

Decarbonizing wastewater treatment: global greenhouse gas (GHG) hotspots and solutions

Department: Earth Sciences

Research group: Geochemistry

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Project description

Wastewater treatment is essential for public health and water quality, yet it is also a non-negligible source of greenhouse gases (GHGs), including CO₂ and especially CH₄ from anaerobic processes and sludge handling, and N₂O from biological nitrogen removal. These emissions are highly heterogeneous across regions because they depend on connection rates to sewers, treatment level and technology, energy supply, influent composition, and operational conditions. As countries expand sanitation coverage and upgrade treatment, wastewater-sector GHG emissions may rise unless decarbonization strategies are implemented in parallel.

In this project, the student will use the IMAGE-DGNM modelling framework to build a first-order, spatially explicit estimate of wastewater-treatment GHG emissions and explore decarbonization options. The output will identify where emissions are the largest, what drives them, and which interventions provide the biggest reductions.

Job requirements

Basic Python skills and interest in climate mitigation and water systems. Motivation to work with models and datasets.