



**OSTARA**

# OSTARA

Industry Update for WASSTRIP on WRRF Nutrient  
Flows, Digestion and Dewatering of Bio-P Sludge

NJWEA Annual Conference, May 16, 2016

**Mike Ditton**, Nutrient Recovery Solutions



# Struvite Happens



# Get the Best of It

Turns struvite into a high  
product in the form of  
ed struvite





## Slow-Release, Root-Activated™ Fertilizer

Phosphate fertilizer

Plant-activated (Citrate Soluble)

90, 150, 300, 450 SGN prill size

Crystalline, granular dust-free

Lowest Salt Index of any P source

99.6% Purity





# Operating Experience

2005

Ostara was founded.



pearl® systems  
Plants worldwide

40

Number of employees  
including R&D, Ops, Sales, Corp



Global Presence  
CAN, US, EU



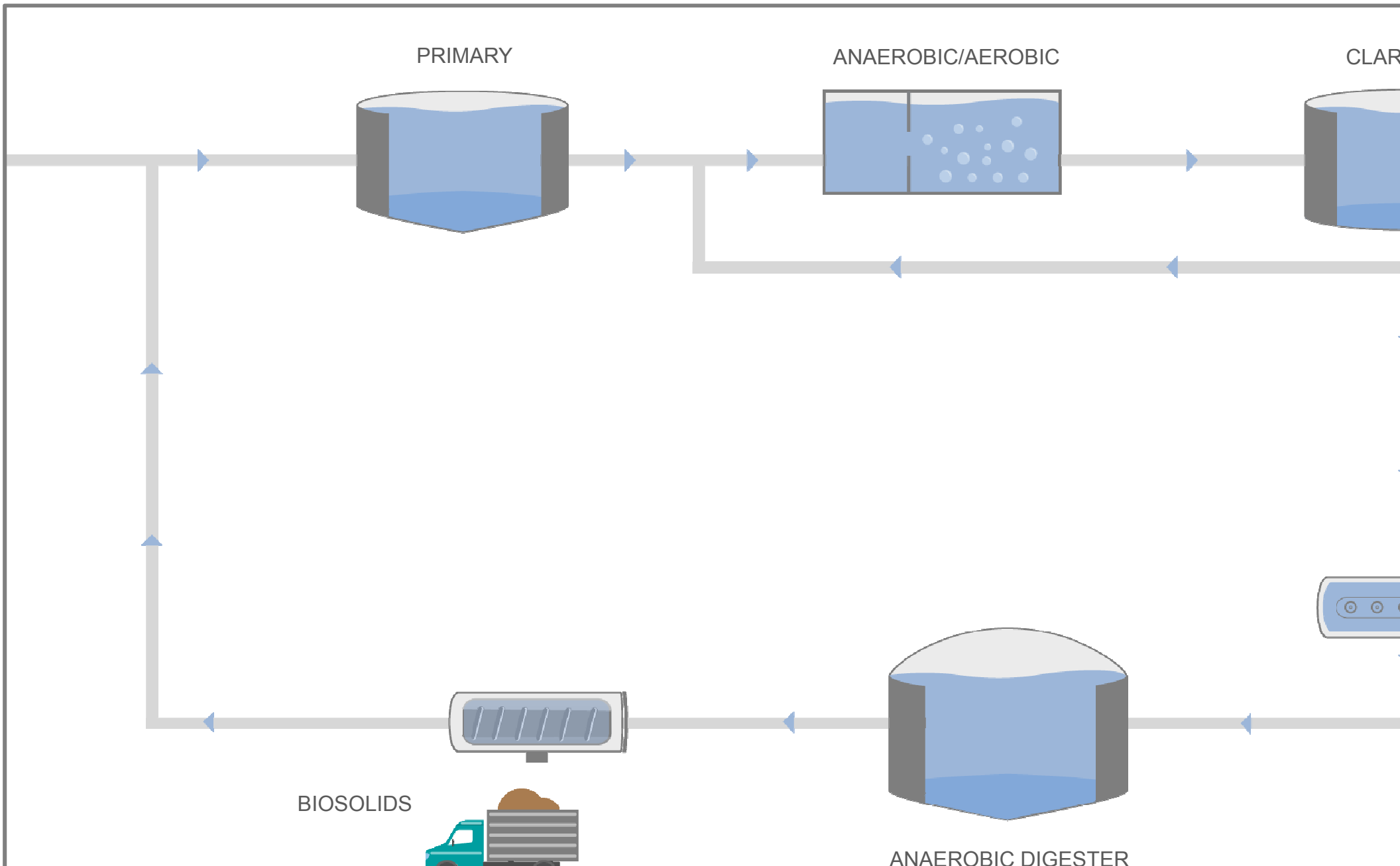
# Today's Agenda

## Important Questions About Nutrient Recovery

1. Existing side stream concerns
2. Where does WASSTRIP fit?
3. What is WASSTRIP and how does it work?
4. What are the realized benefits of WASSTRIP?
5. What continued research is underway?

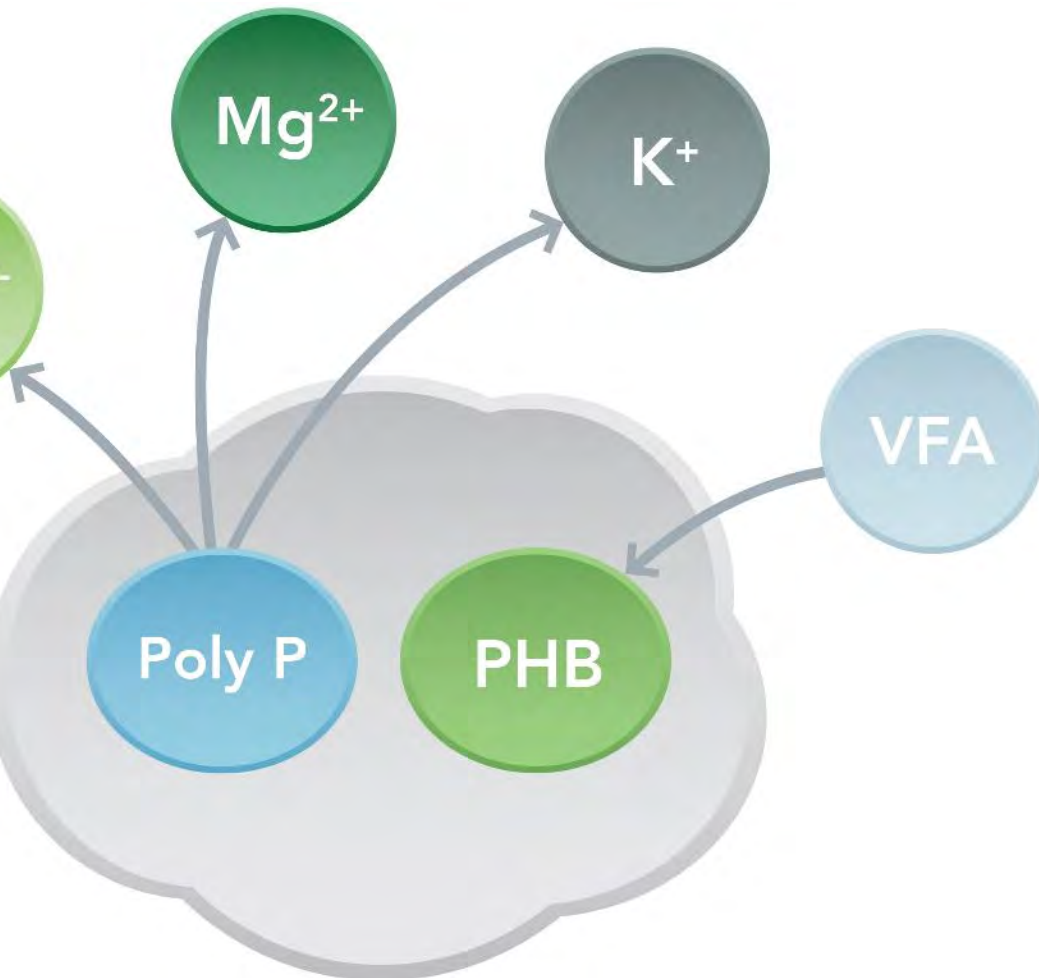
# Biological Nutrient Removal Efficiently and Effectively

