

Capture the Most Phosphorus

CalPrex™

Pre-Digestion P-Recovery

AirPrex®

Sludge Optimization and P-Recovery

THE PROBLEM

Phosphorus is a **Limited** Resource

Most phosphorus fertilizer used for modern agriculture originates from phosphate rock. Phosphate rock is a non-renewable resource with limited reserves. To ensure sustainable food production for the future, it is critical to expand the recovery and reuse of phosphorus from waste sources. Prior to the development of CalPrex and AirPrex, the methods to effectively recover phosphorus entering a wastewater treatment plant were to chemically acidify sludge or incinerated ash. These processes are prohibitively expensive if only used for fertilizer production.

THE SOLUTION

Maximum Phosphorus Recovery,
Minimum Sludge Production

The combination of CalPrex + AirPrex captures 50%+ **total** phosphorus entering treatment plants, with minimal addition of chemicals.

The CalPrex process harnesses the acidogenic bacteria power to acidify bio-P sludge. Over 60% of phosphorus solubilizes in the acid phase digestion process. Dewatering acidogenically digested sludge isolates the dissolved phosphorus (orthophosphates) in the centrate. The centrate is sent to the CalPrex reactor, where orthophosphates are precipitated by calcium hydroxide. By maintaining a pH solution of 6.5 or below, phosphorus is recovered as brushite ($\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$), a market-ready, high-quality fertilizer.

AirPrex converts the remaining orthophosphates in digested sludge to struvite ($\text{MgNH}_4\text{PO}_4 \cdot 6\text{H}_2\text{O}$) by air stripping CO_2 and adding magnesium chloride. Struvite is another market-ready fertilizer. AirPrex reduces the phosphorus recirculation by 90%.

THE BENEFITS

CalPrex + AirPrex:
A **Combined** Approach



Reduce Phosphate Recycle Load up to **90%**



Reduce Polymer Consumption up to **30%**



Reduce Disposal Costs up to **20%**

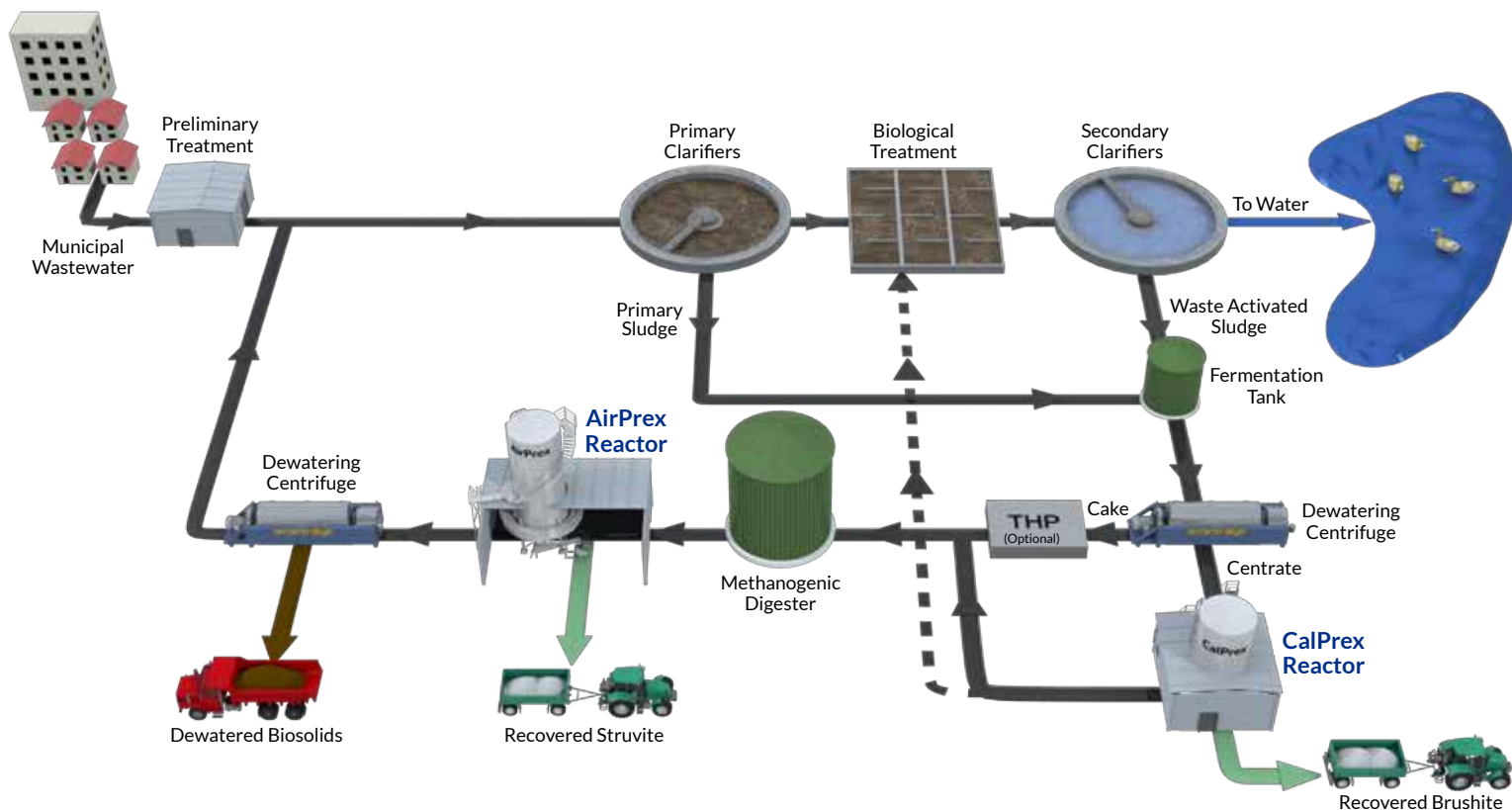


Reduce Maintenance Costs up to **50%**



Recover Over **50%** of **Total** Phosphorus

PROCESS: CalPrex™ & AirPrex®



	Centrate Recovery	WAS Fermentation + Centrate Recovery	AirPrex®	CalPrex™	AirPrex® & CalPrex™
Reduce Phosphorus Recycle	✓	✓	✓	✓	✓
Recovery of Marketable Fertilizer	✓	✓	✓	✓	✓
Reduce Struvite Maintenance	✓	✓	✓	✓	✓
Reduce Digester Struvite Buildup	✗	✓	✗	✓	✓
Improve Sludge Cake Dryness	✗	?	✓	?	✓
Reduce Polymer Demand	✗	?	✓	?	✓
Reduce P Content of Sludge	✗	✓	✗	✓	✓
Compatible with THP or TCHP* Addition	✗	✓	✓	✓	✓
Lower Chemical Cost Per P Recovered	✗	✗	✗	✓	✓

*Thermal Hydrolysis Process or Thermo-Chemical Hydrolysis Process

The CalPrex™ Technology is licensed by Nutrient Recovery and Upcycling LLC.

