



Industry Standard Biological Wastewater Treatment in WaterTAP

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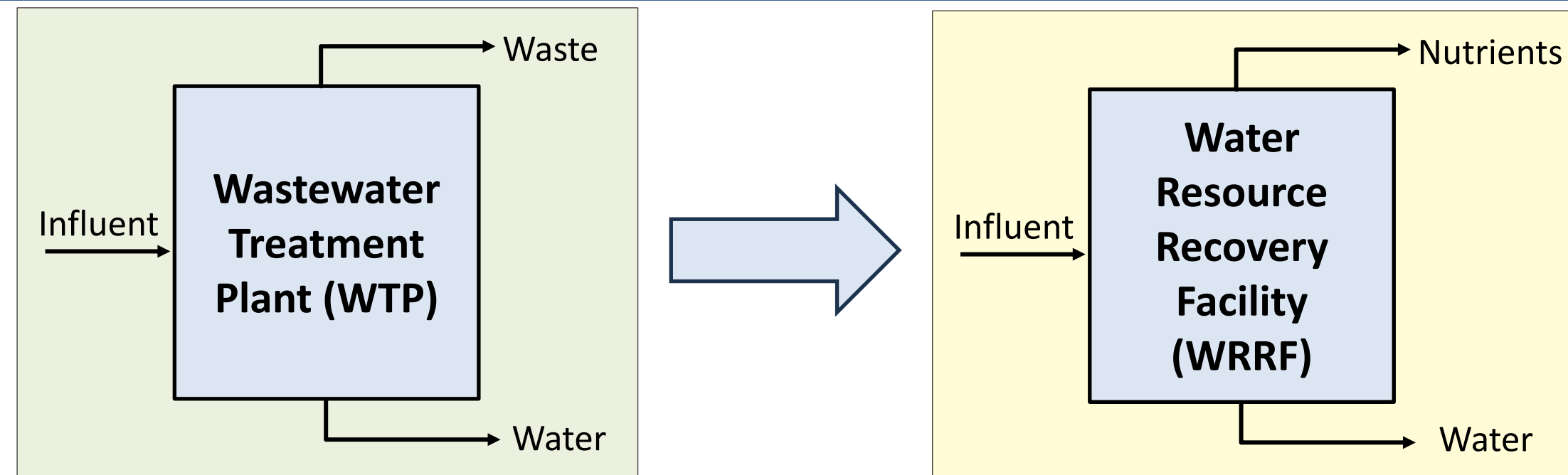
Background

Biological wastewater treatment is essential in and municipal and industrial wastewater facilities to decompose organic components and other contaminants. By utilizing microorganisms to treat bodies of water instead of chemicals, biological treatment:

- reduces the accumulation of nutrients in treated water and the resultant algal blooms
- recovers nutrients for use in novel technologies

The International Water Association (IWA) has developed standardized biochemical models for these processes.

