

# Ostara Nutrient Recovery Solutions



National Nutrient Reuse and Recovery Forum  
March 2018

**Ostara Nutrient Recovery Technologies**



# Operating Experience



2005  
Year Ostara  
founded

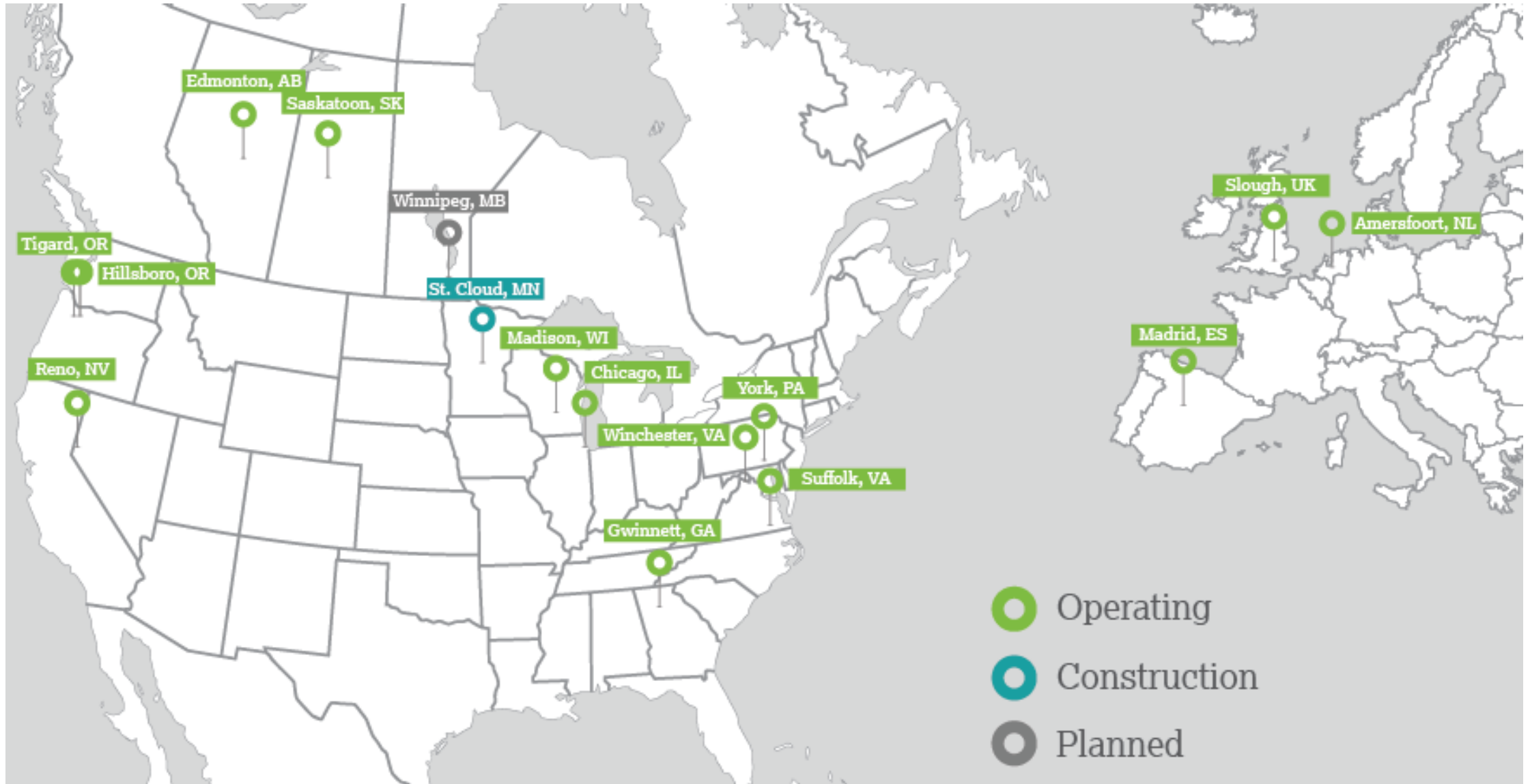
17,000  
Tons annual  
fertilizer  
production  
capacity

