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CREATE CHANGE

Exploring new opportunities for resource 'reuse' in urban water management

Prof Zhiguo Yuan AM

Director, Advanced Water Management Centre

The University of Queensland



Advanced Water
Management Centre

Resource recovery from wastewater

Water – recycling and fit-for purpose reuse

Bioenergy – biogas

Nutrients

- Fertilizer such as struvite
- Single cell proteins (Tim Huelsen talk today)

Direct recovery of valuable materials

- Cellulose recovery
- Melanoidin recovery from THP-AD effluent (Damien Batstone)
- Other materials also possible, particularly from industrial wastewaters

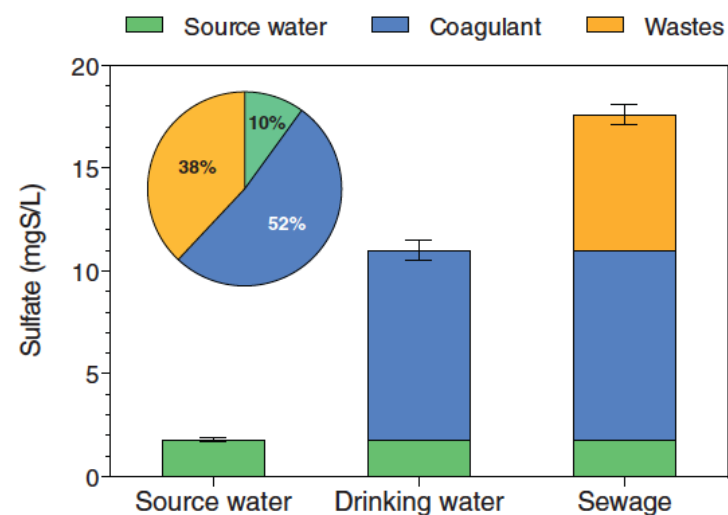
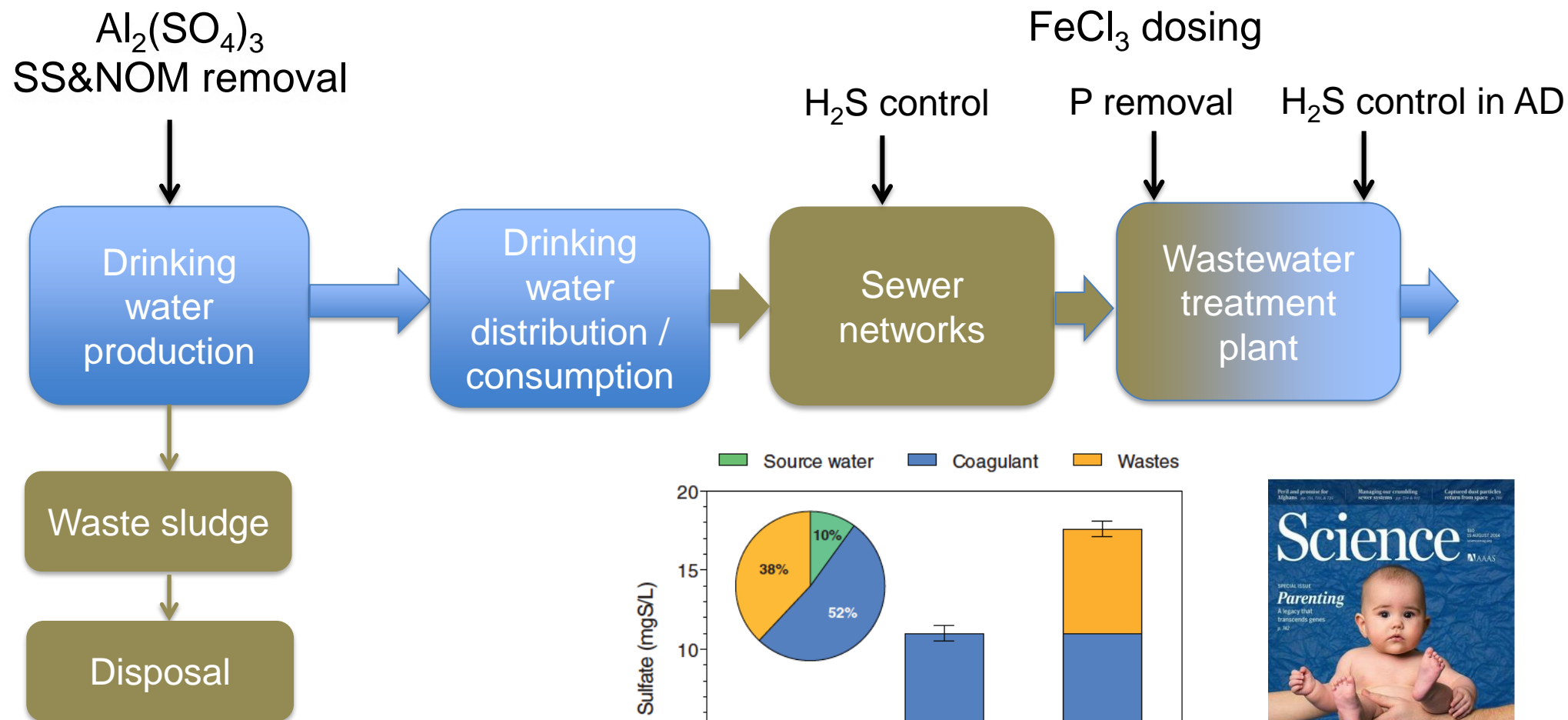
Fit-for-purpose, in-situ reuse of ‘wastewater materials’

- Multiple use of iron salts in an urban water system
- Free nitrous acid production from wastewater to enhance bioenergy recovery
- Methane-supported denitrification