## Reduces Effluent Phosphorus Concentration

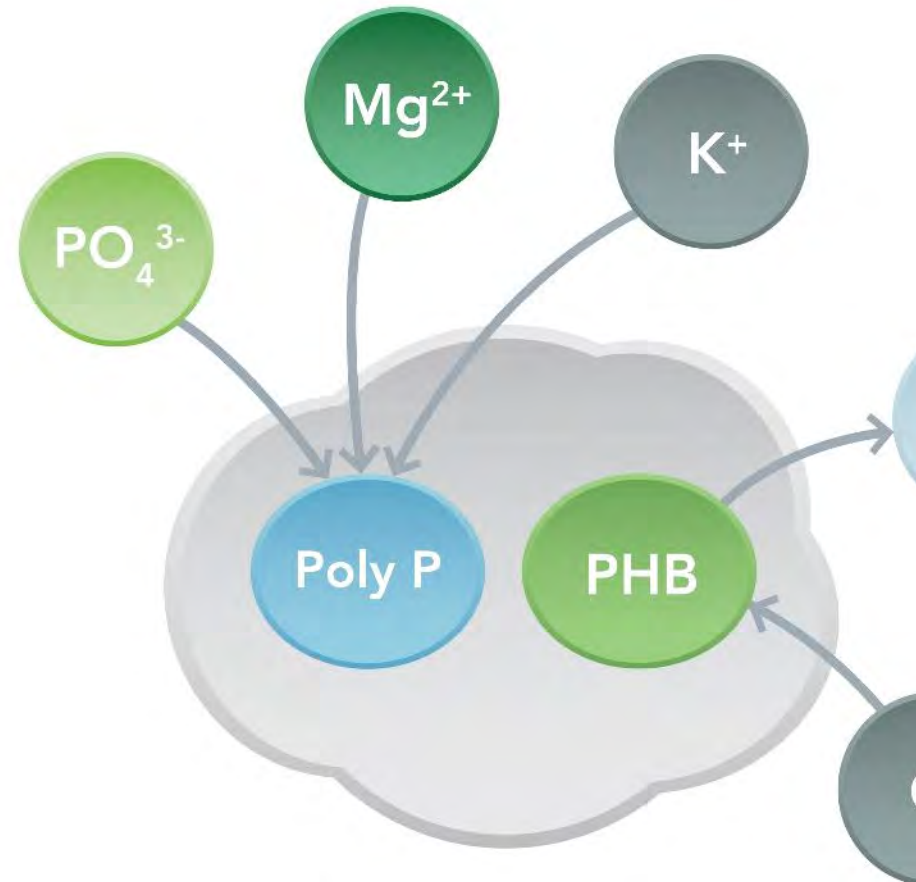


# Biological Phosphorus Removal Leverages Polyphosphate Accumulating Organisms (PAOs)

Anaerobic



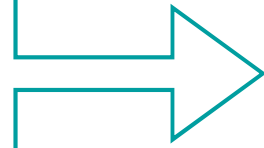
Aerobic





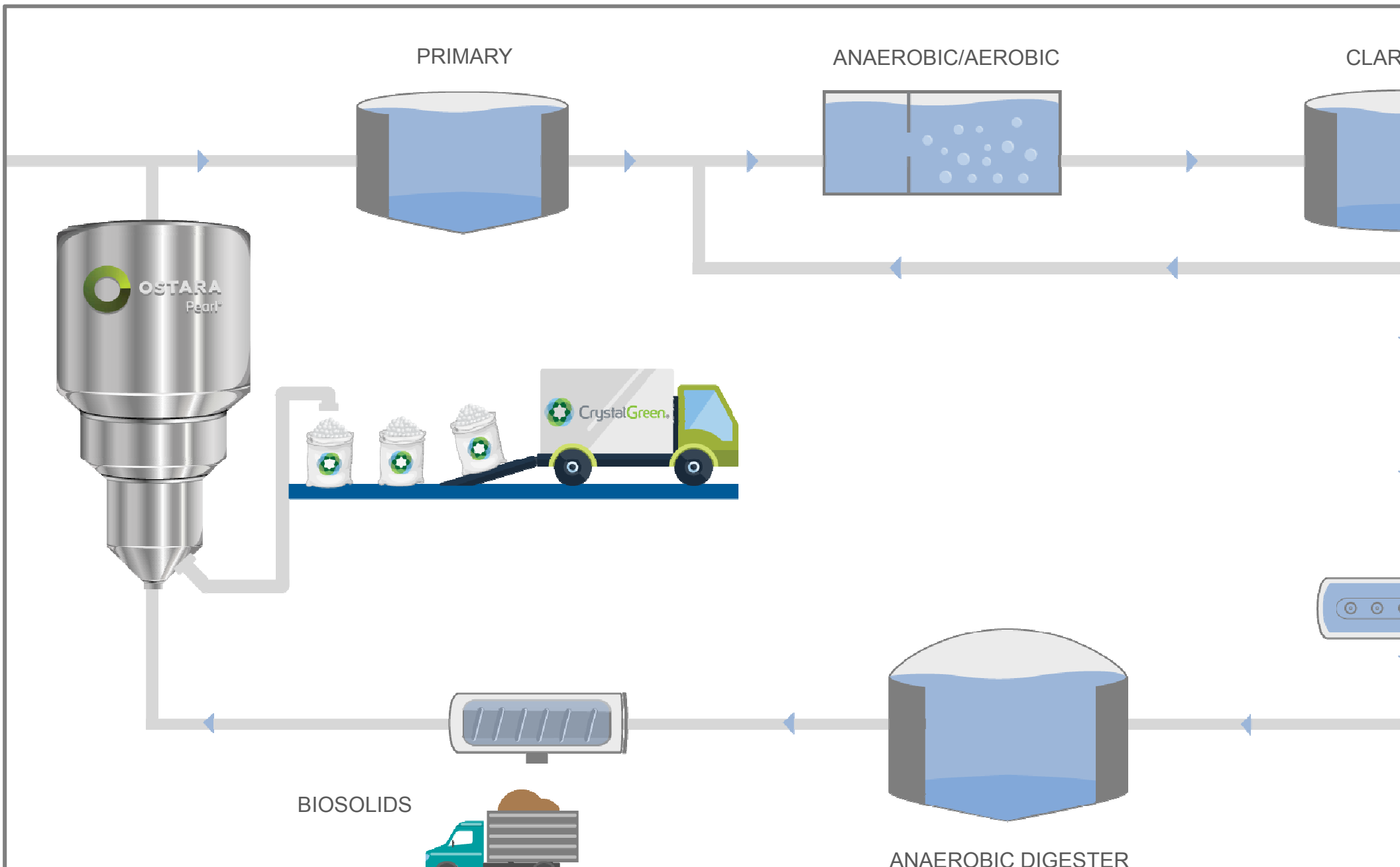