14  
Operational  
Pearl® systems  
worldwide

11 Million  
People served by  
Ostara's nutrient  
recovery facilities

400,000  
Hours of Pearl®  
operational  
experience

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





# Phosphorus

is Essential to All Living Organisms

# There is No Substitute for Phosphorus



Phosphorus is a building block of DNA, cellular membranes and energy metabolism

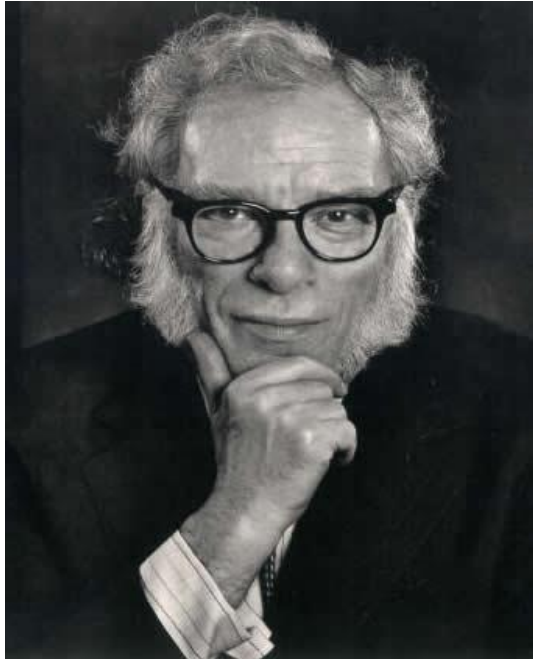


The human adult body contains approx. 1.5 kg (~2%) phosphorus, mostly in teeth and bones



There is no known substitute for phosphorus

"...for phosphorus, there is neither substitute nor replacement."  
Isaac Asimov



*"We may be able to substitute nuclear power for coal, and plastics for wood, and yeast for meat, and friendliness for isolation - but for phosphorus there is neither substitute nor replacement."*