Motivation

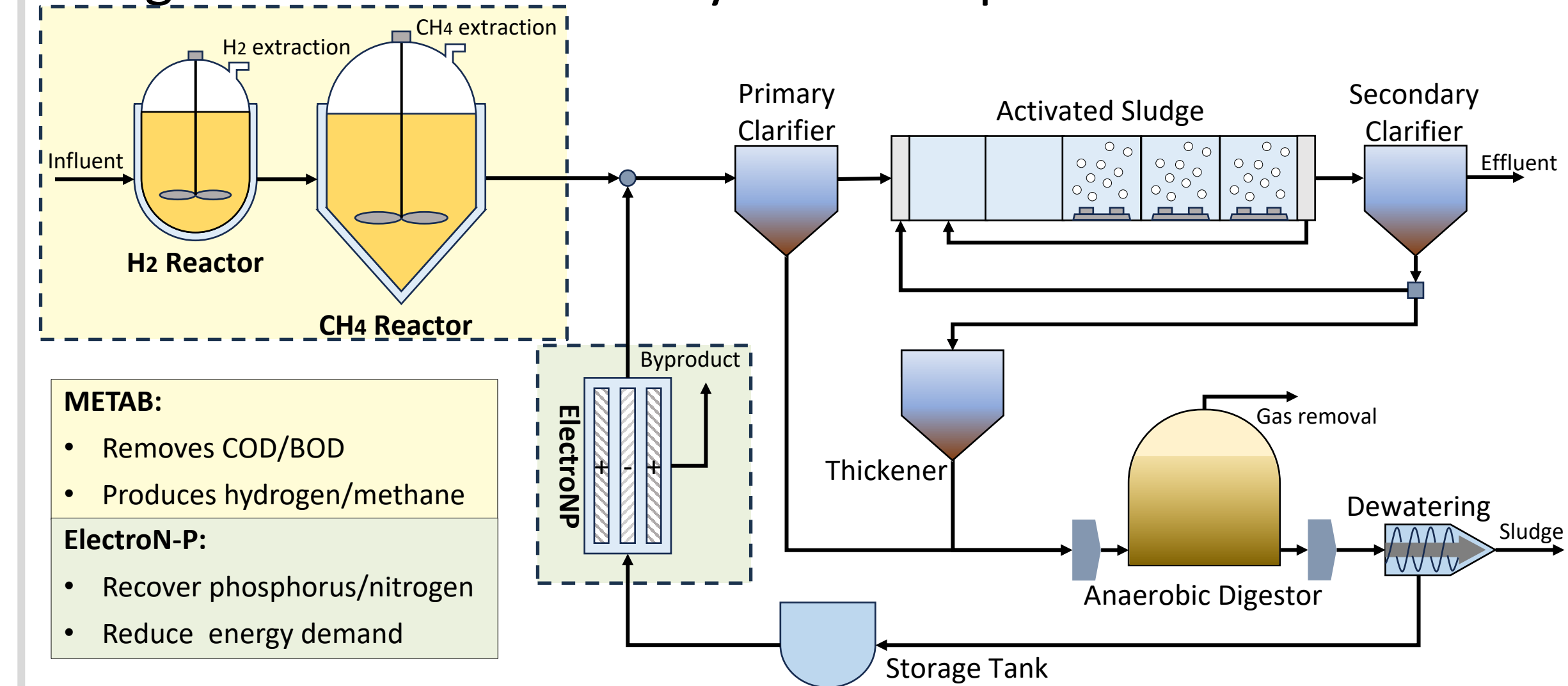


Apply advanced technologies to:

- Increase energy efficiency
- Recover valuable products
- Reduce waste disposal costs