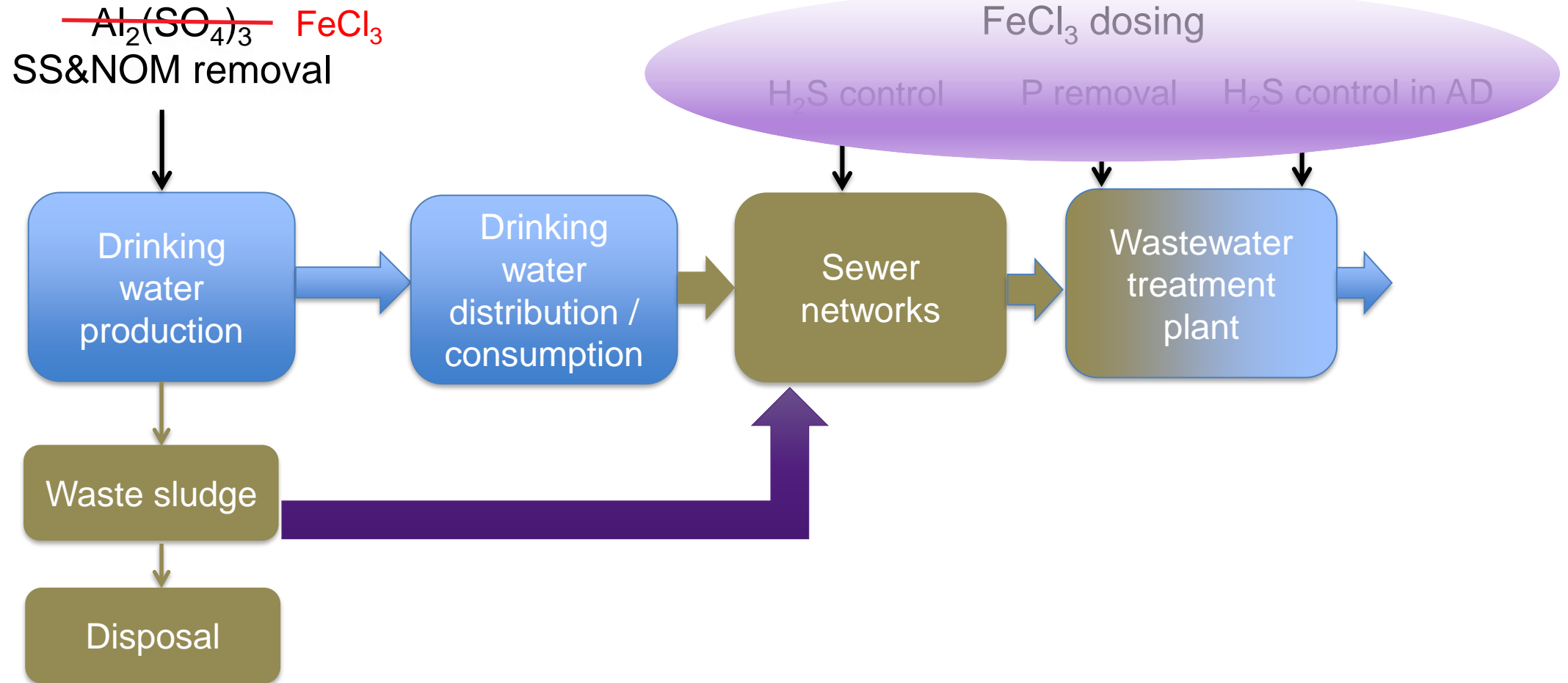


Example 1: Multiple use (reuse) of iron salts in an urban water system

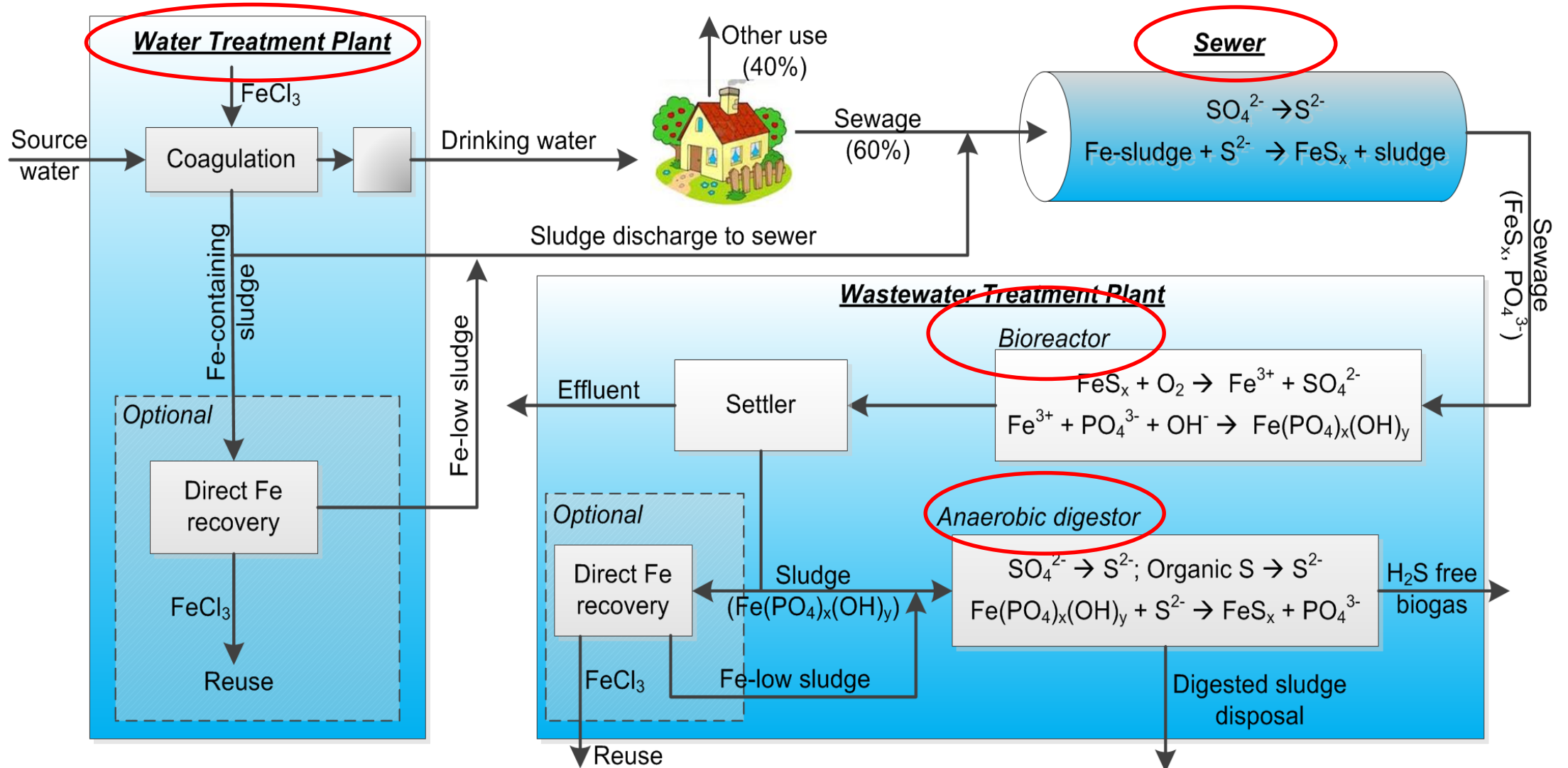