June 1974

# Today's Phosphorus Cycle is Broken





# Lake Erie

In danger of dying by suffocation

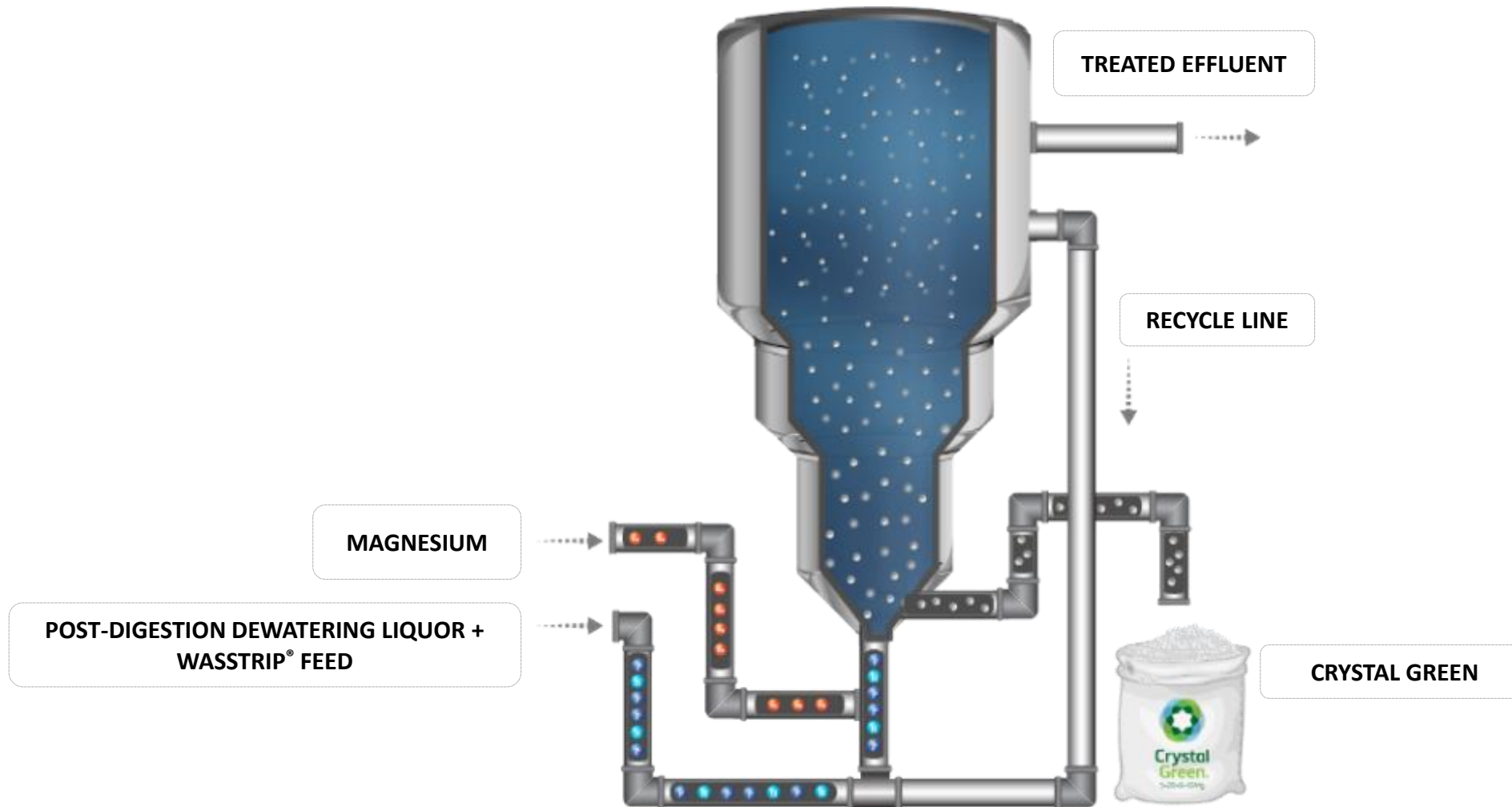


# Ostara Provides a Sustainable, Closed