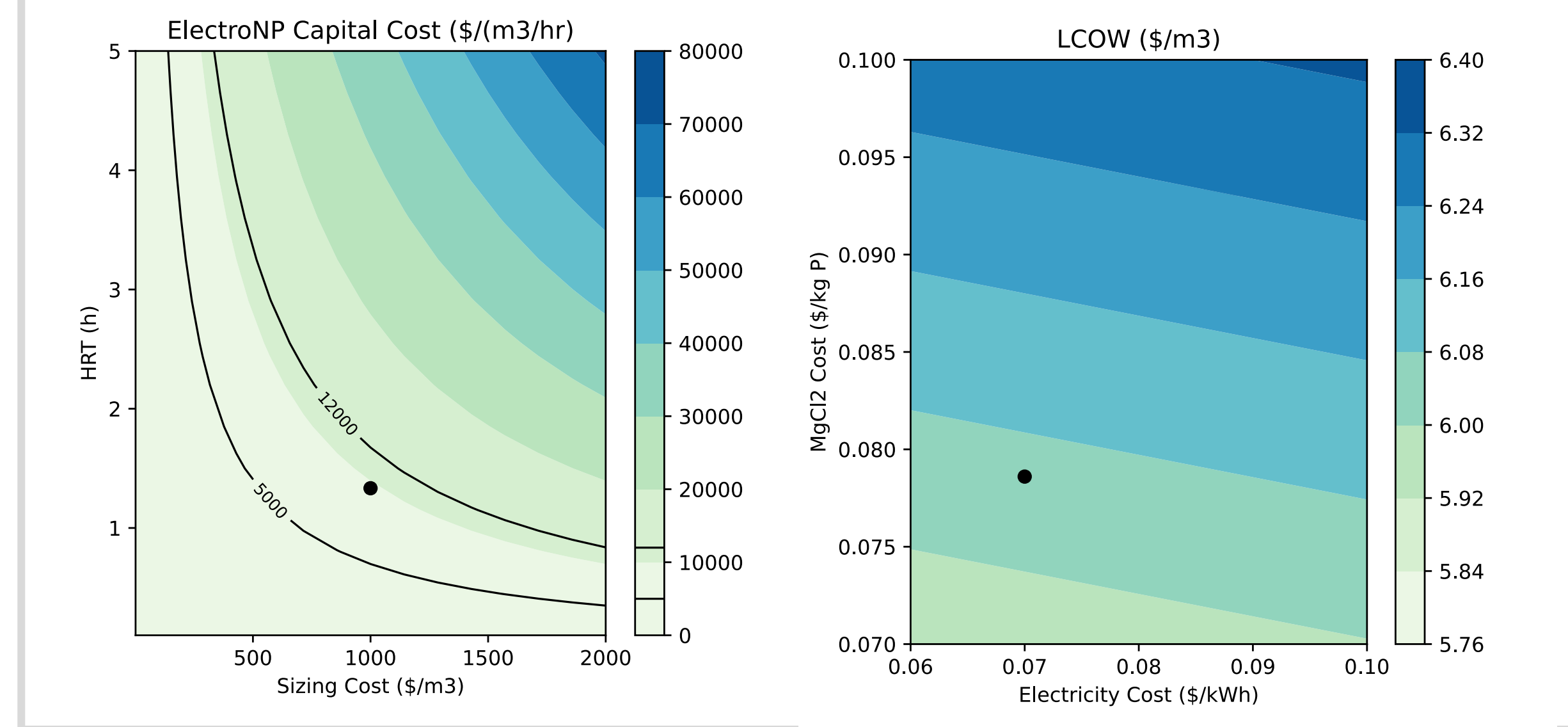
Analysis and Results

Explore design and operation of novel technologies being integrated into the industry standard plant wide model.



