Increased energy use (-)
Increased chemical usage (-)
Increased waste generated (?)

Reuse Systems



Typical Wastewater Treatment Process Flow



Challenges for Potable Quality



RO Permeate

- Effluent quality monitoring
- Redundancy & safeguards
- Advanced treatment?
- Potable classification

RO Reject

- Discharge option?
- Additional treatment
- Beneficial use?
- Disposal?

Models to Consider

Own &
operate

Fully own treatment system
Operations in-house

Own &
contract

Fully own treatment system
Contract operations (third party)

WaaS

Water as a Service – pay per gallon
Third party finances, builds, & operates

Future Needs for Water Reuse

- Regulatory pathway to “potable water”
- Regulatory framework to make industrial symbiosis easier
- Define fit for use water quality requirements
- More economical RO reject management (beneficial use opportunities)