Loop Solution



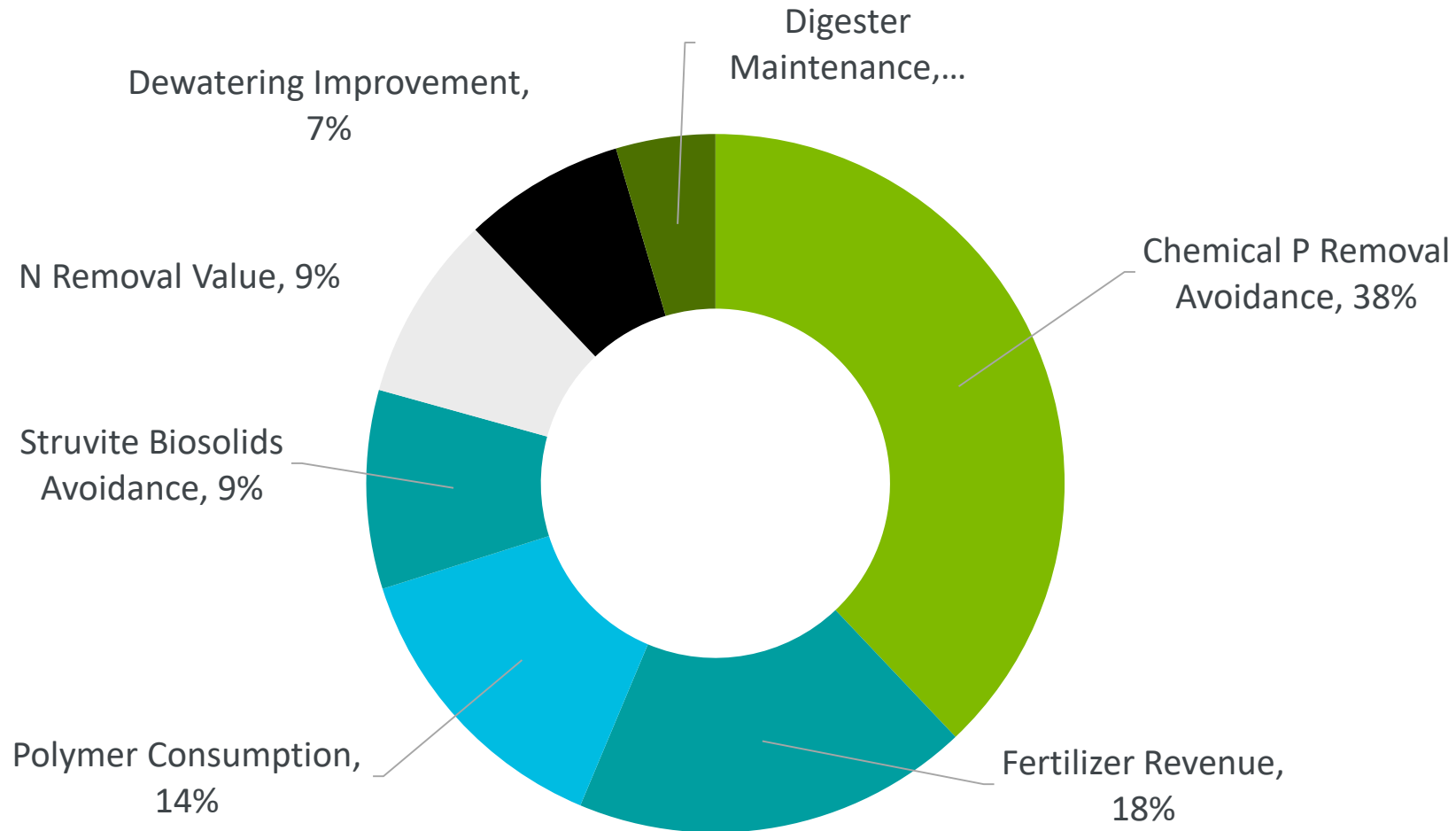


# Ostara's Core Technology: The Pearl<sup>®</sup> Reactor



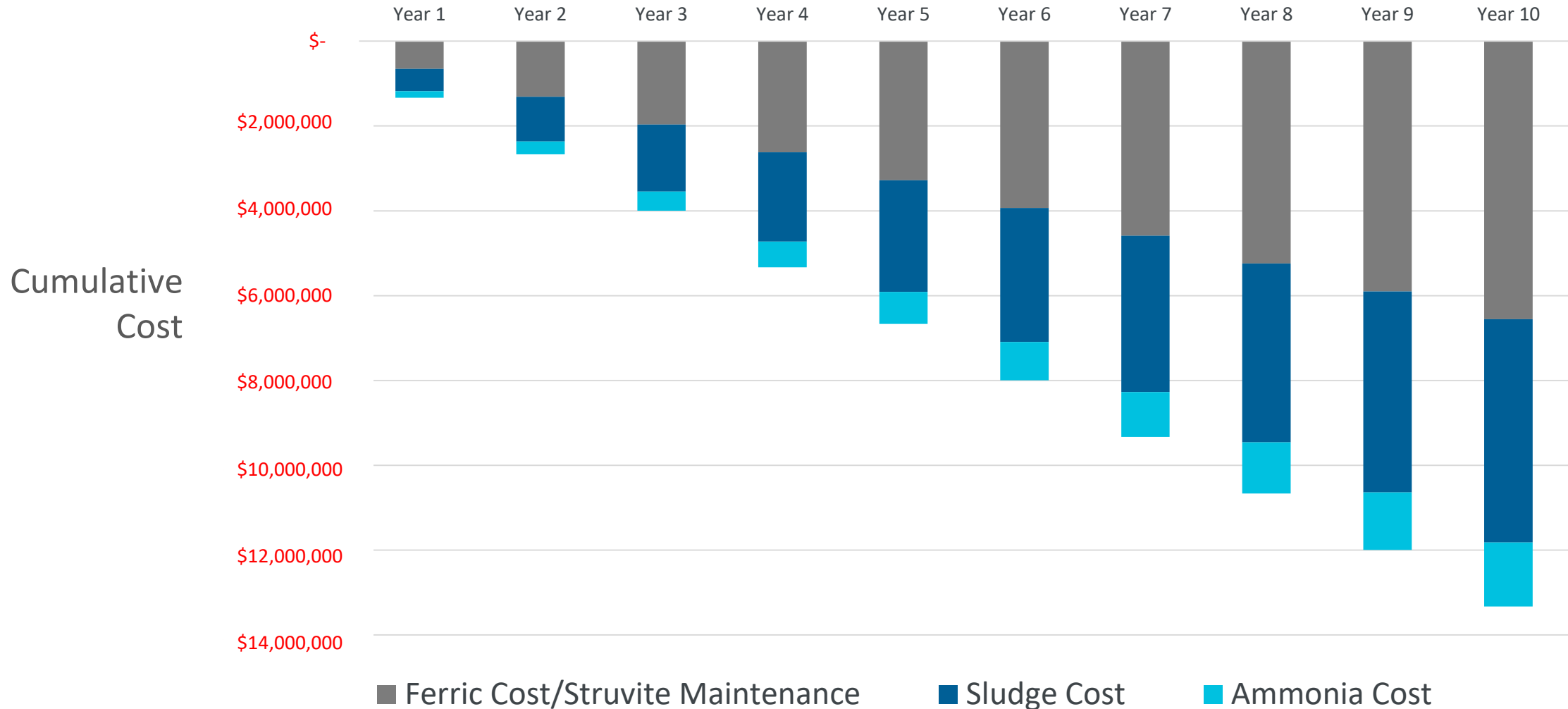