Coagulant use in an urban water system



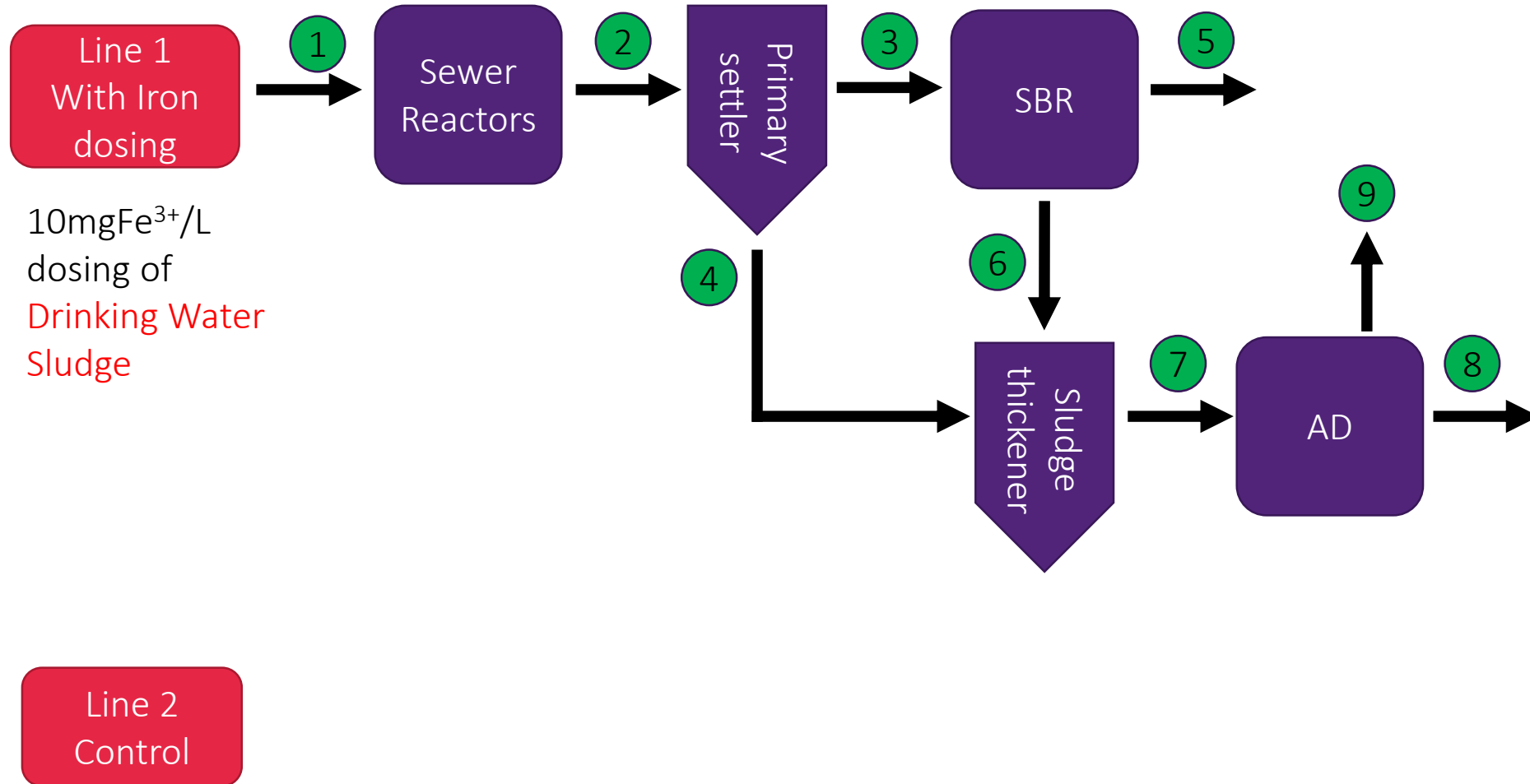
Coagulant use in an urban water system



Chemistry should work out!