# Accidental Struvite Formation Poses Serious Operational Challenges



# Phosphorus Recovery Intercepts Recycle

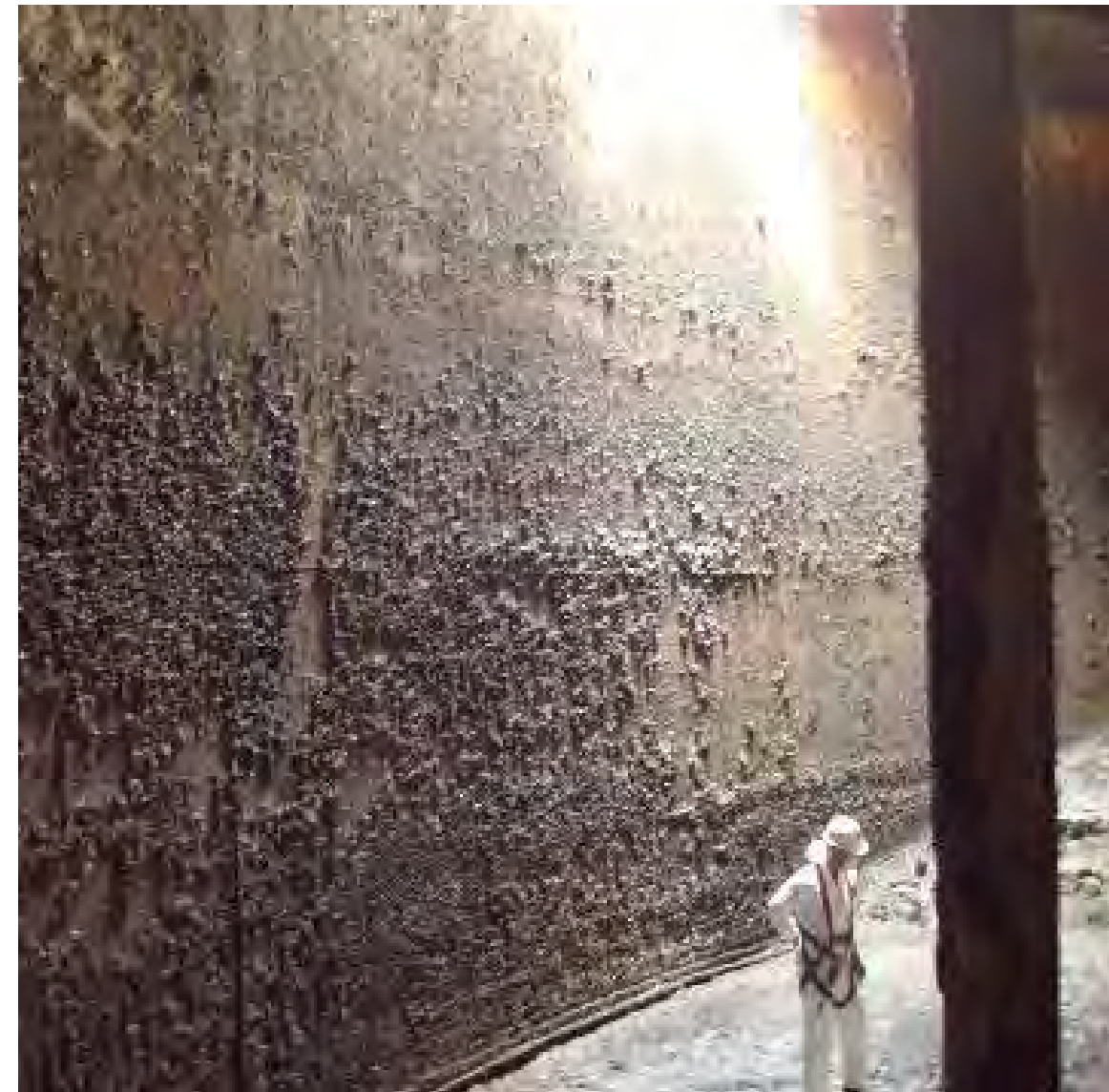
## Recover Phosphorus and Ammonia





# Accidental Struvite Formation

## Also Occurs in Anaerobic Digesters





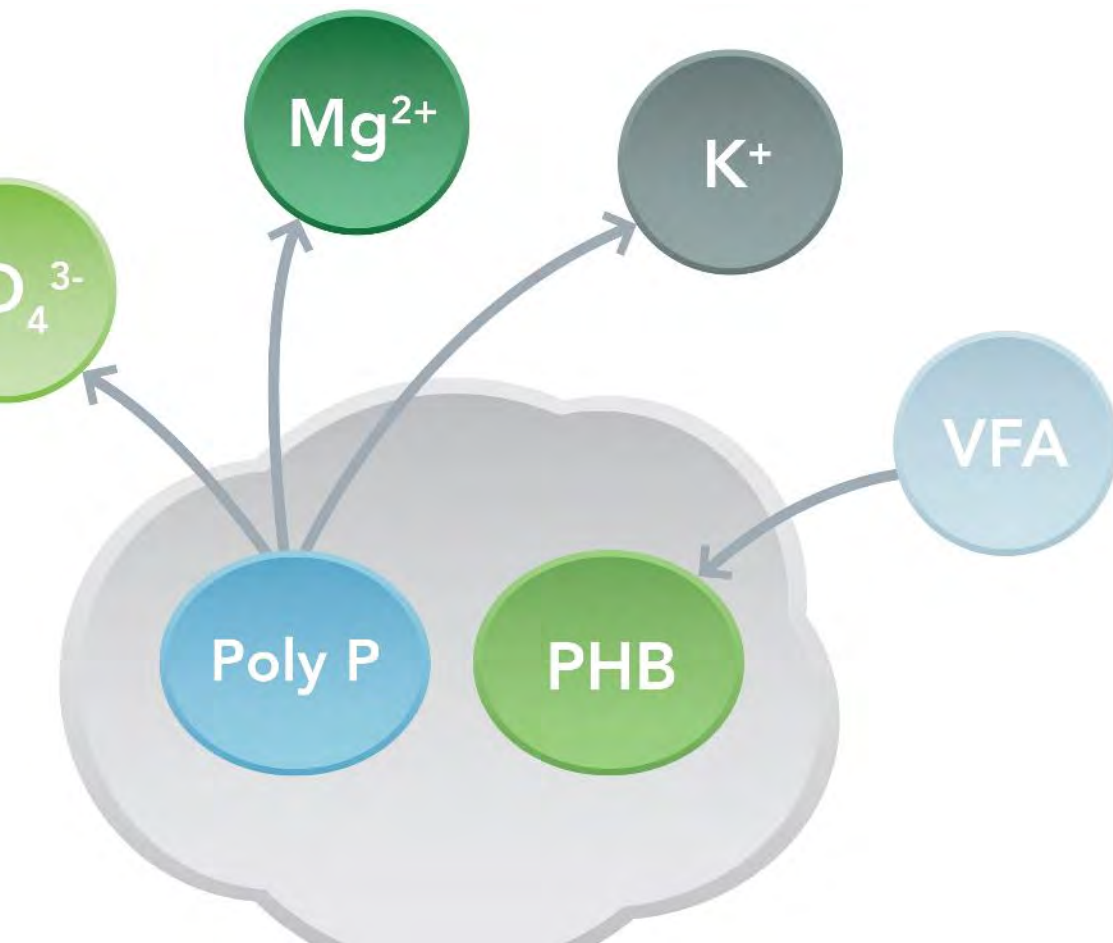