# Breakdown of Annual Savings

## 50-MGD Plant



# Status Quo: Ferric, Sludge Disposal, Ammonia

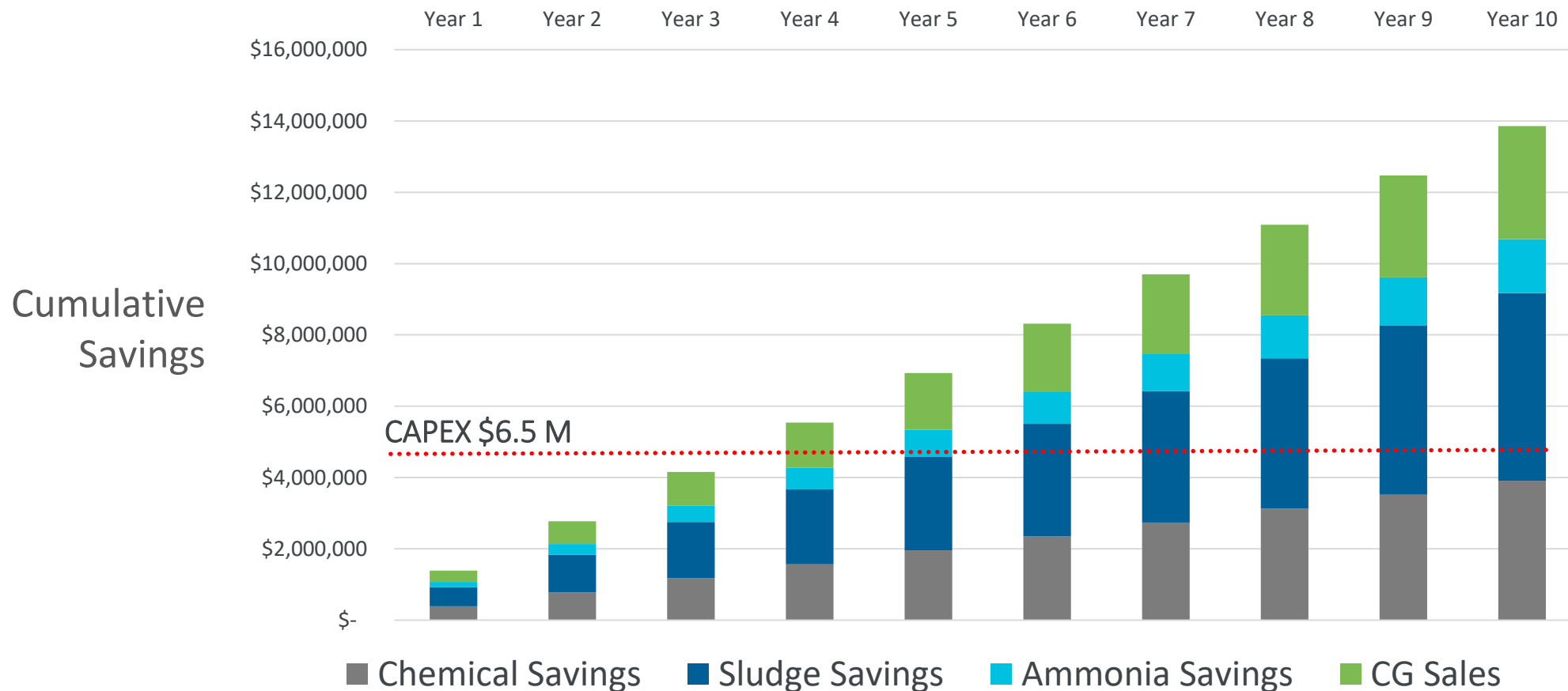
## Without Pearl Installation over 10 years (50 MGD Plant)