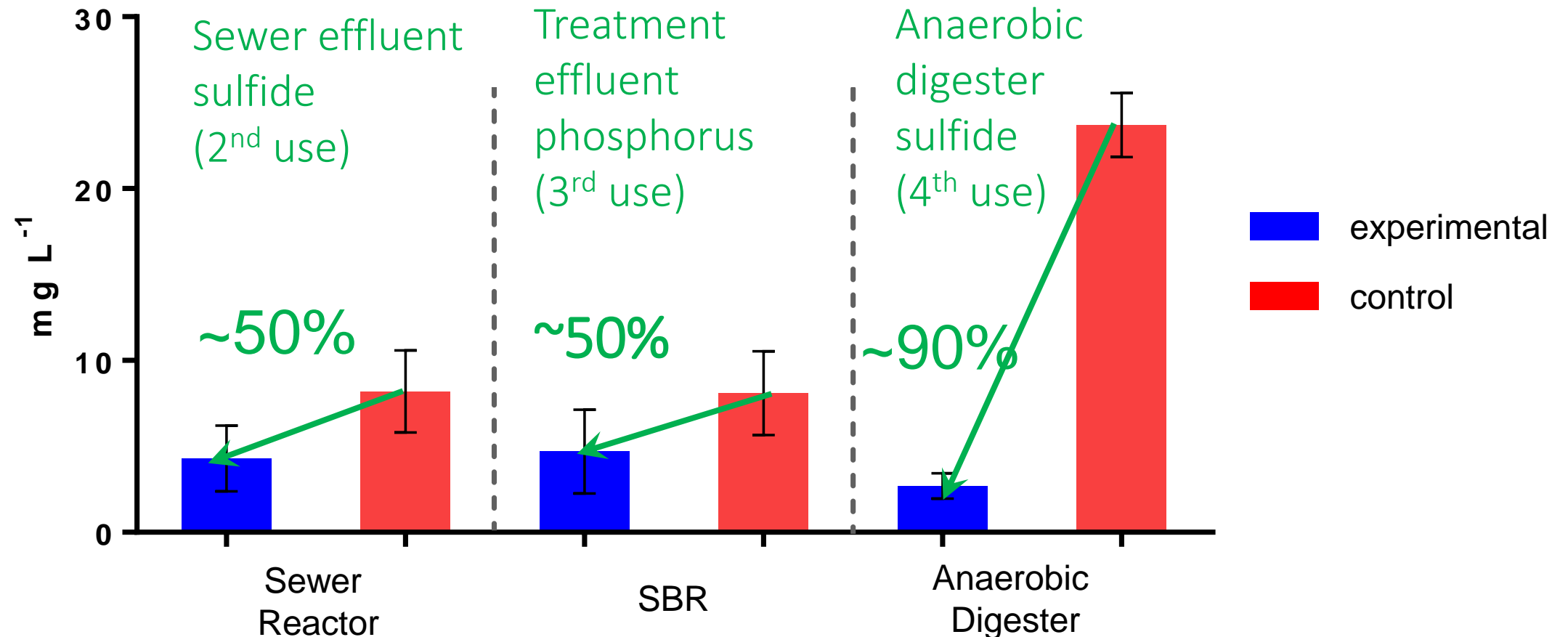


Multiple use (reuse) of iron salts in an urban water system

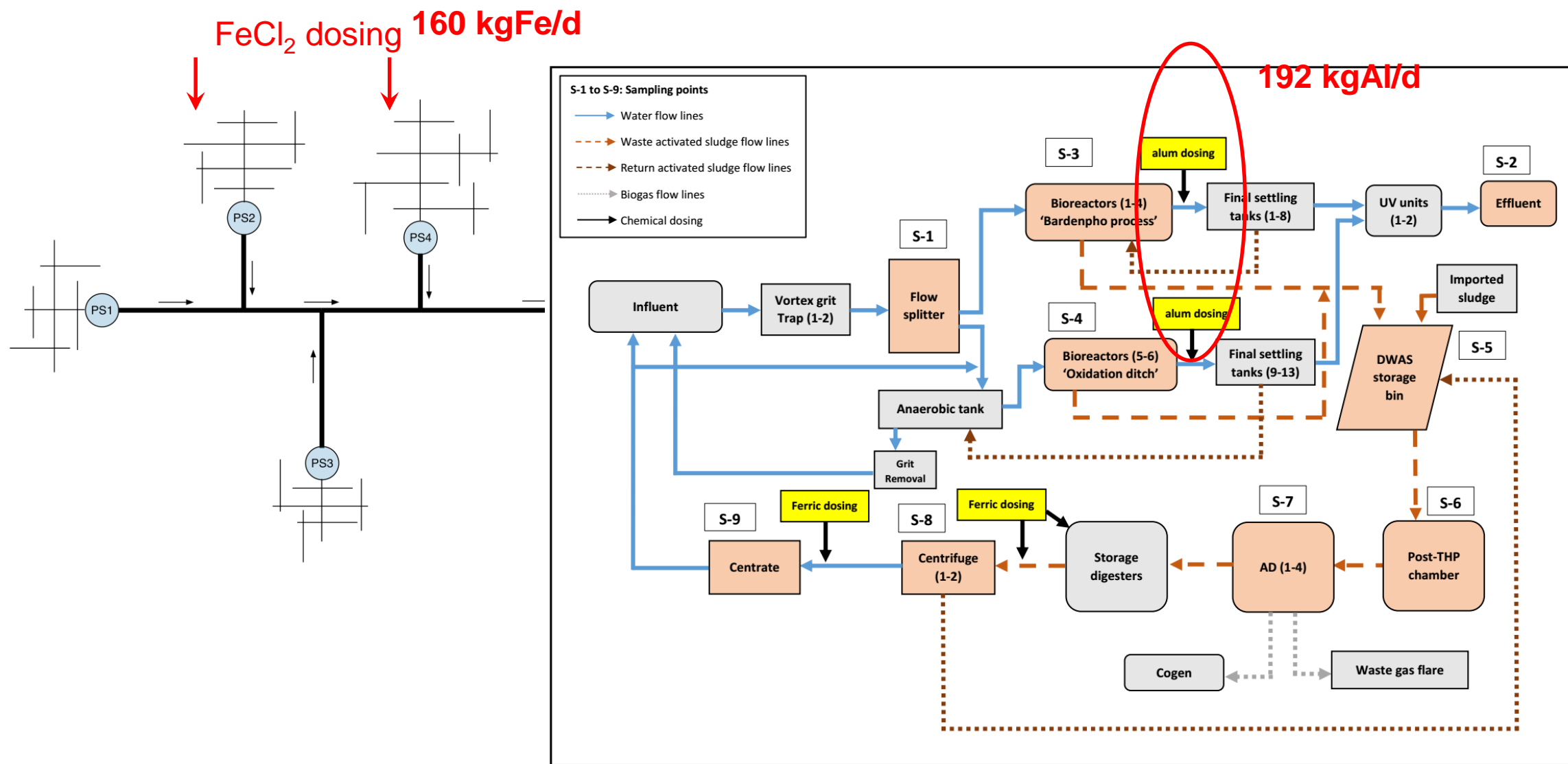


Multiple use (reuse) of iron salts in an urban water system