# Accidental Struvite Formation

## Also Occurs in Dewatering Equipment

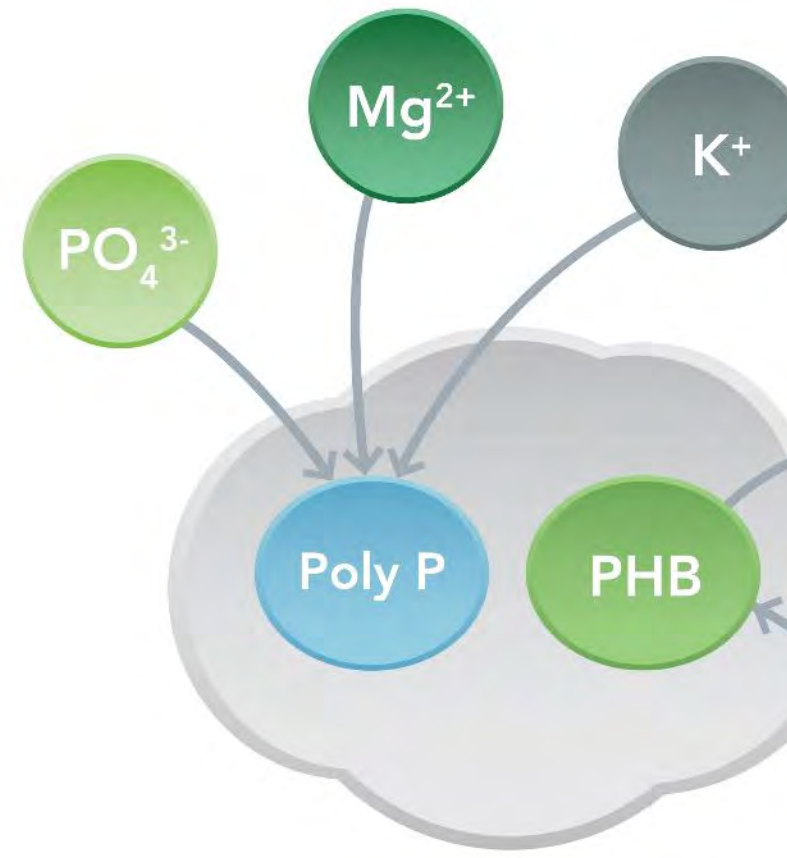


# WASSTRIP Leverages Polyphosphate Accumulating Organisms (PAOs) in Reverse

Anaerobic

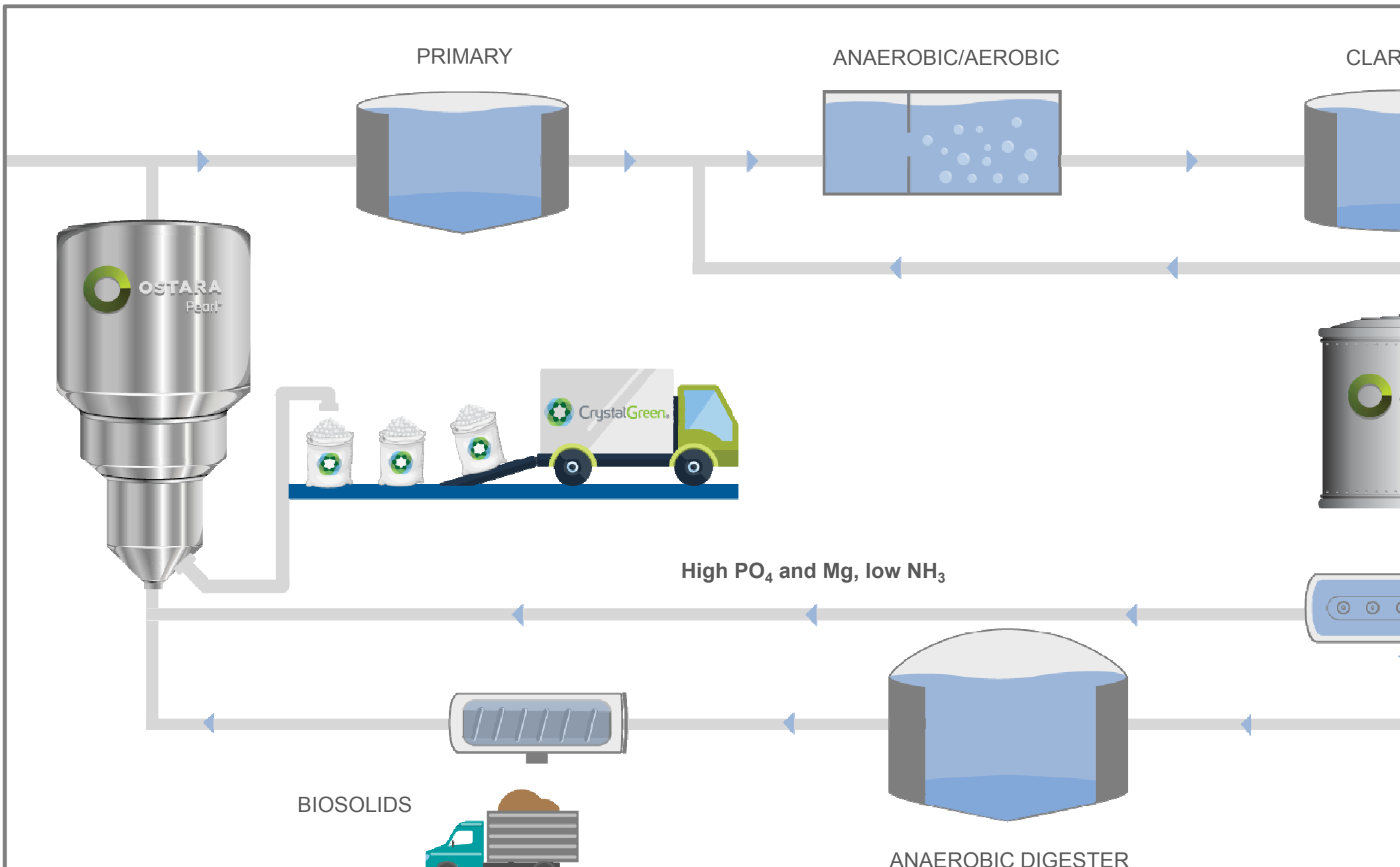


Aerobic





# WASSTRIP Increases Phosphorus Recovery While