# Cumulative Savings Provide ~ 5 Year\* Capital Payback

## Offsets Initial Investment (50 MGD Plant)



\*Average based on standard installation of two Pearl®2K systems at a 50 MGD or 500,000 population equivalent wastewater treatment plant.



## Crystal Green is simply a natural, slow release, granular fertilizer

- ✓ Proven to reduce non-point source runoff
- ✓ Registered commercial fertilizer in the US and Canada
- ✓ Established market
- ✓ AAPFCO approved source of slow release nutrients
- ✓ USDA CSP Approved input



# Crystal Green is Produced in Market Specific Sizes

SGN  
450



SGN  
300



SGN  
150



SGN  
90



The only uncoated continuous release granular phosphorus fertilizer

- ✓ Root-Activated™ (citrate soluble)
- ✓ 99.6% Purity
- ✓ 0.9, 1.5, 3.0, 4.5 mm prill size
- ✓ Lowest Salt Index of any P source
- ✓ Hardness similar to MAP or DAP
- ✓ High uniformity index



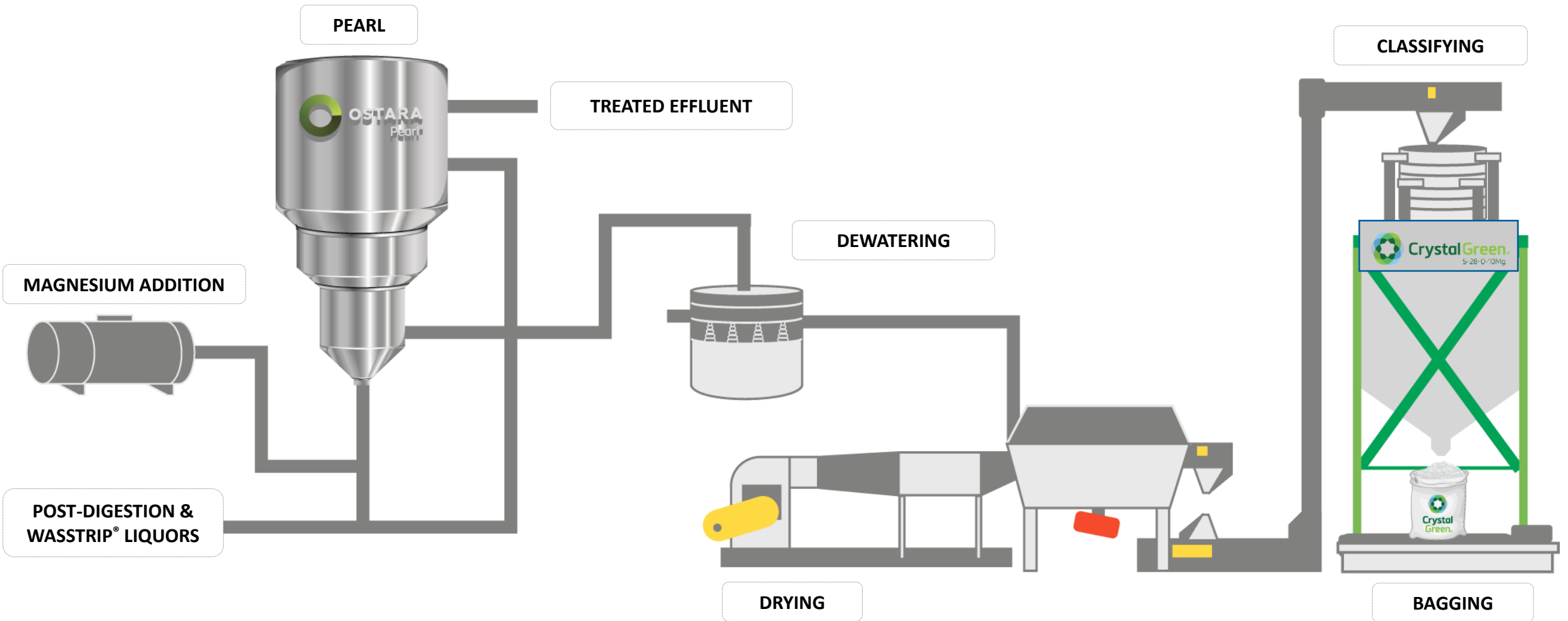
## Guaranteed Fertilizer Purchase Optimizes Your Investment



