



## BREAKING THE FOREVER PFAS CYCLE: RECYCLE STREAM TREATMENT TO REDUCE PFAS LOADING TO WRRF INFLUENT AND BIOSOLIDS

**July 11, 2025**

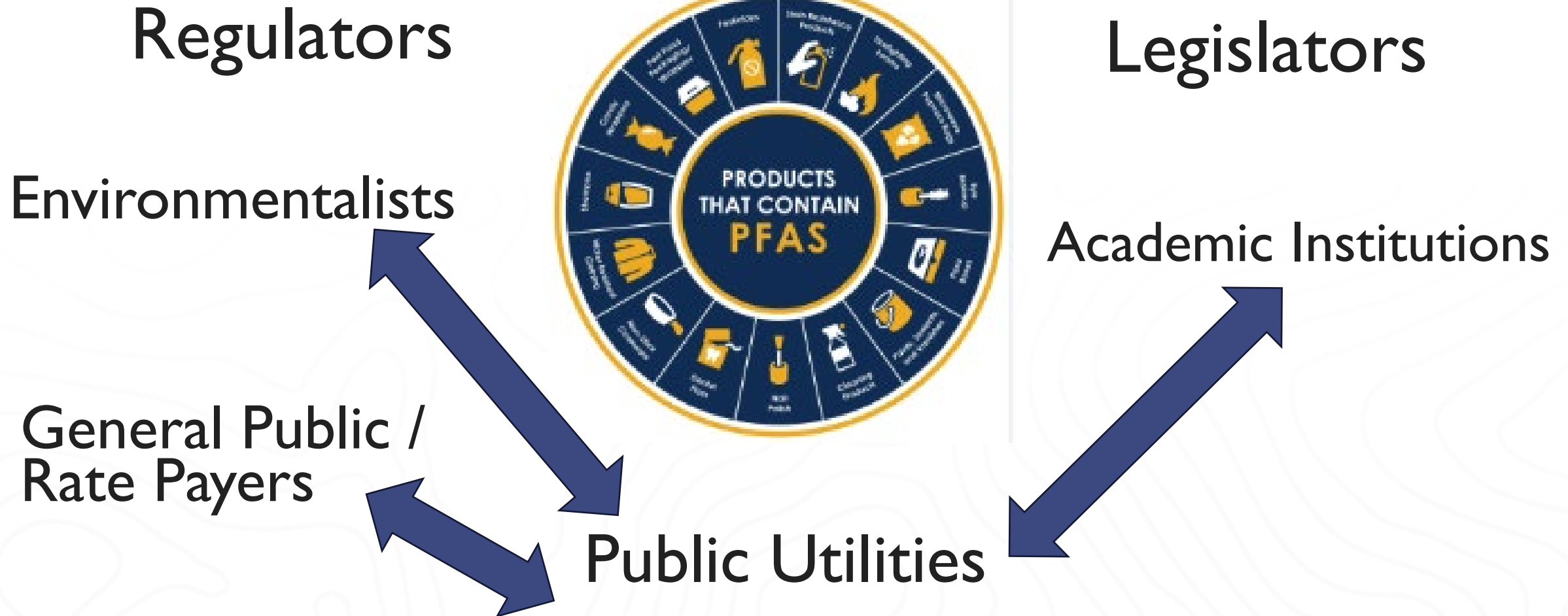


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# Agenda

- Review the benefits of biosolids beneficial reuse
- Discuss consequences of land application prohibition and limited alternatives
- Importance of Source tracking & control
- Present overview of WRF project – Breaking the PFAS cycle