Protecting Digesters from Struvite Formation



# **WASSTRIP** Reduces Digester Struvite Formation by 90-Percent



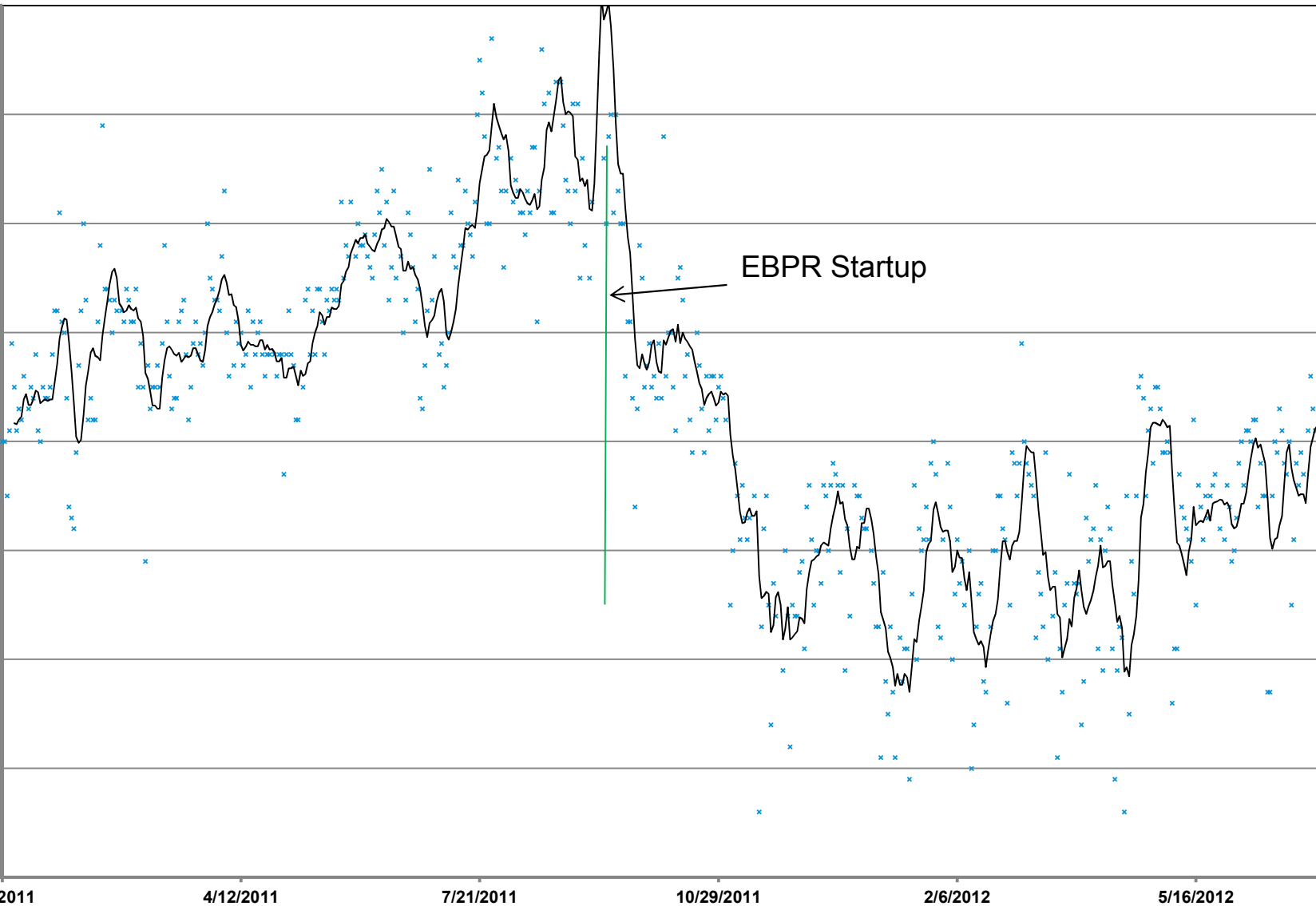
**WITHOUT WASSTRIP**



**WITH WASSTRIP**

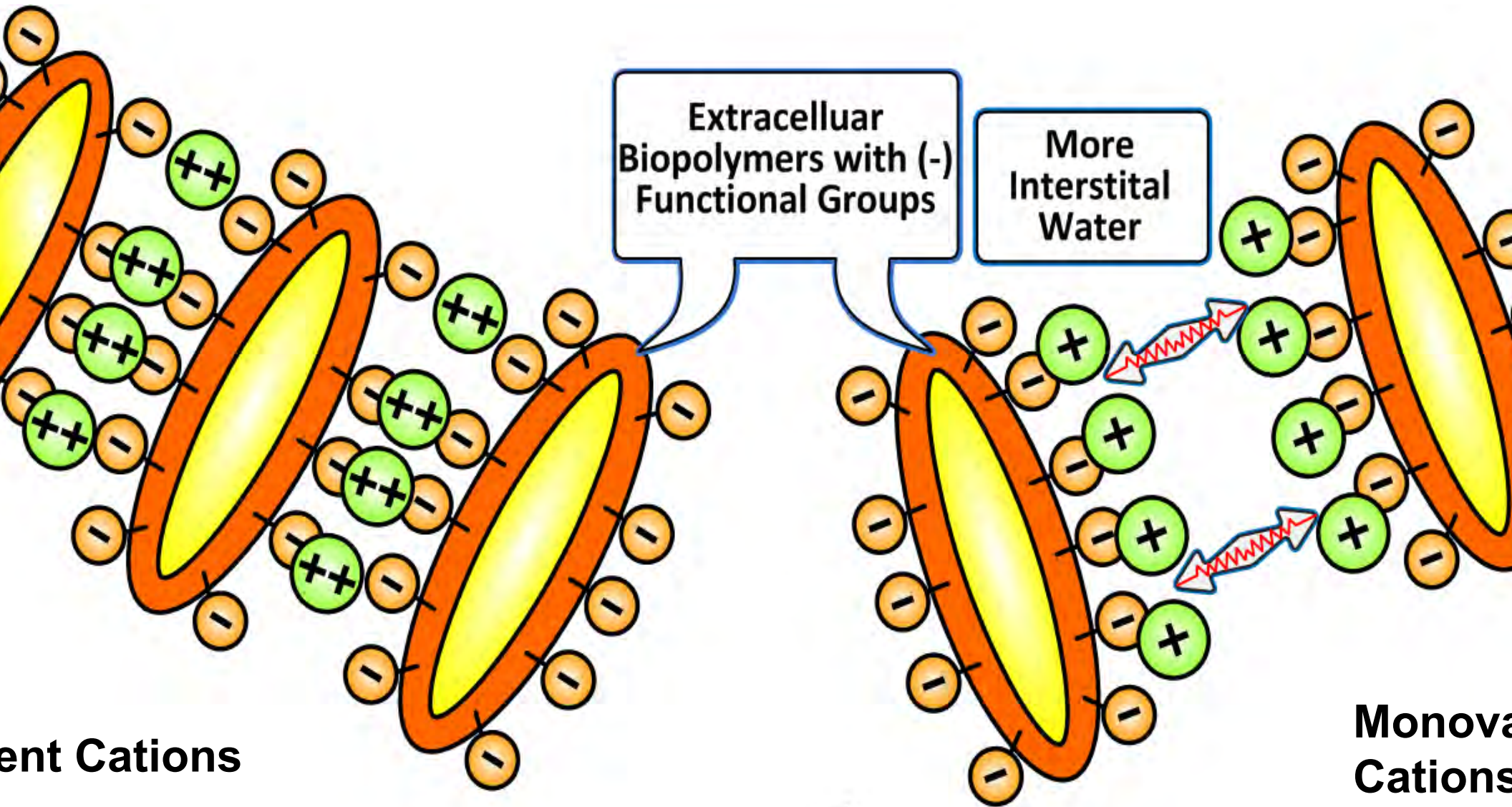
# Biological Phosphorus Removal Reduces Biosolids Dewaterability