10mgFe³⁺/L dosing of Drinking Water Sludge to sewer



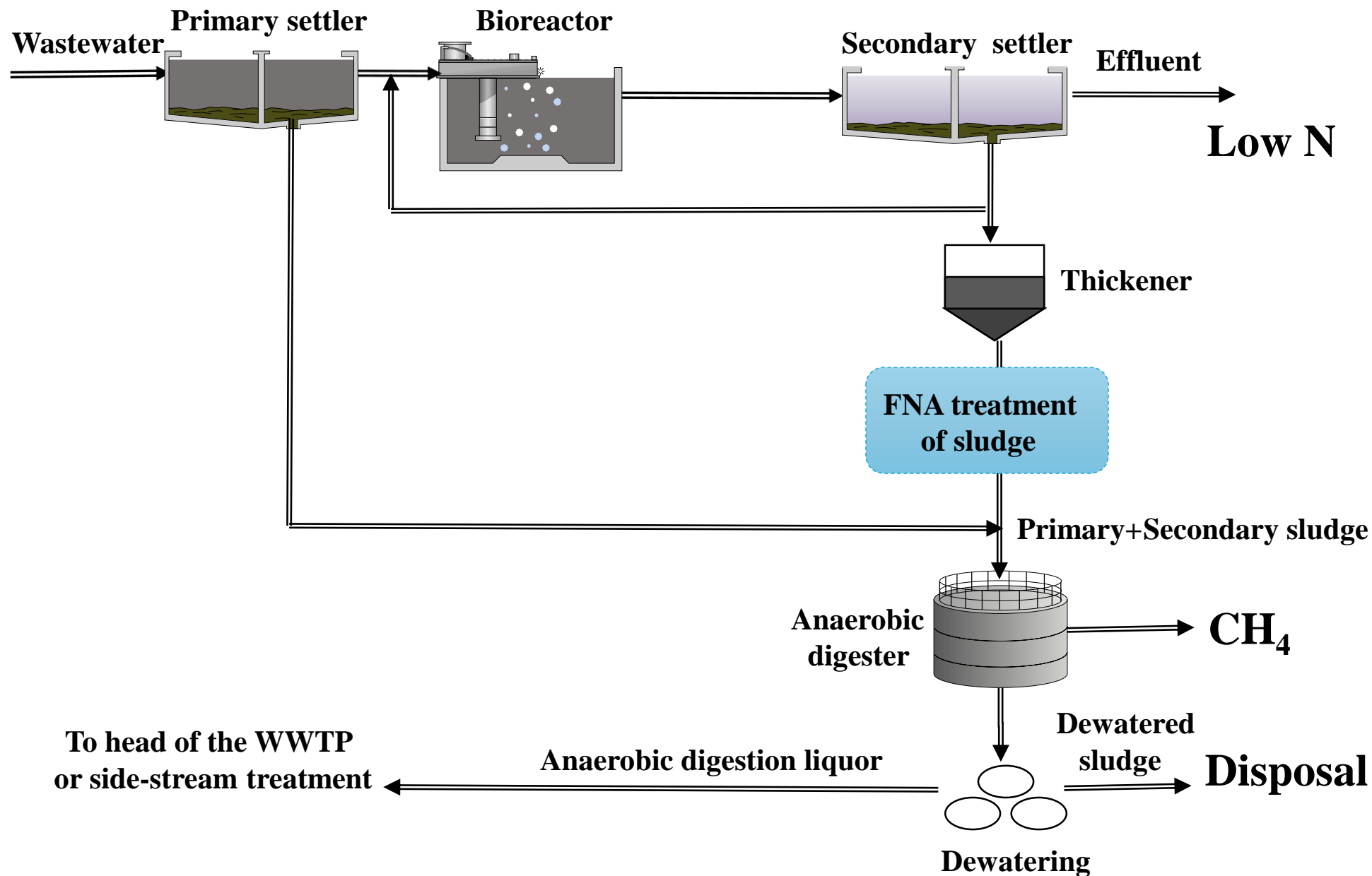
Results partially demonstrated in field studies



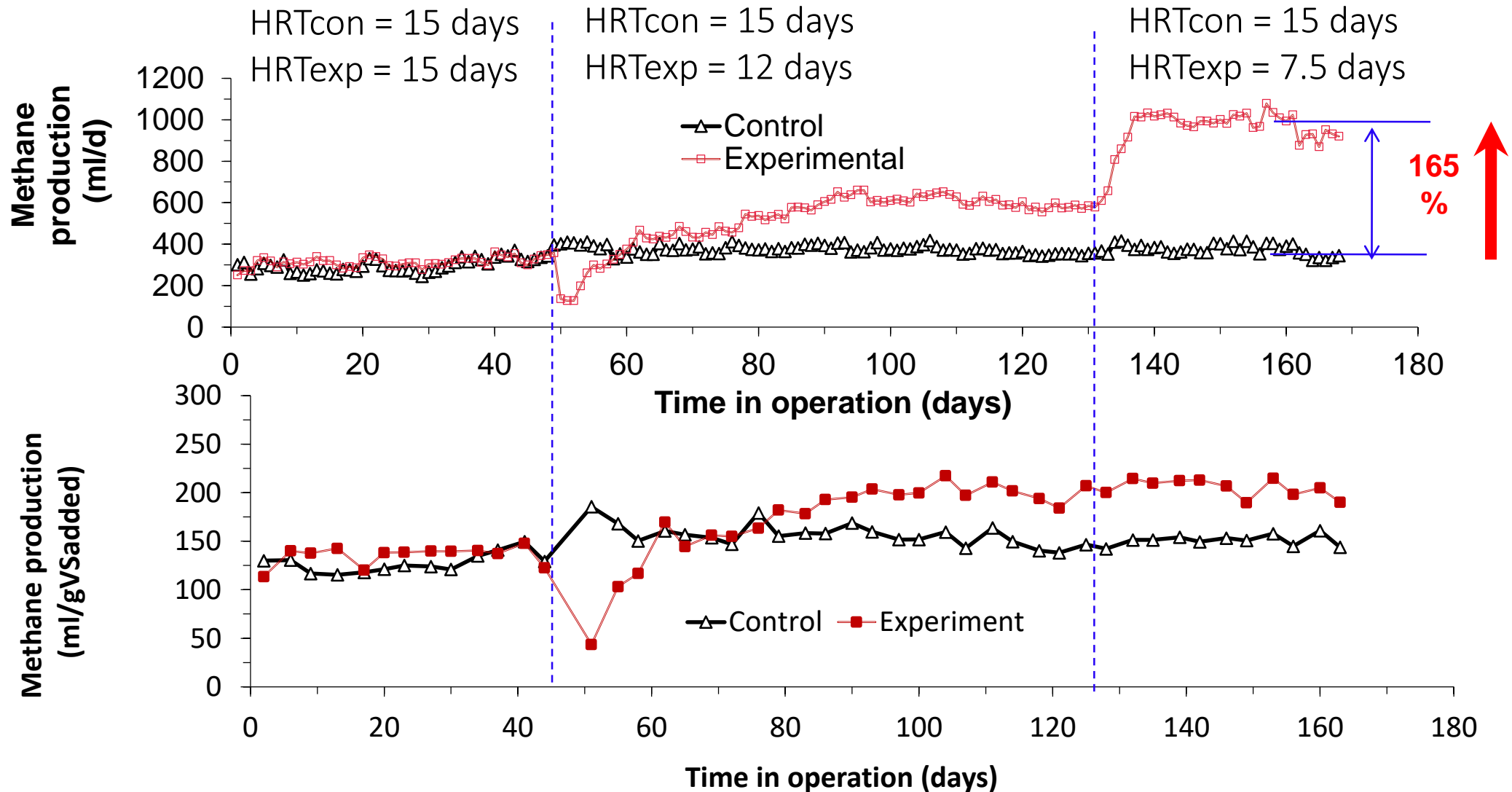
Example 2: In-situ FNA production to enable the Lodomat technology