# Industry / Producers



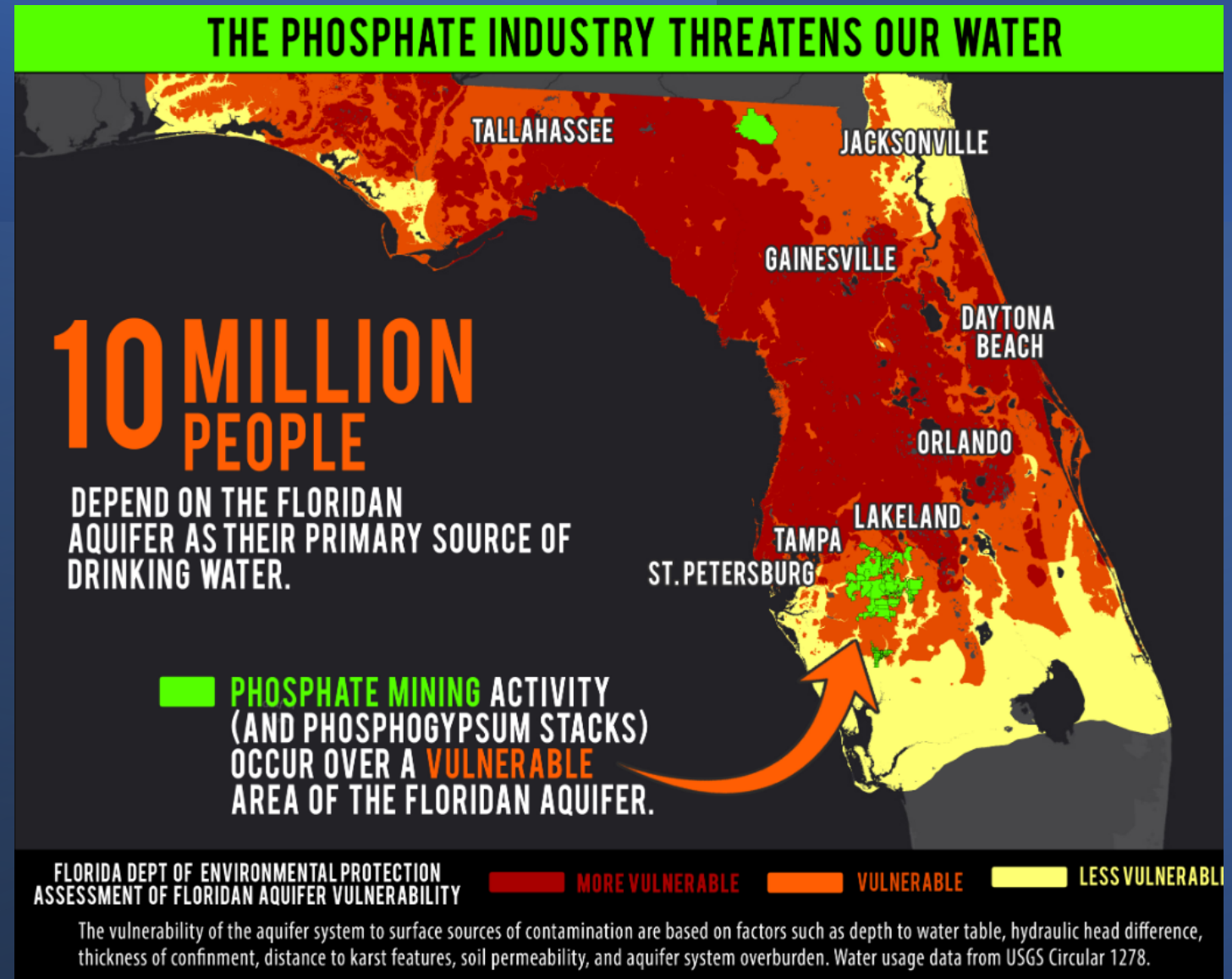


## **Benefits of land applied biosolids**

- Locally sourced, renewable nutrient source
- Low-cost fertilizer alternative
- Soil conditioner
- Carbon sequestration

## Phosphorus Is:

- Essential for plant growth
- A limited resource
- Mining generates phosphogypsum - a radioactive byproduct

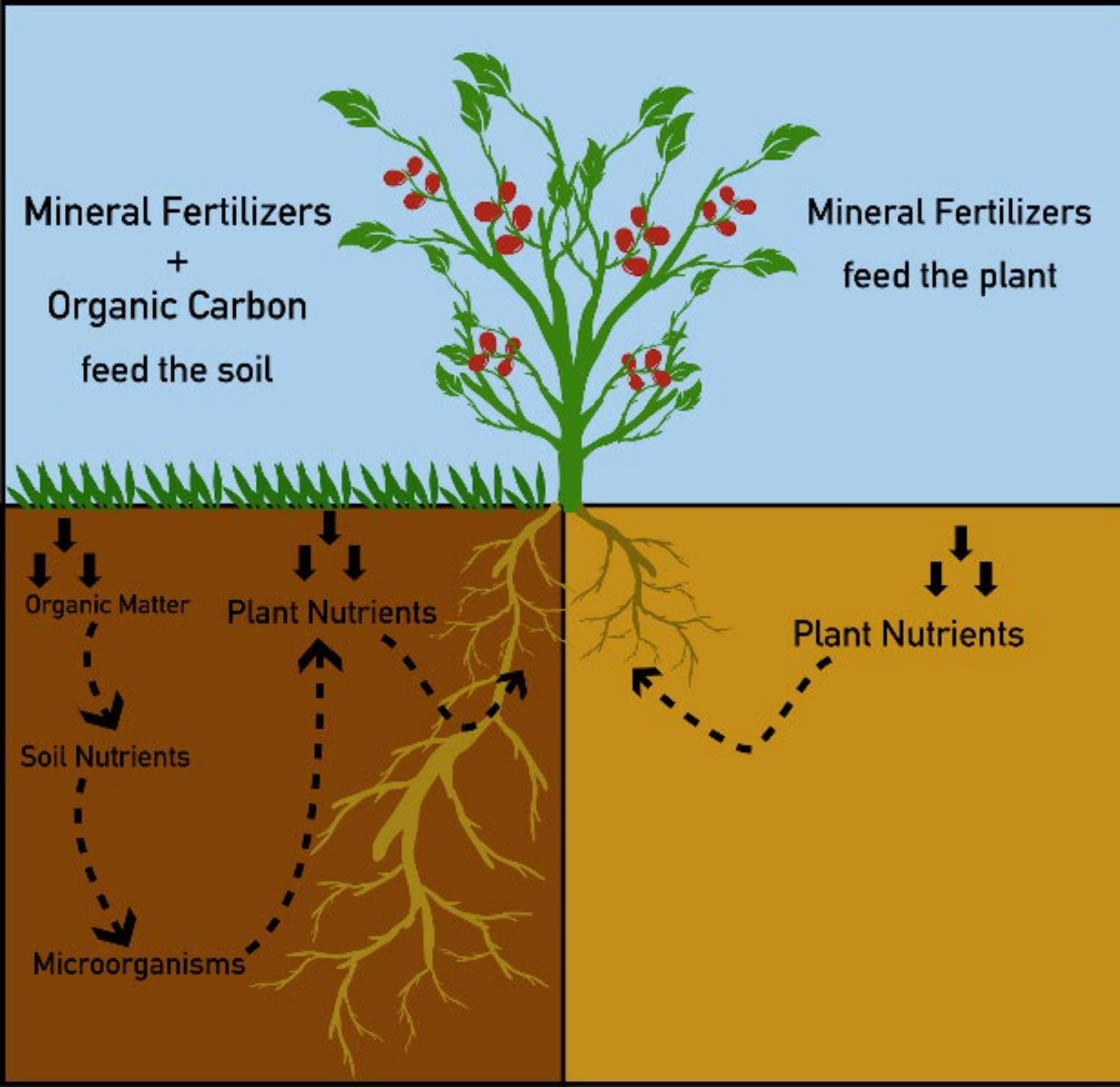


## Nitrogen Fertilizer:

- Made from Fossil fuels
- Enormous carbon footprint
- Pricing / availability impacted by fuel costs







40-60%

In the last century, many of our agricultural soils have lost 40-60% of the basic building block that makes them productive – organic carbon.