Denver Metro Robert Hite Treatment Facility Full Scale EBPR Trial





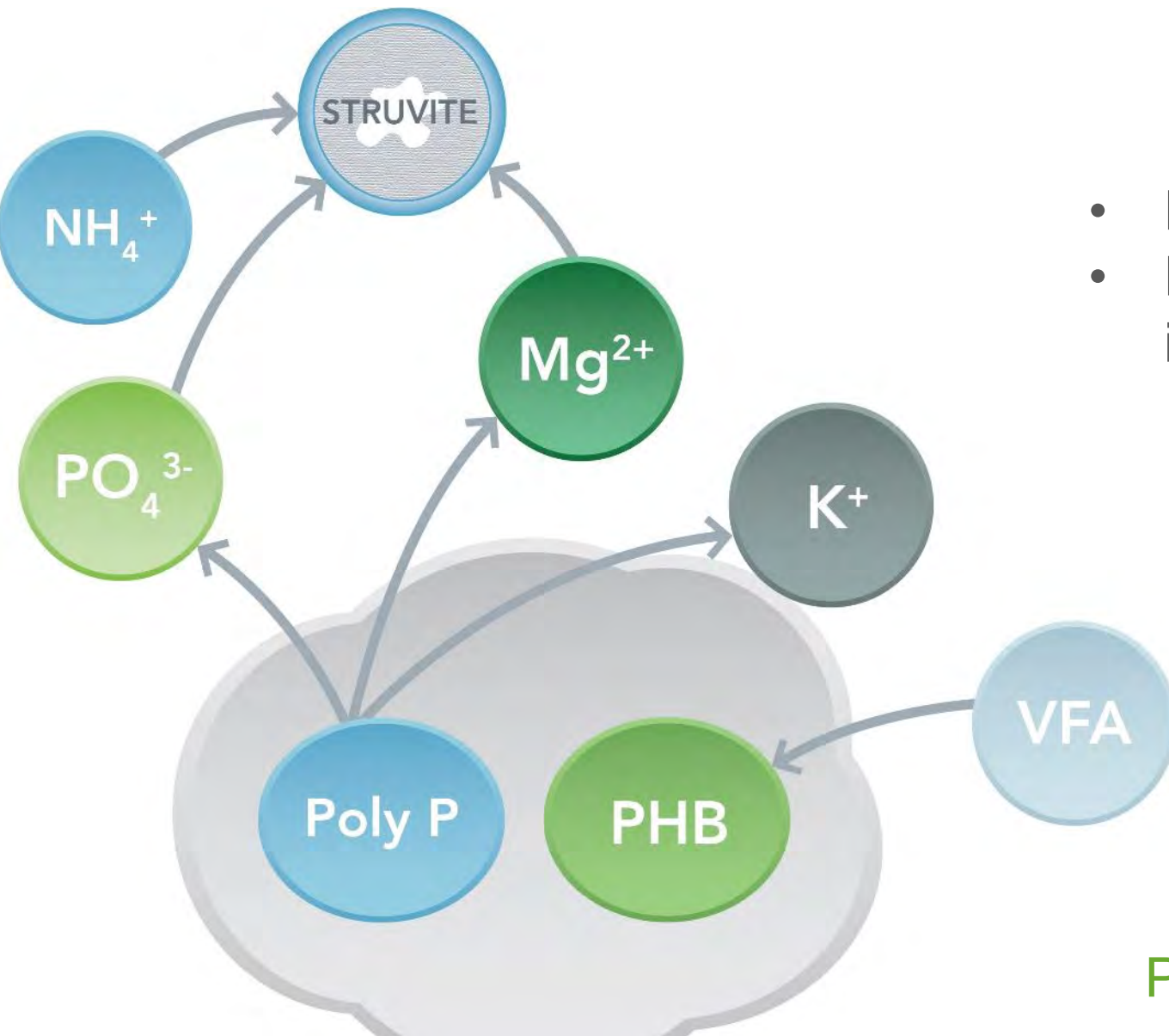
# Excess Monovalent Cations Reduce Bridge Effect Impairing Biosolids Dewaterability



ent Cations

Monova  
Cations

# Anaerobic Digestion of PAOs Increases the Monovalent to Divalent Cation Ratio in the Digestate



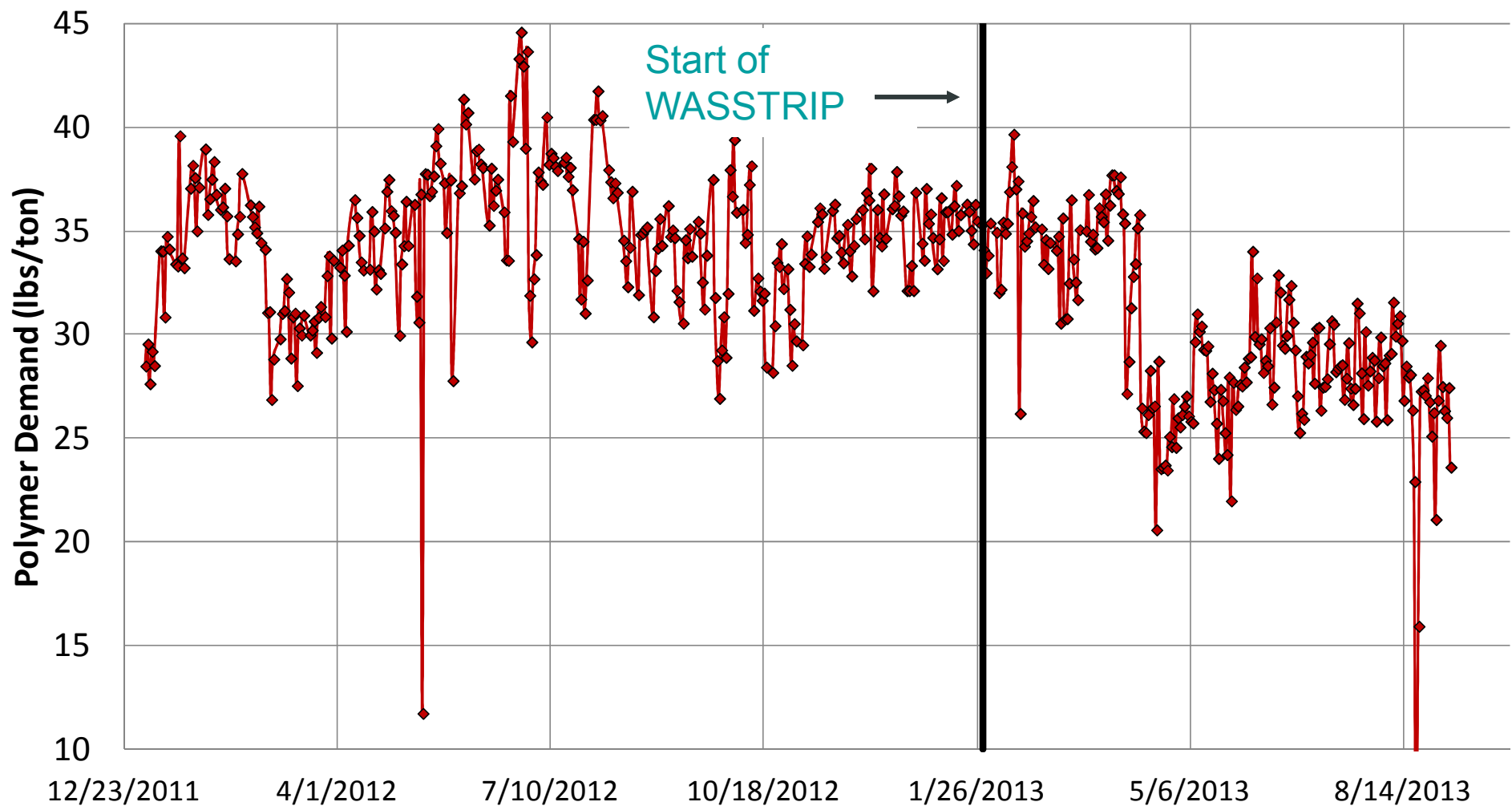
- Released Mg is bound as struvite
- Released K remains free → increase the M/D ratio