- ✓ Long-term purchase agreement
- ✓ Sales price tied to global fertilizer market value
- ✓ Established sales channel in North America and Europe

# Fertilizer Product Handling is Simple and Fully-Automated

Crystal Green is dried, sorted and bagged ready-for-sale on site





# With Ostara, Nutrient Management Partnership Maximizes Your Success



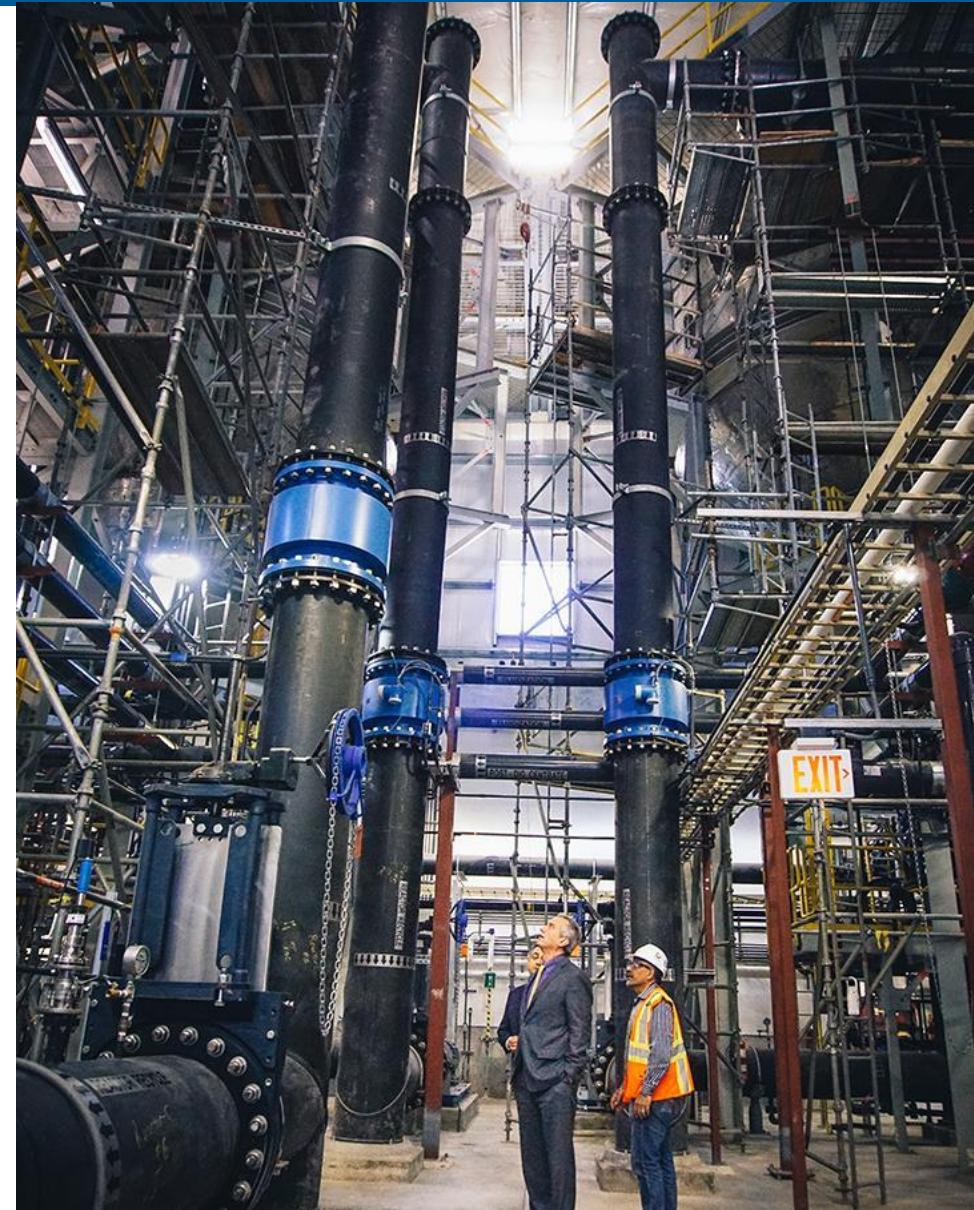


# Ostara's Solution Enabled Stickney Water Reclamation Facility to Successfully Meet Nutrient Limits With Bio-P Removal



## Metropolitan Water Reclamation District Of Greater Chicago

PARAMETER	VALUE
Design Capacity	1200 MGD
Population Served	4,500,000
Pearl Model	10K
# of Reactors	3
Installation	Greenfield
Installation Year	2016
WASSTRIP	Planned



# Pearl<sup>®</sup> 10K



**Load Capacity (PO<sub>4</sub>-P per day)**

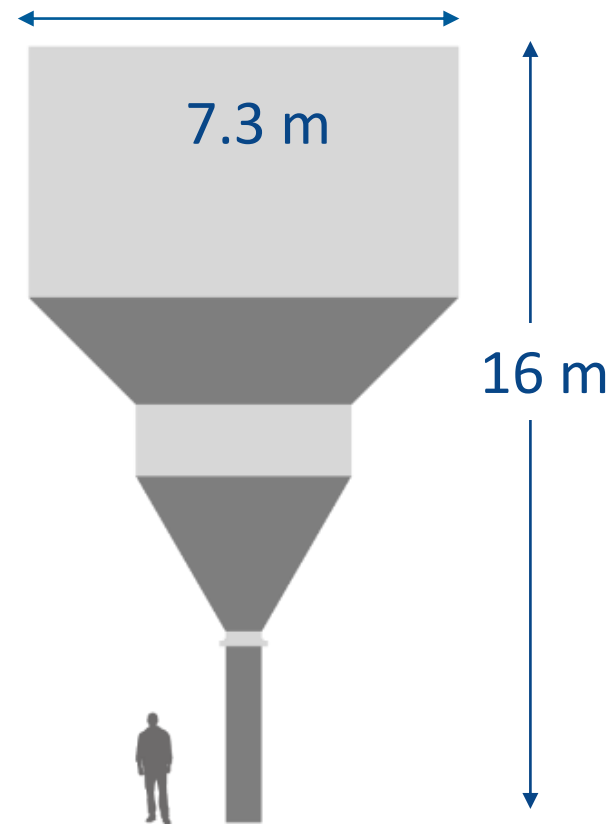
1,250 kg

**Average Production Capacity  
(Crystal Green per day)**

6,350 kg

**Installation Base (2017)**

4





# 3 x Pearl<sup>®</sup> 10K at Chicago

Capacity of 7,500 tons/year of Crystal Green<sup>®</sup>





## 3X Pearl 10K at Stickney Nutrient Recovery Facility

Achieves MWRD's Project Goals:



1.0mg/L limit for total P in effluent



Plant efficiency and cost-effective implementation of Bio-P



Capacity to produce 7,500 tons/year of Crystal Green



Cost recovery in 5-7 years



# Ostara Offers a Closed Loop Solution for Phosphorus Recovery



## From Waste to Worth

Close the loop on the phosphorus cycle by recovering nutrients from a renewable source and transforming them into eco-friendly, high value fertilizer





# THANK YOU

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