**SOIL HEALTH**  
INSTITUTE

Landfills for biosolids disposal should be a last resort and used only for highly contaminated waste streams

Diverting organic waste from landfills is a crucial step in reducing greenhouse gas emissions and promoting a circular economy





# Gasification & Pyrolysis – Come with their own set of consequences

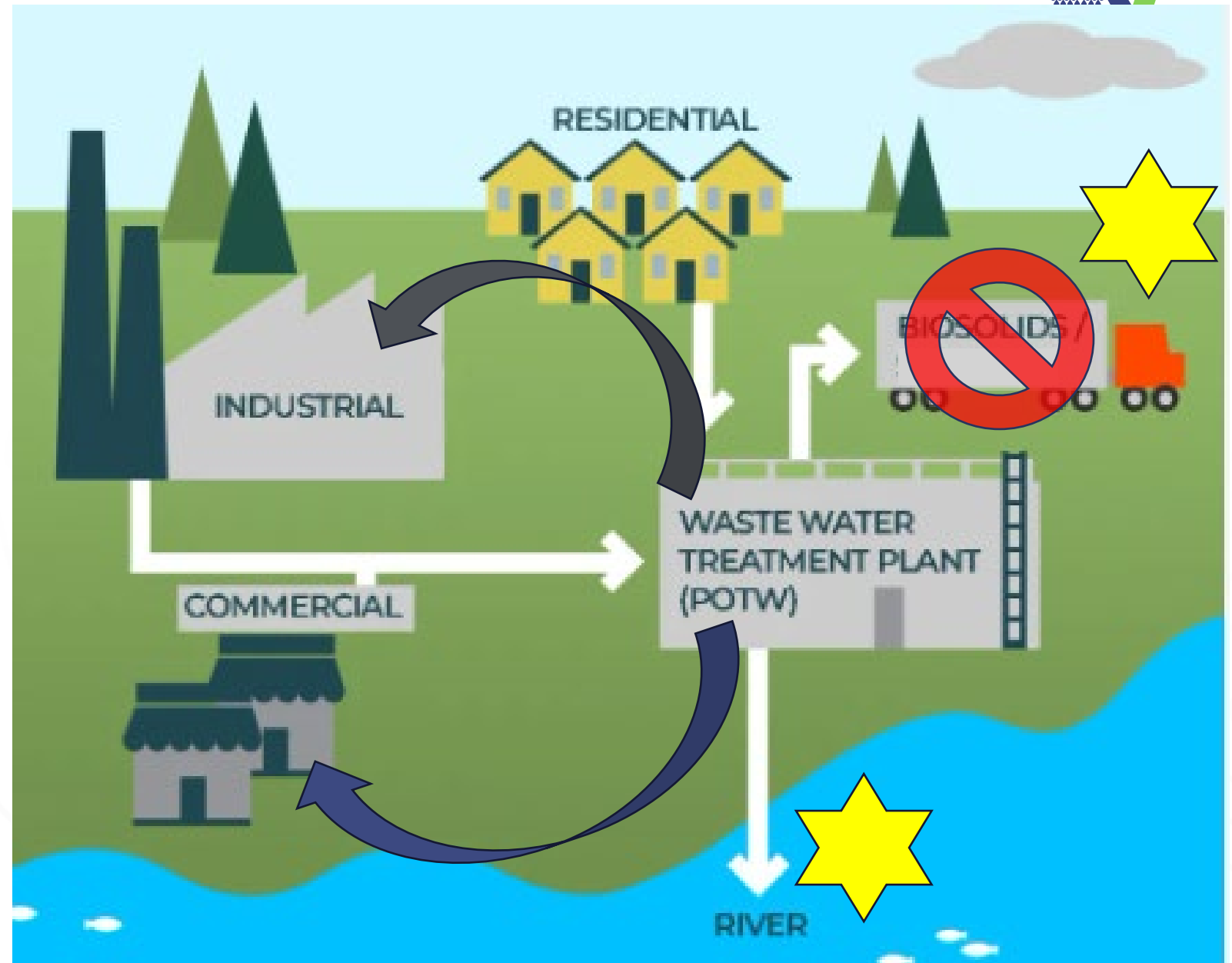
- Remains unproven for large scale biosolids processing
- Require additional processing (Energy Input)
- Emit large quantities of CO<sub>2</sub> and CO
- No current or proposed air quality standards





Mitigating PFAS  
at the source can:

**Reduce PFAS  
concentrations  
in BOTH  
biosolids and  
WRRF effluent**





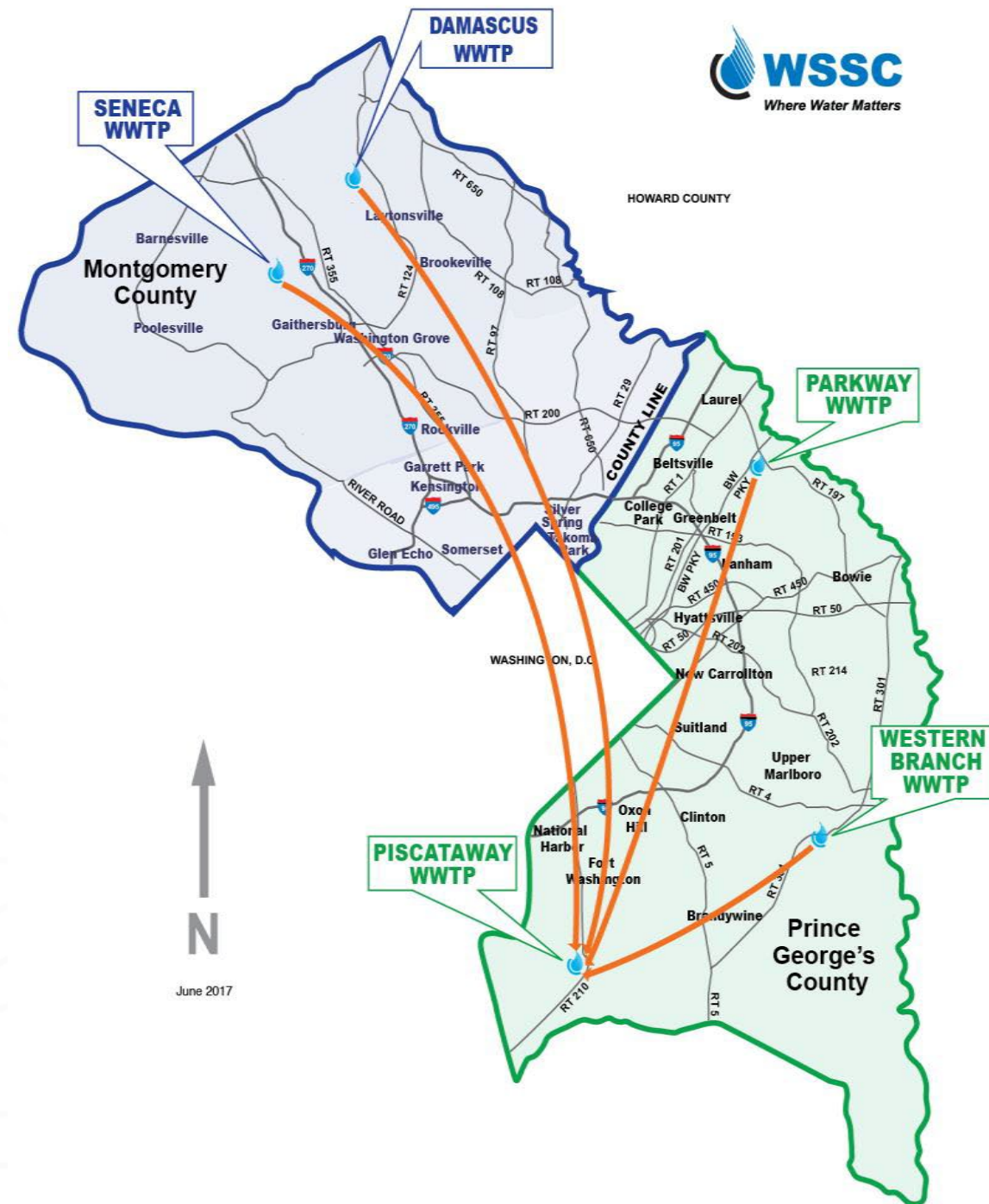
# WSSC Water BioEnergy Facility – Innovative Biosolids Management





# Centralized biosolids processing

- Biosolids from all WSSC facilities trucked to Piscataway and provided additional treatment
- Thermal Hydrolysis Process (THP) and Anaerobic Digestion (AD)