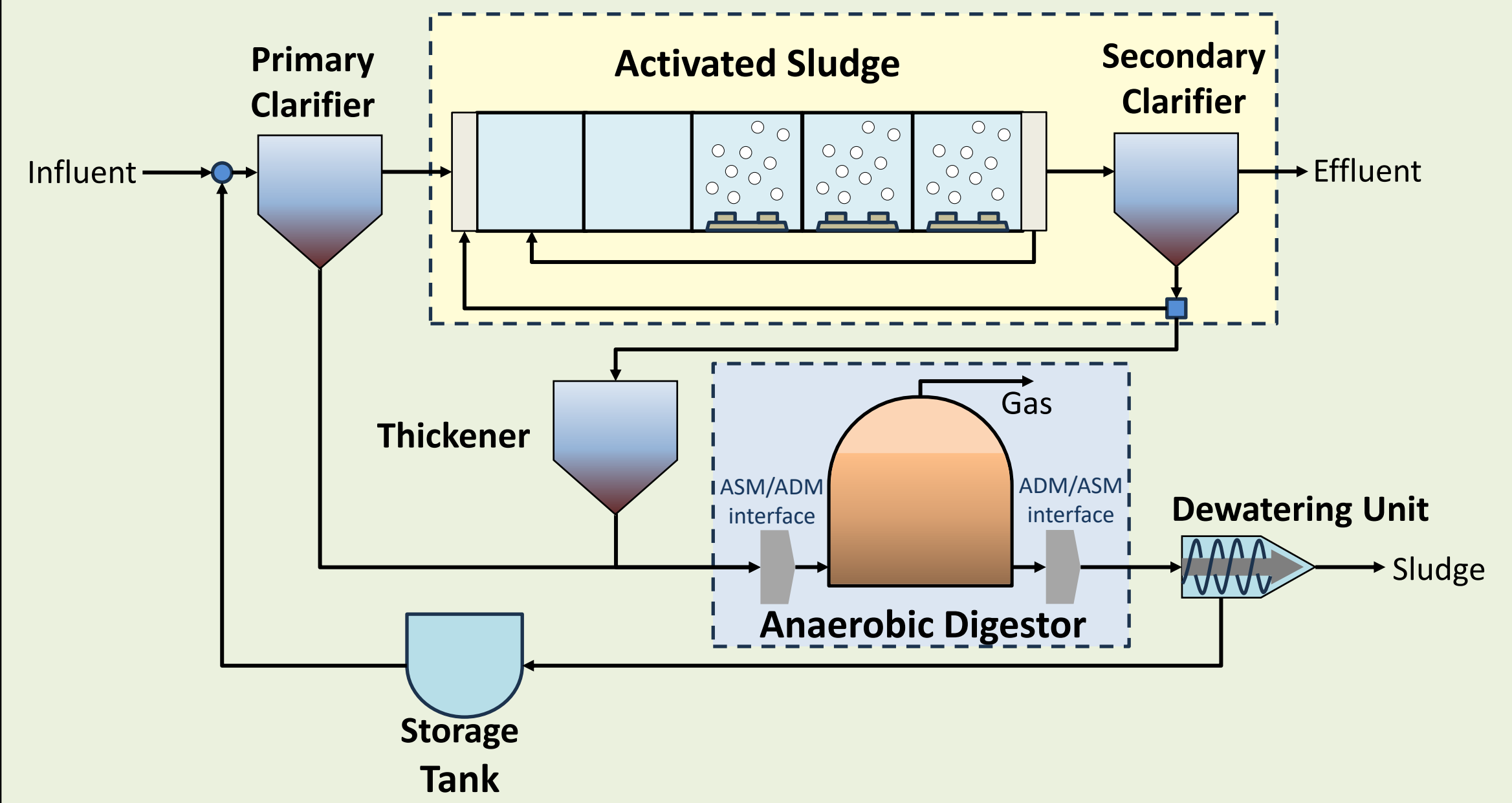
- METAB:**
- Removes COD/BOD
 - Produces hydrogen/methane
- ElectroN-P:**
- Recover phosphorus/nitrogen
 - Reduce energy demand

Leveraging technoeconomic assessment to set research targets for novel technologies