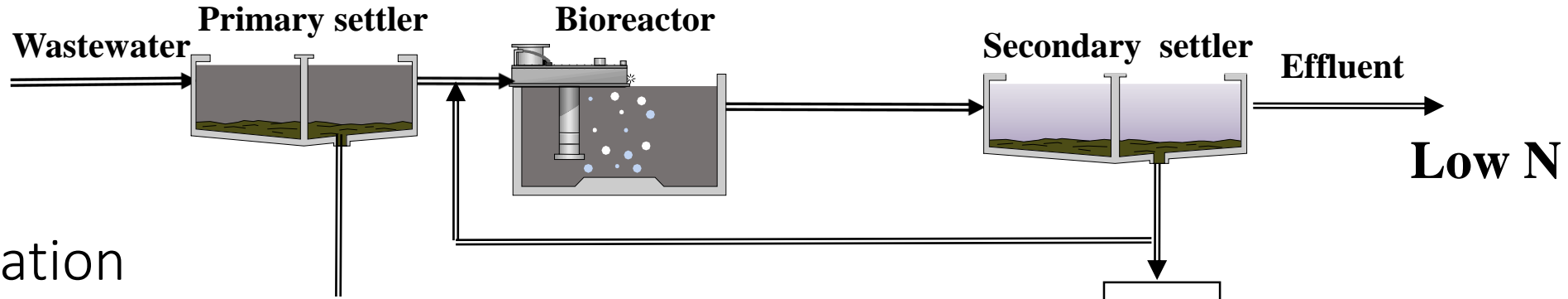
Lodomat: a technology that

- substantially increases energy recovery
- reduces energy consumption
- reduces sludge disposal

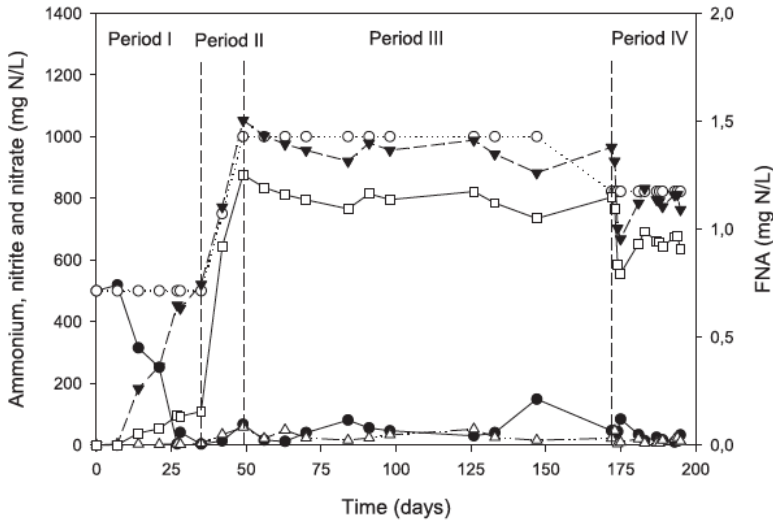


Methane production (Lodomat)