## PFAS Source Tracking



WSSC Water WRRF



## High-Level PFAS Emitter

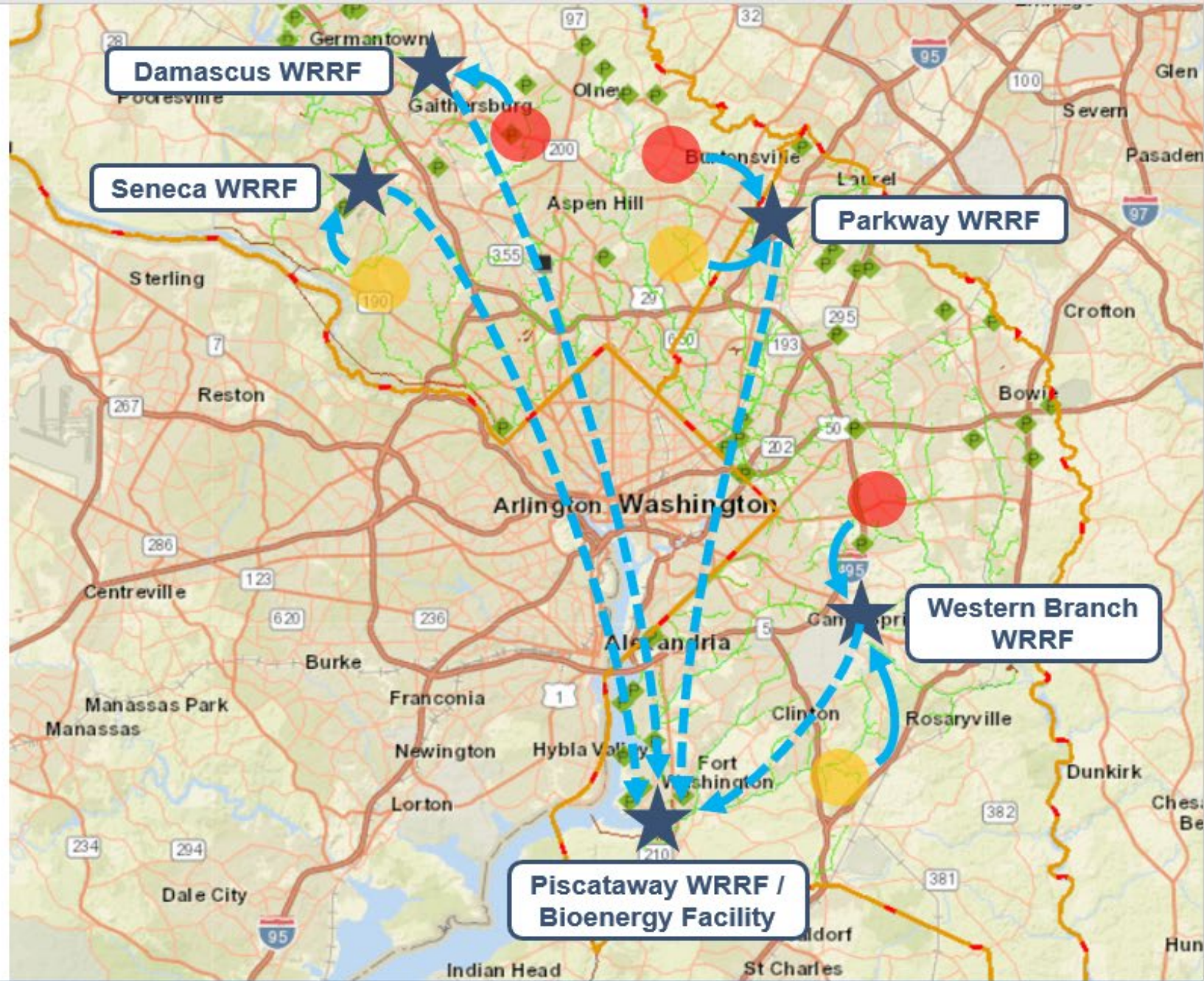
## Low-Level PFAS Emitter



## Collection System PFAS Stream

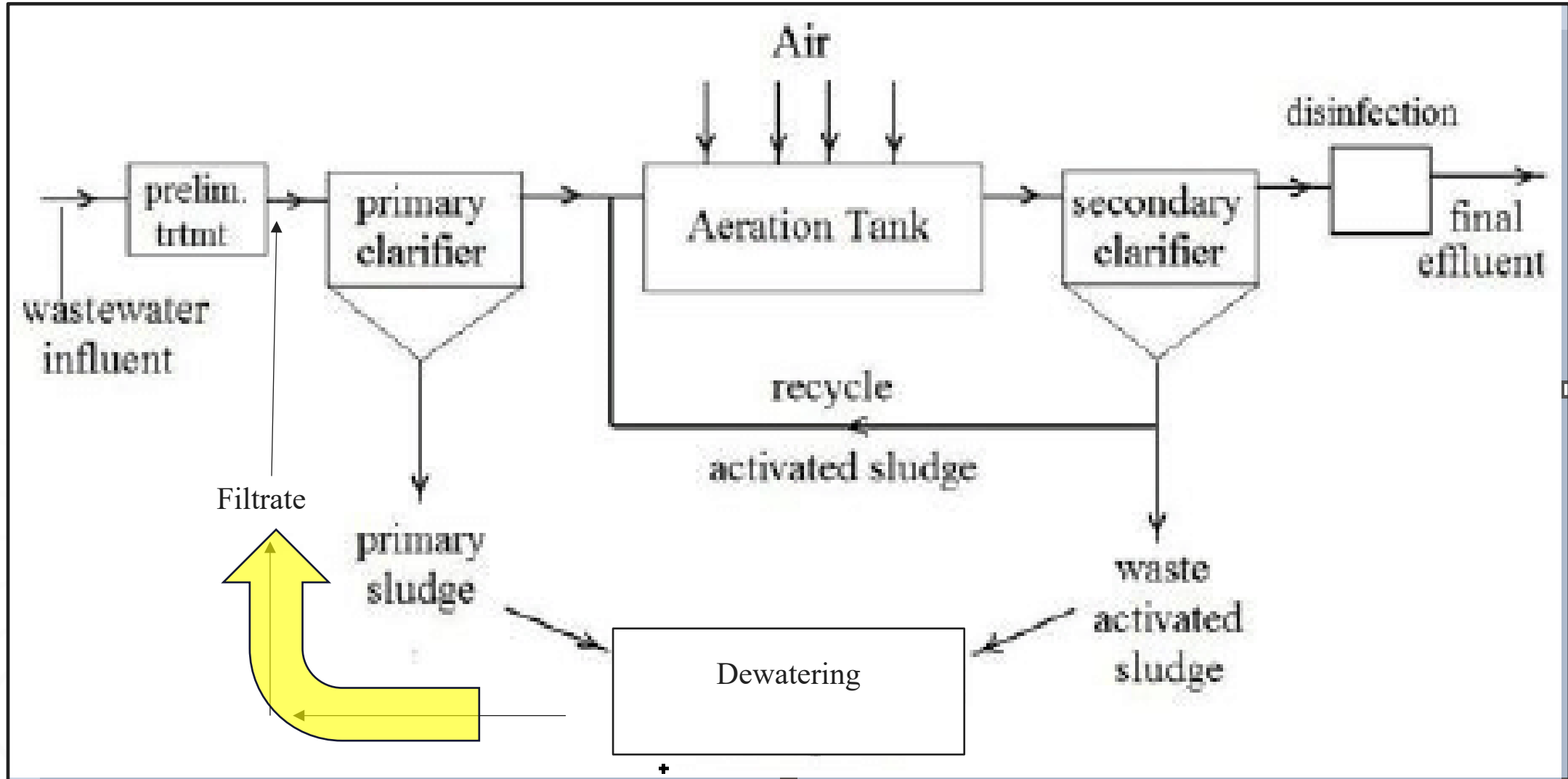


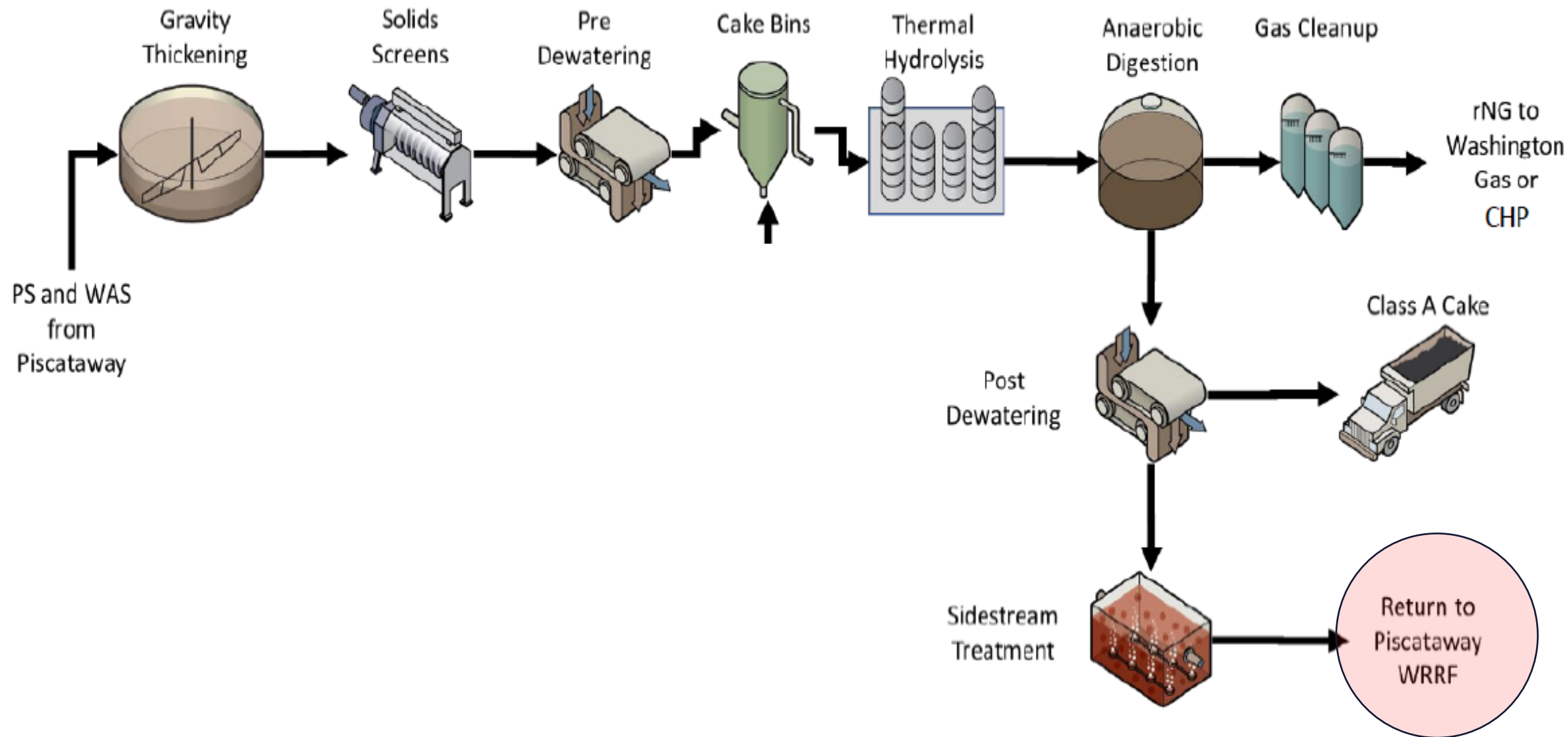
## Biosolids PFAS Stream





# PFAS Monitoring & Source Tracking





## WRF 5337 - BREAKING THE PFAS CYCLE: RECYCLE STREAM TREATMENT TO REDUCE PFAS LOADING TO WRRF INFLUENT AND