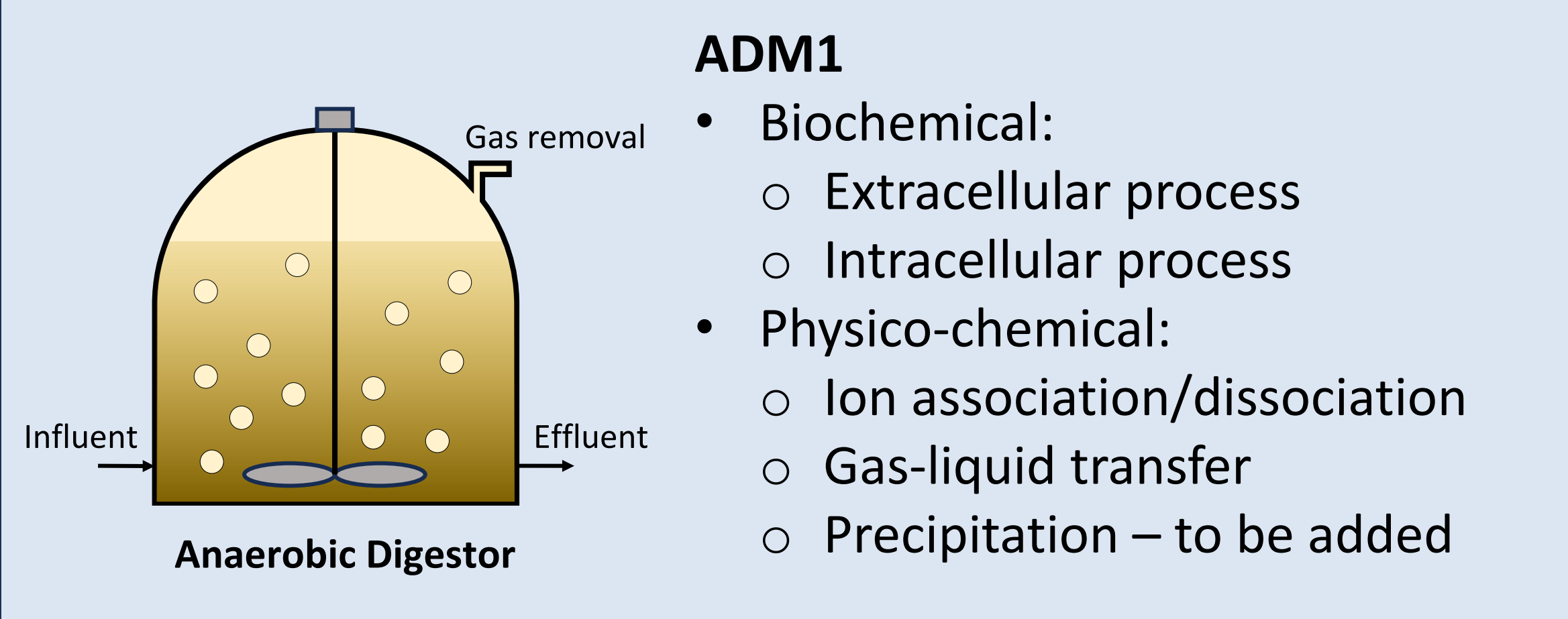


Approach

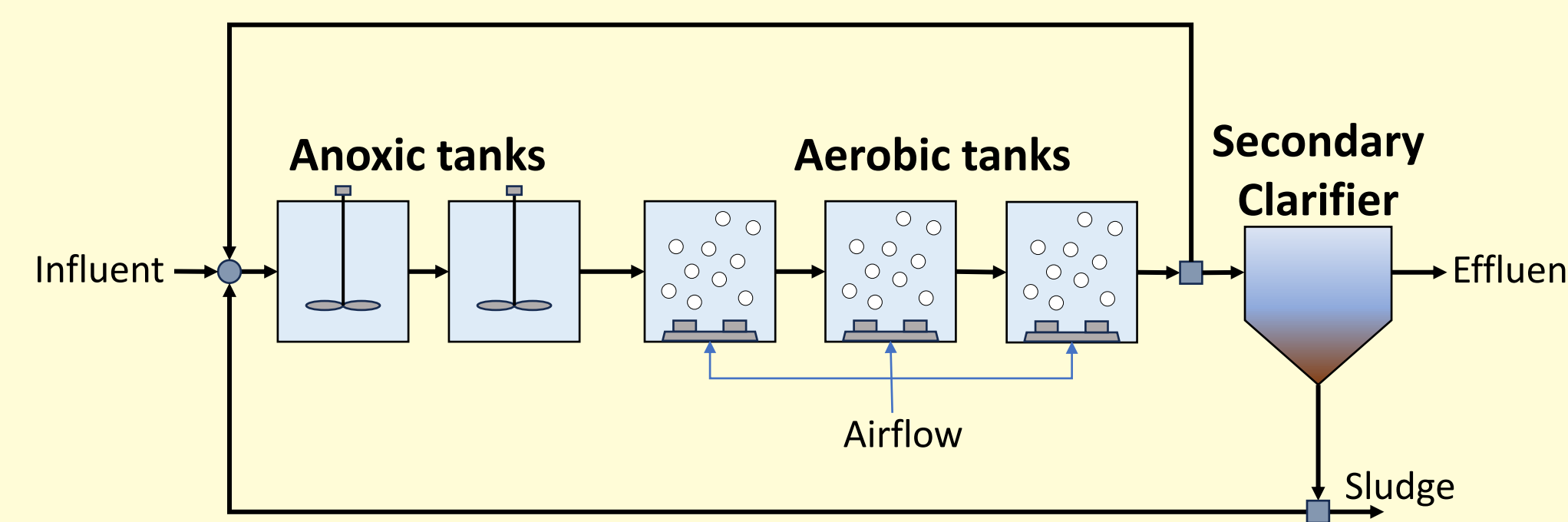
Benchmark Simulation Model 2 (BSM2)