PHB - Polyhydroxybutyrate

# Implementing WASSTRIP

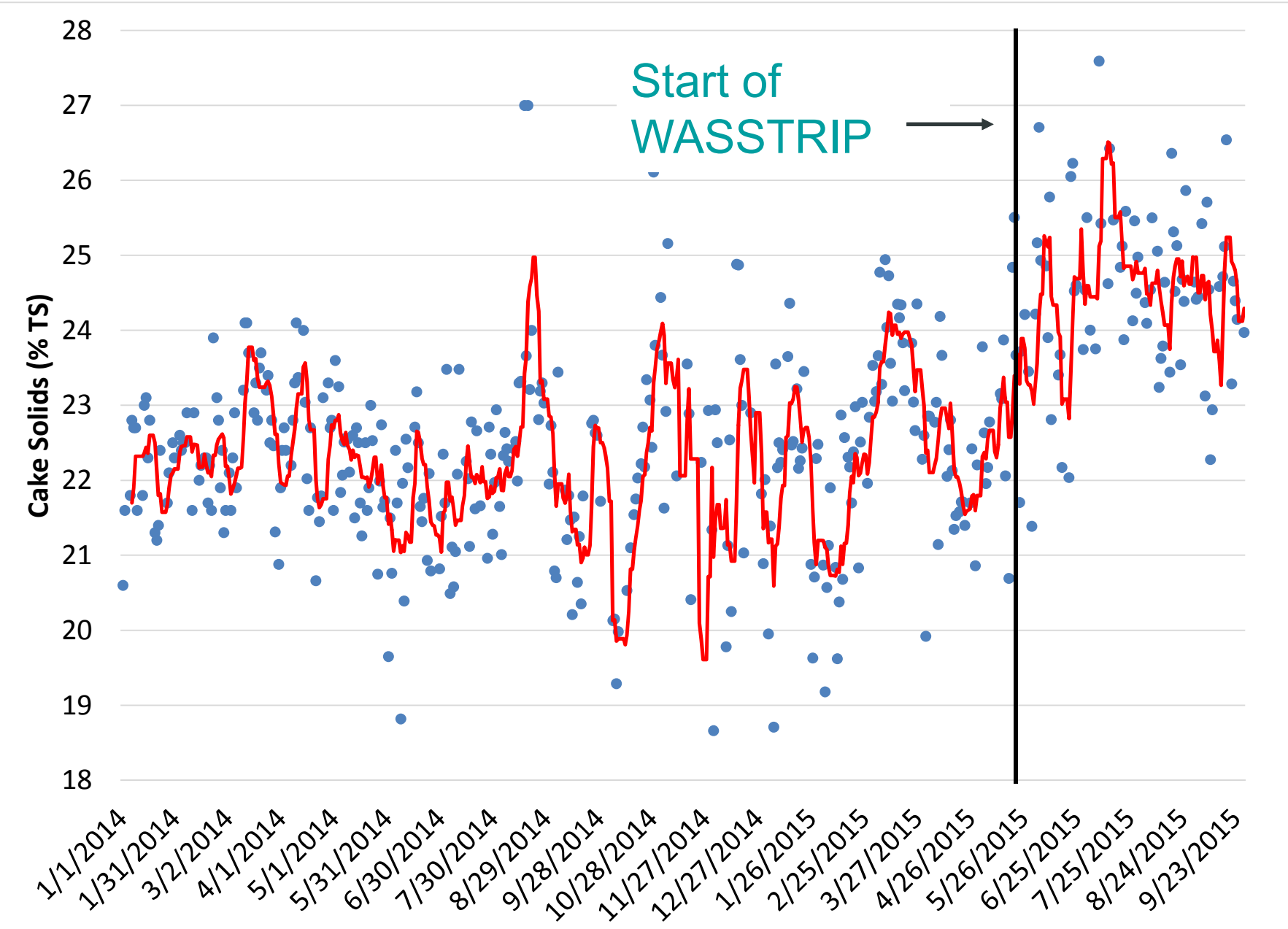
## Reduced Polymer Demand by 25%

HRSD Atlantic Treatment Facility, Virginia Beach, VA



# Gwinnett County F. Wayne Hill

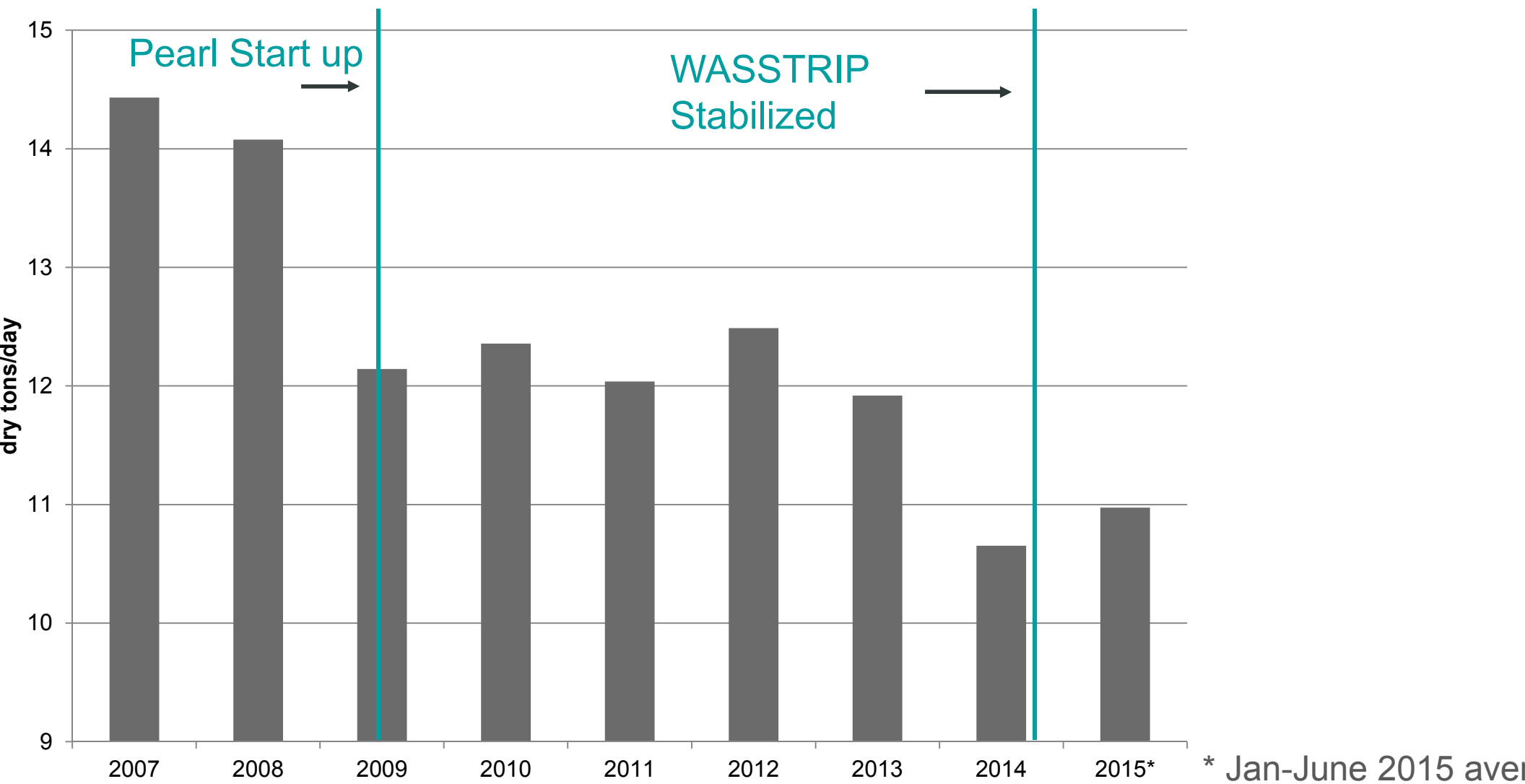
## Economics at Current Flows





# CWS Durham AWWTP Dry Solids Production Has Decreased by 25% with Pearl and WASSTRIP

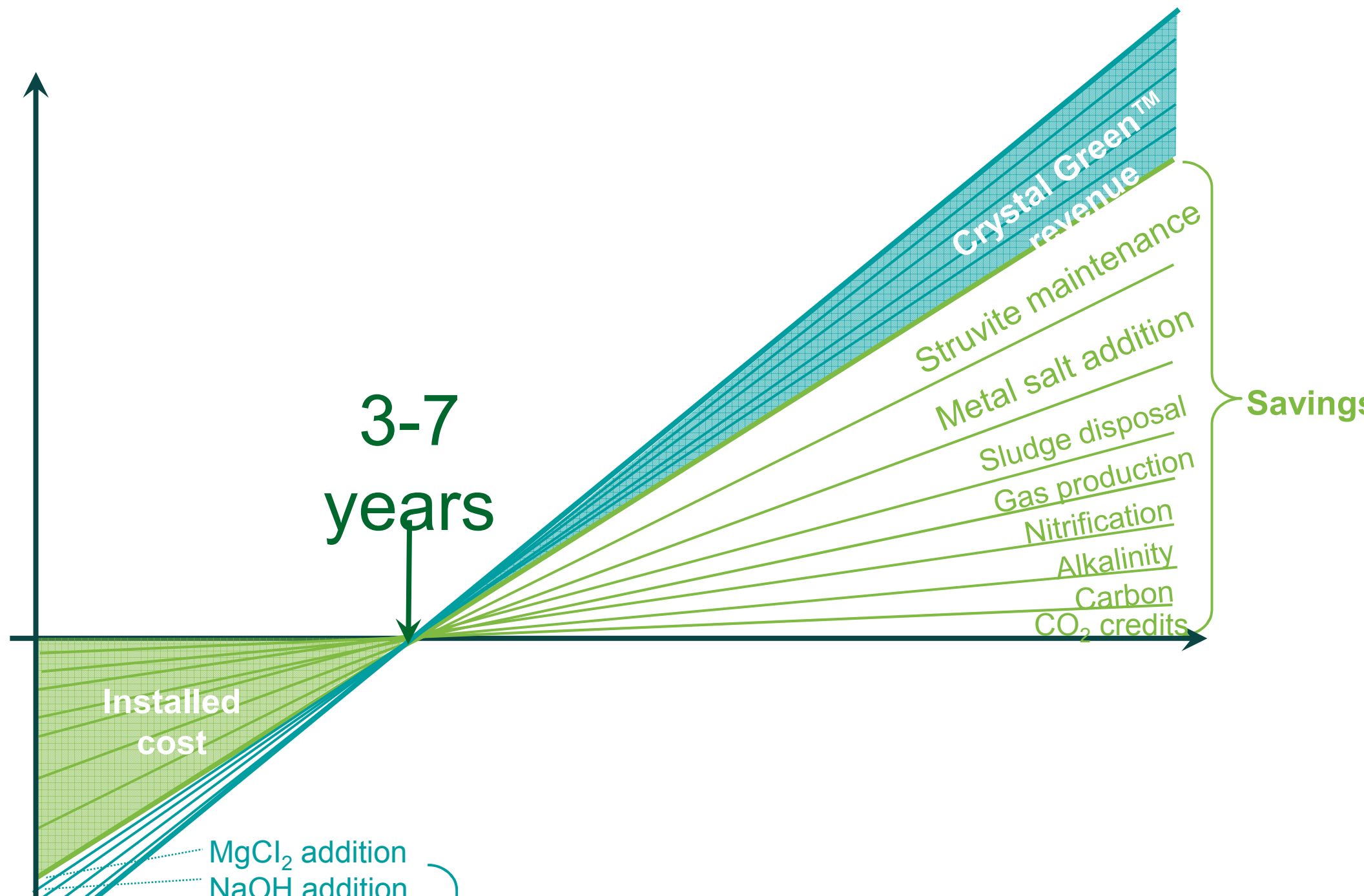
## CWS Biosolids Reduction



# **WASSTRIP** Provides Many Benefits

- ✓ Reduced nuisance struvite formation (90%)
- ✓ Improved sludge dewaterability (2-4%)
- ✓ Improved N:P nutrient balance in biosolids