BIOSOLIDS

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- Quantify the proportion of PFAS loading to WRRFs attributed to recycle flows
- Evaluate PFAS destruction efficiency for 3 innovative technologies
- Research mechanisms to elude PFAS from the solids phase into the liquid phase to increase recycle streams PFAS concentrations



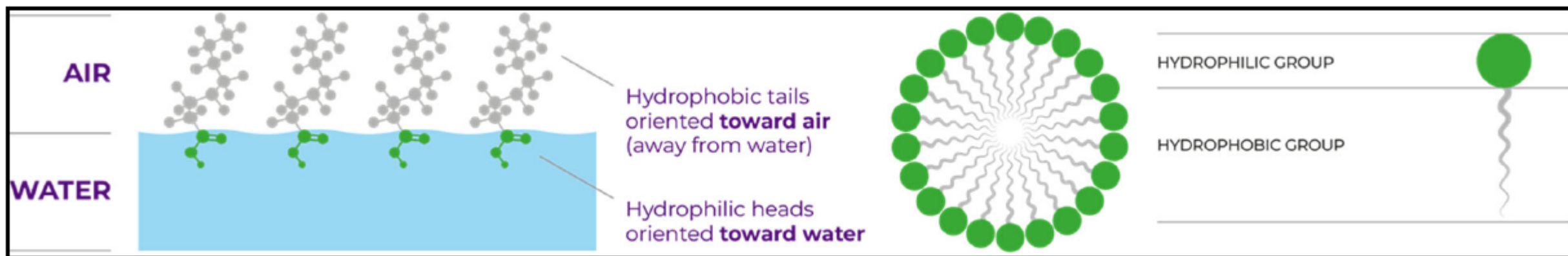
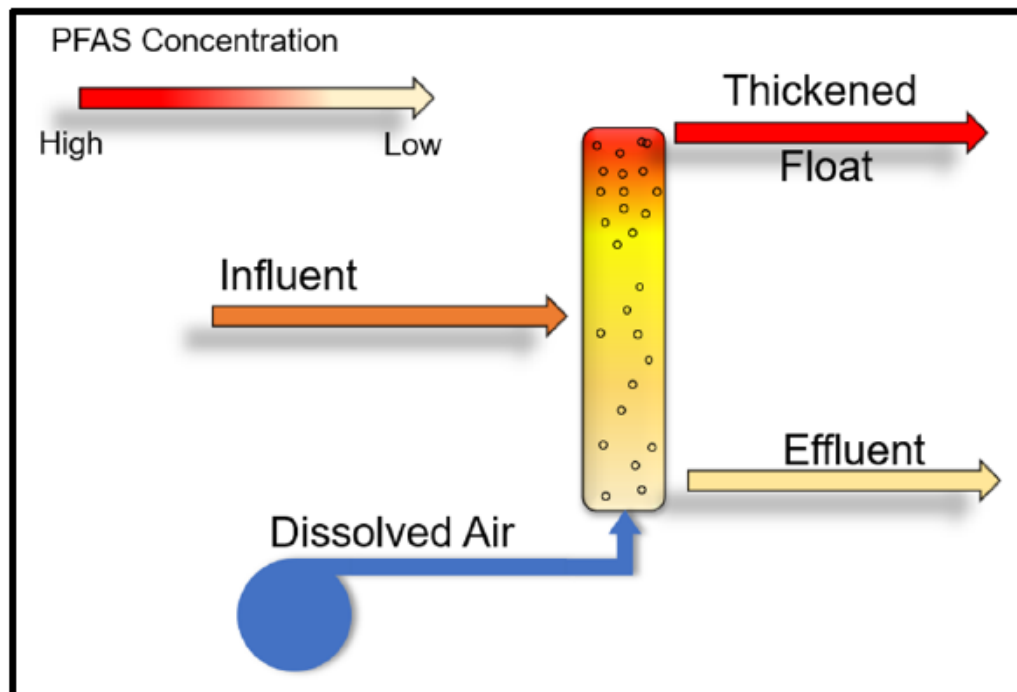
# Research Partners