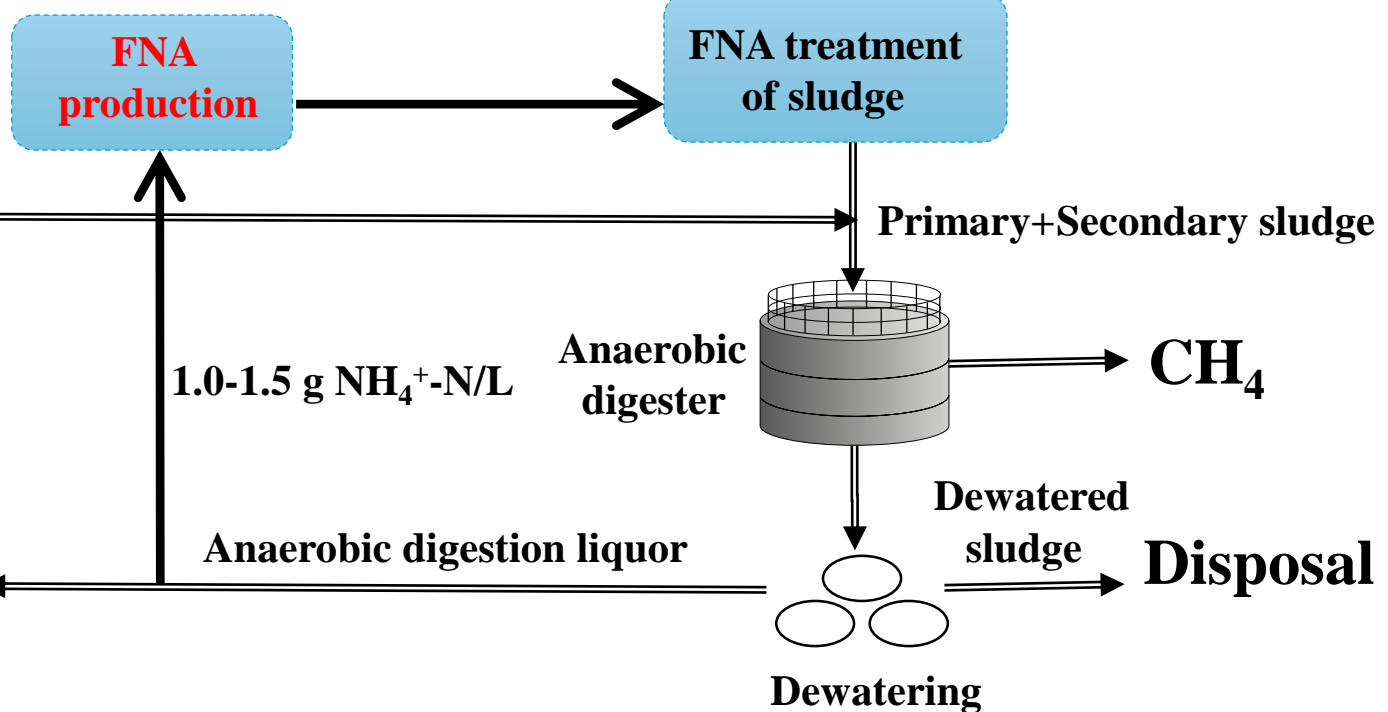


Nitrification



Acidification

To head of the WWTP or side-stream treatment



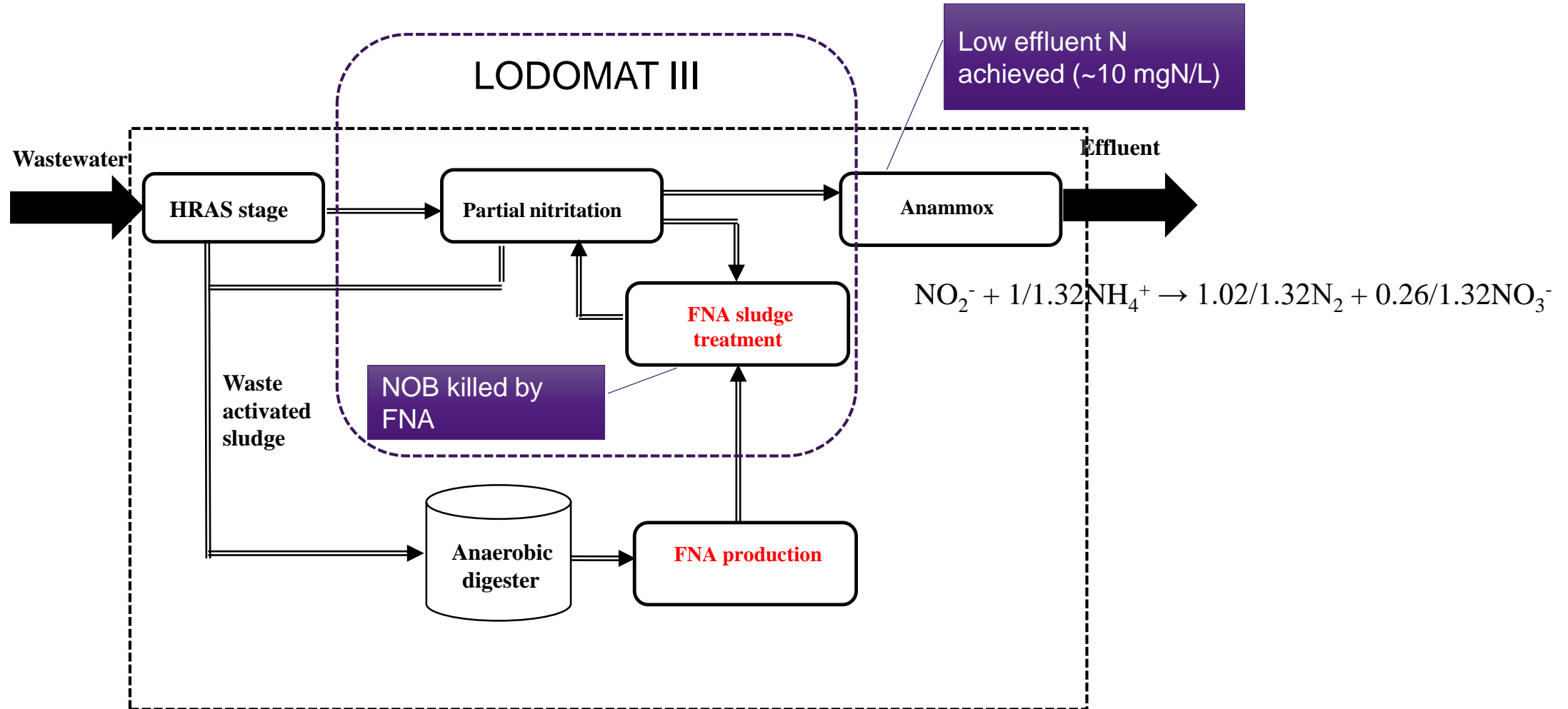
Pilot plant testing on-going

QUU/UQ Innovation Centre at Luggage Point WWTP

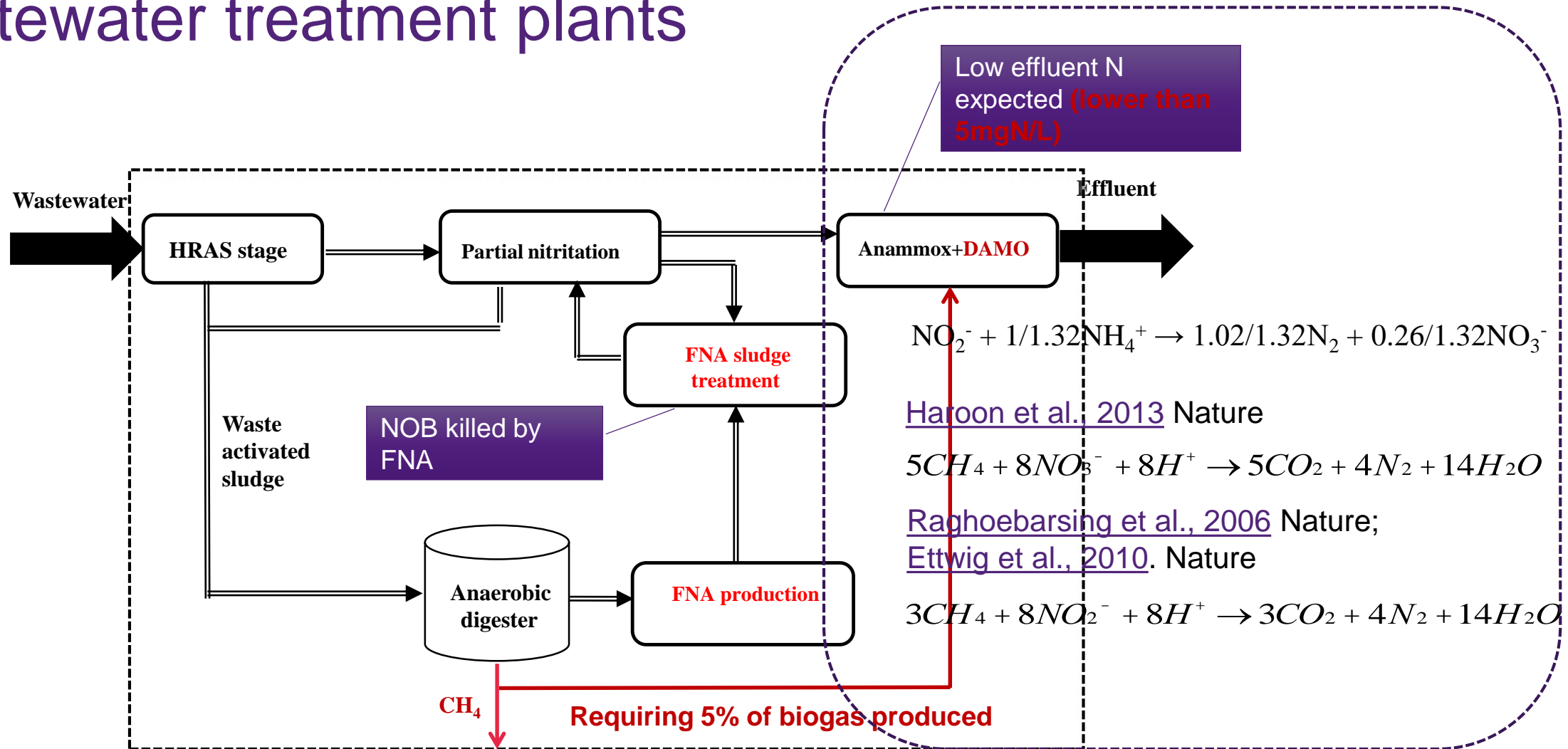


Example 3: Methane-supported denitrification

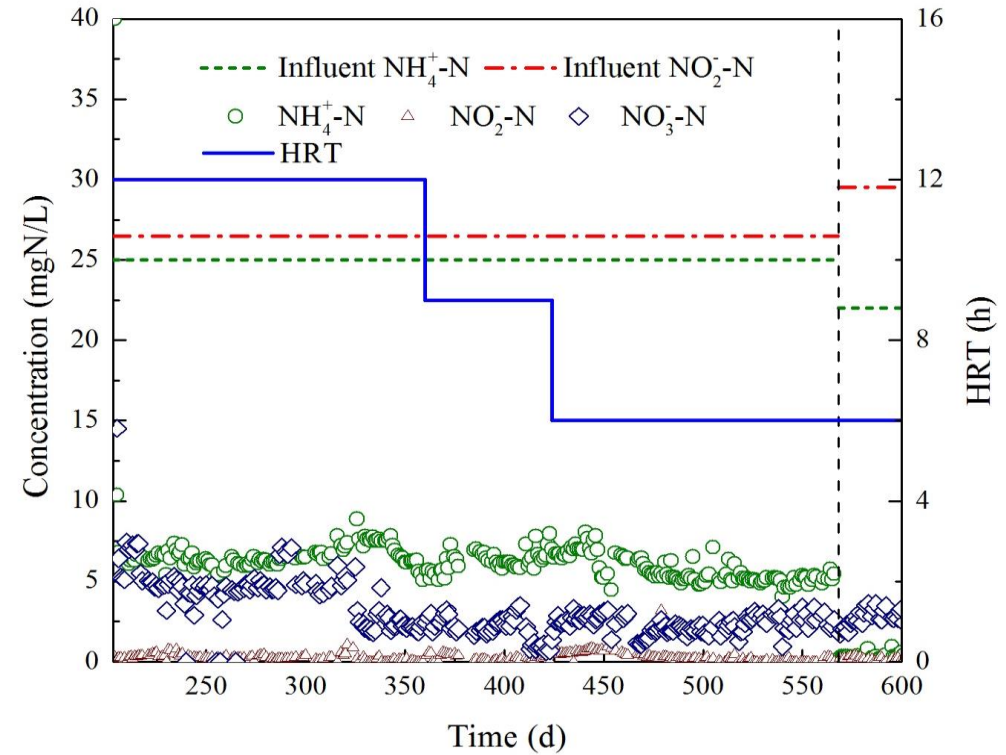
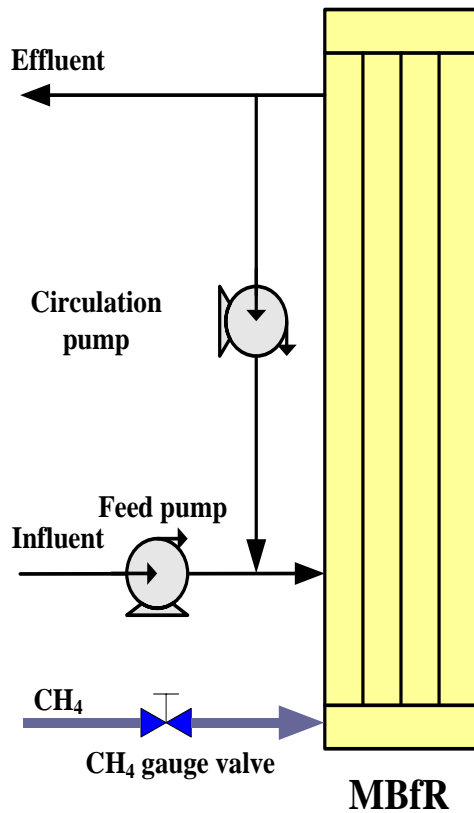
Biogas-supported N removal in next generation wastewater treatment plants



Biogas-supported N removal in next generation wastewater treatment plants



Biogas-supported N removal in next generation wastewater treatment plants



Effluent:

$\text{NH}_4^+\text{-N}$: 0 mg N/L

$\text{NO}_2^-\text{-N}$: 0.2 mg N/L

$\text{NO}_3^-\text{-N}$: 2.1 mg N/L

TN Removal rate: ~200 mg N/L/d

Concluding remarks

Ample opportunities for resource recovery/reuse in urban water management

Tailored fit-for-purpose recovery/reuse should not be forgotten

Need to think out-of-the-box



Acknowledgements

- ✓ My Team
 - ✓ Sewer team
 - ✓ Lodomat team
 - ✓ DAMO team
- ✓ Funding bodies
 - ✓ Australian Research Council
- ✓ Industry partners