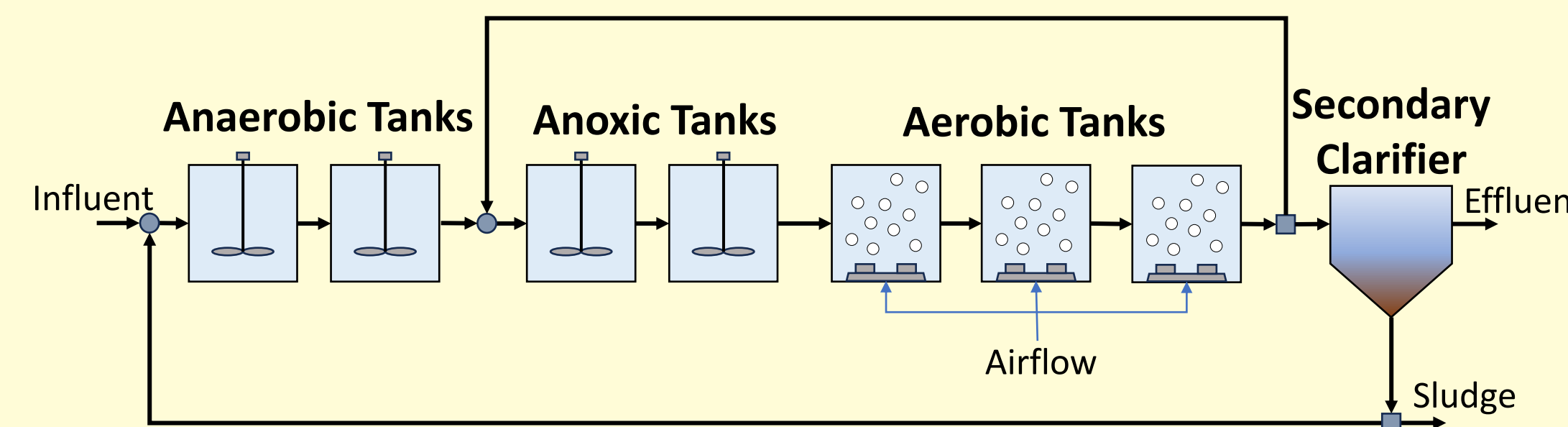
Anaerobic Digester Model No. 1 (ADM1)



Activated Sludge Model 1 (ASM1)



Activated Sludge Model 2d (ASM2d)



ASM1

- Carbon oxidation
- Nitrification
- Denitrification

ASM2d

- Additional biological processes
- Phosphorus removal
- Cell internal structure

Remarks and Future Work

Future efforts on plant-wide treatment development will account for model costing as well as various forms of physicochemical phenomena, such as precipitation and ion speciation. This material is based upon work funded by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), Industrial Efficiency and Decarbonization Office (IEDO), under Funding Opportunity Announcement Number DE-FOA-0002336.

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