- WSSC Water
- MW COG
- Arlington Co.
- UOSA
- DC Water
- Prince William Co.
- HRSD
- Charlotte Water
- Black & Veatch Inc.
- Virginia Tech University
- University Missouri KC
- Eurofins Inc.
- Ovivo Inc.
- 374 Water Inc.

MW COG / Utility Co-funding:	\$175,000
Water Research Foundation funding:	\$150,000
<u>In Kind Contributions:</u>	<u>\$190,000</u>
<b>Total Value:</b>	<b>\$515,000</b>

# Foam Fractionization (Concentration)



# Electrochemical Oxidation

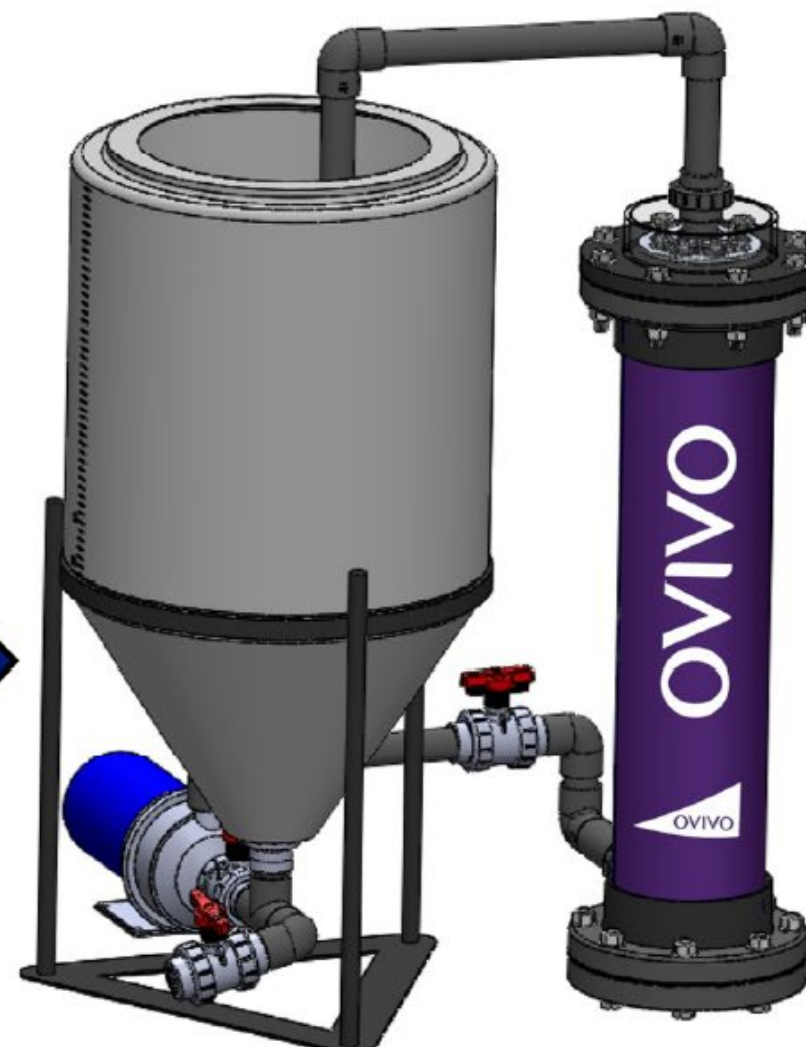


**BENCH**

1/3 Scale

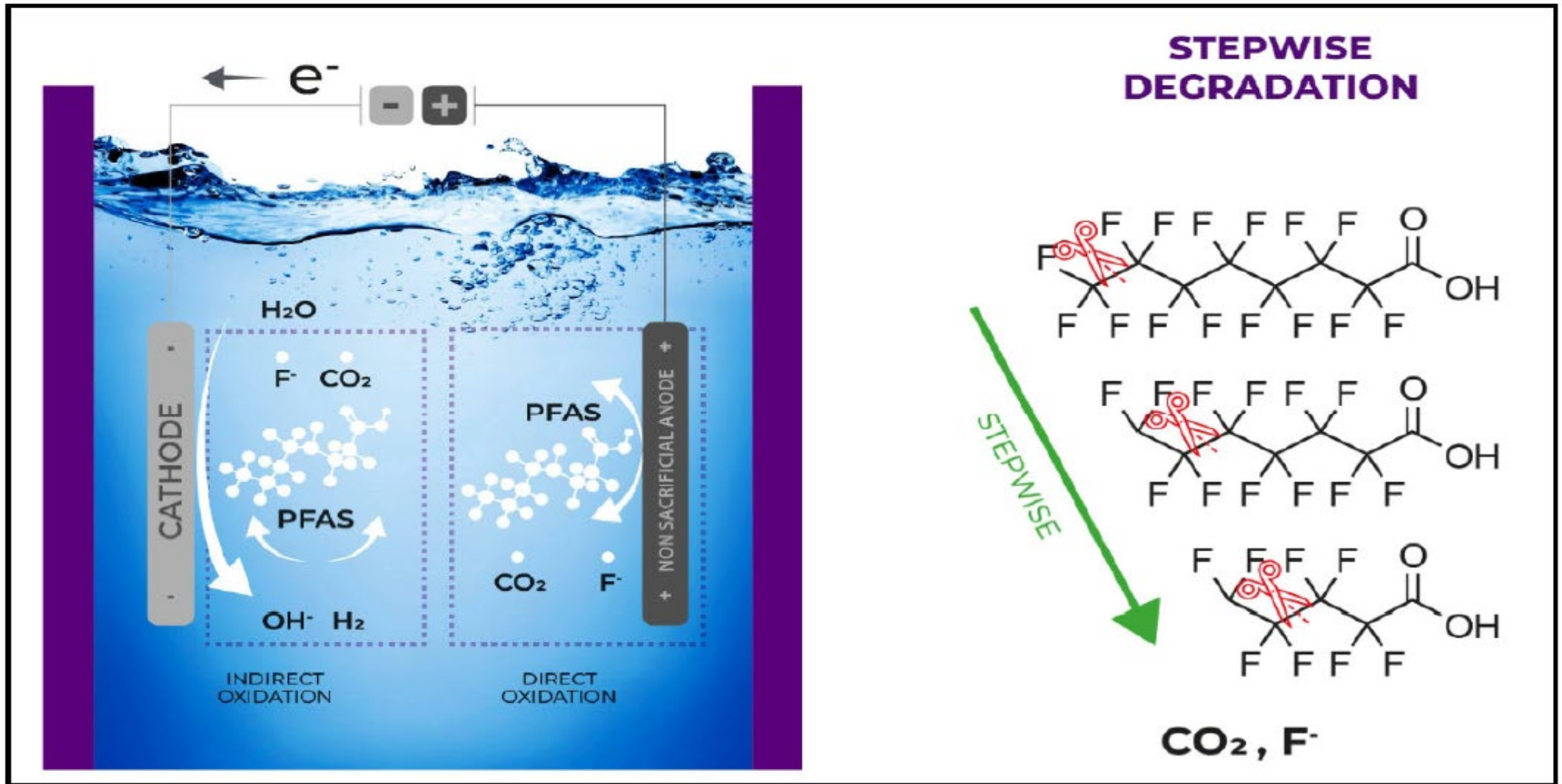


Commercial

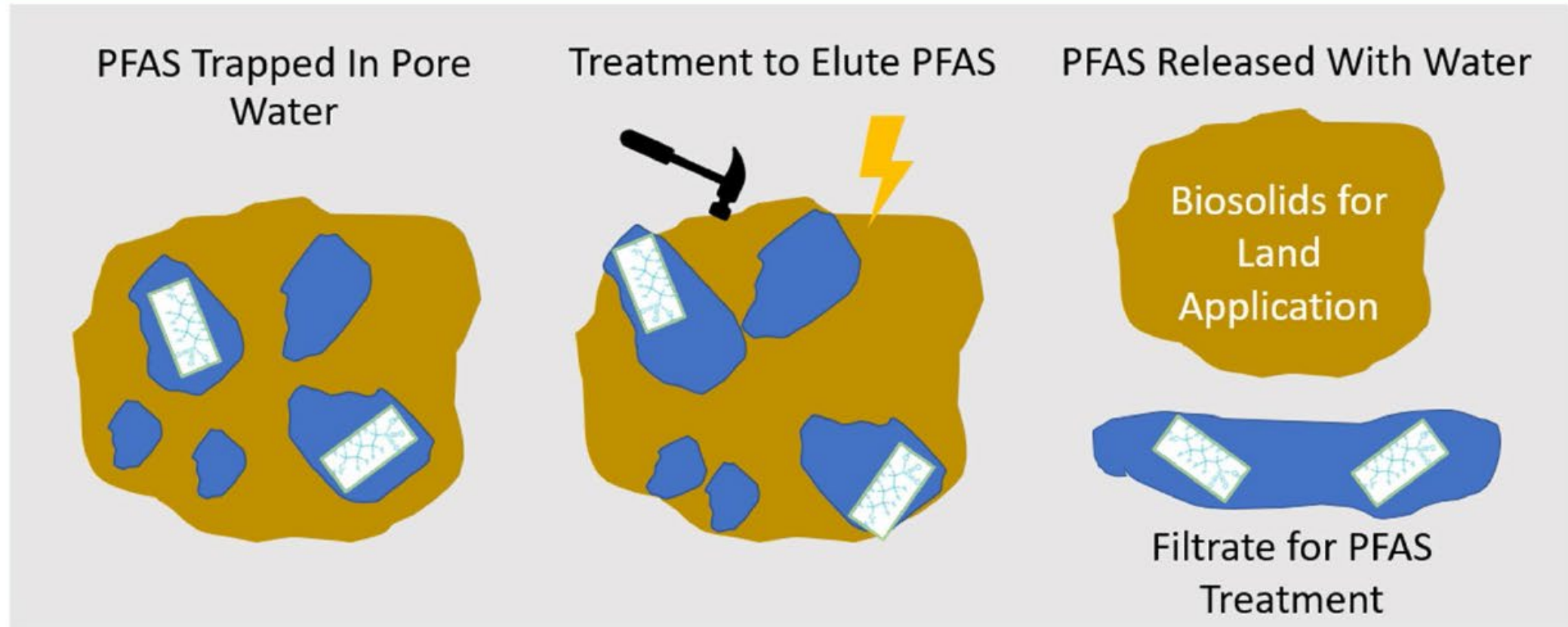




# Supercritical Water Oxidation



# Background: Potential Elution Benefits



- Reduce soluble PFAS in biosolids
- Move PFAS into a smaller, more treatable waste stream

# Summary

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- Cutting edge research with regional utilities, Industry Leaders & Academic Institutions
- Identify practical and cost-effective solutions to manage PFAS as required to:
  - Maintain safe & sustainable biosolids beneficial reuse programs
  - Reduce PFAS concentrations in BOTH biosolids & WRRF effluent
- Promote regional collaboration & information sharing to maximize resources



# Questions?