- ✓ Reduced biosolids production (20-35%)
- ✓ Reduced Ammonia Load on plant
- ✓ Increased fertilizer production

# Payback period is typically 3 to 7 years

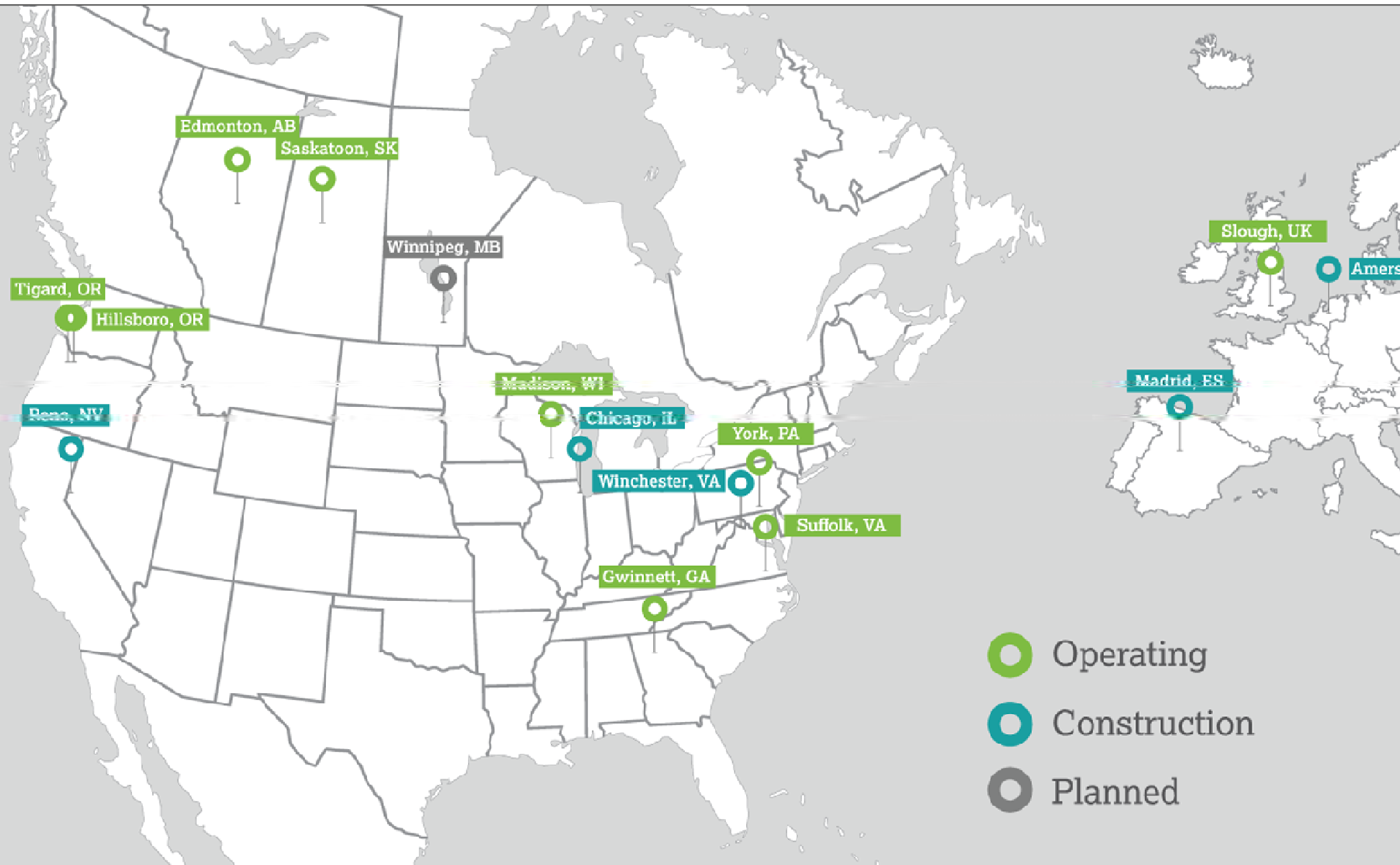


# Future Work

- Data collection from multiple WASSTRIP® sites:
  - Durham, OR
  - Madison, WI
  - Saskatoon, SK
  - Rock Creek, OR
  - Gwinnett County, GA
  - Amersfoort, Netherlands
  - Chicago, IL
- Pilot digester trials ongoing at HRSD and MCES
- WERF initiative to investigate poor EBPR dewatera



# Pearl<sup>®</sup> Nutrient Recovery has a Growing Installation Base





**THANK YOU**

**MIKE DITTON**

mditton@

ostara.com

crystalgreen