CRC for Water Sensitive Cities

Energy and Fertiliser from Algae and Wastewater

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Program C: Future Technologies

Project C 2.1: Resource Recovery from Wastewater

Background

Human kind now faces the emerging crises of food shortages. To combat these, the nutrients vital for crop growth (e.g. nitrogen (N) and phosphorous (P)) must be reused wherever possible. Growth of algae in wastewater can help achieve this objective, as the algae remove N and P from the wastewater into their cells where it can be recovered later.

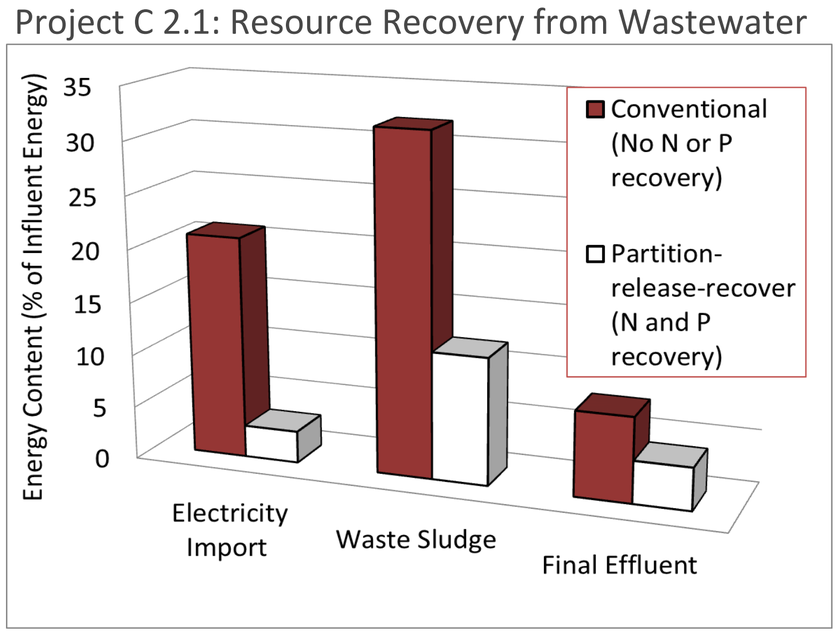

Fig 2. Energy contents of various streams for conventional and PRR wastewater treatment. Adapted from (Batstone et al. 2014).

Objectives

Algae can be used in a complete wastewater treatment process described as partition-release-recover (PRR) by Batstone & Virdis (2014) (Fig 1). The process relies on microbial growth for nutrient removal, and anaerobic digestion for energy generation. PRR can produce clean water and high-grade fertiliser products while using far less energy and creating far less waste sludge than conventional wastewater treatment (Fig 2).

My research will evaluate the potential of the microalgae-PRR process when using mixed cultures grown from wastewater under natural light. The results will aid in proving the viability of the process, and if adopted this will address food shortage problems while lowering operating costs for wastewater treatment plants.

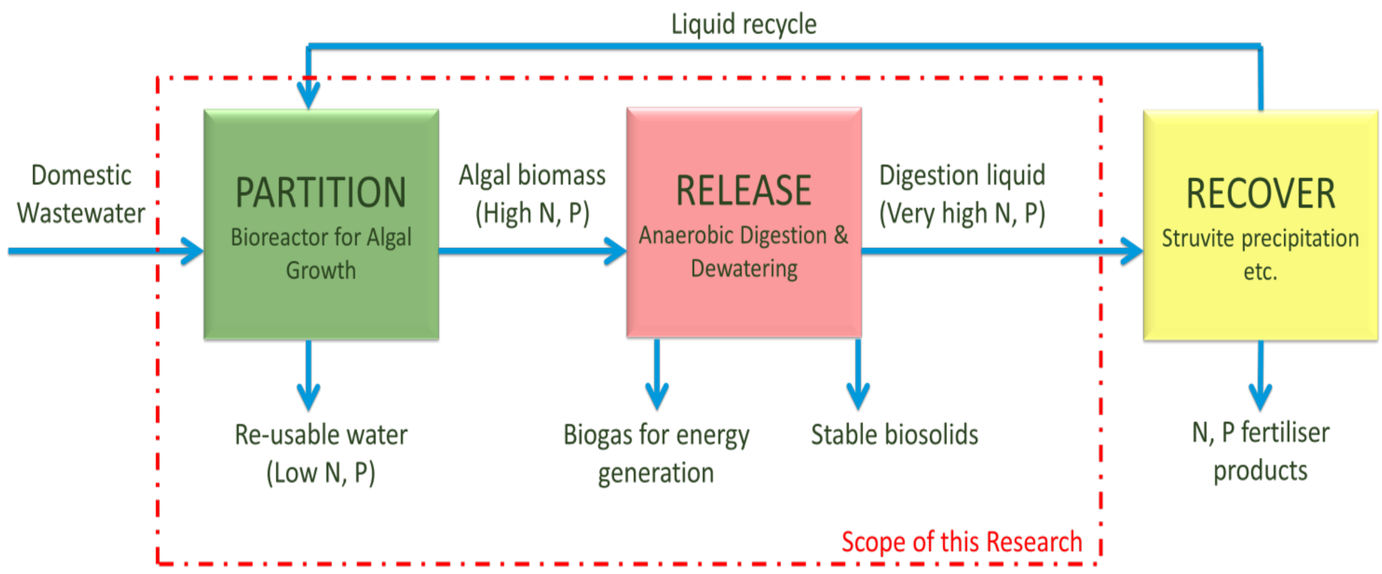

Fig 1. Conceptual diagram of the microalgae partition-release-recover process for complete wastewater treatment. Adapted from (Batstone et al. 2014).

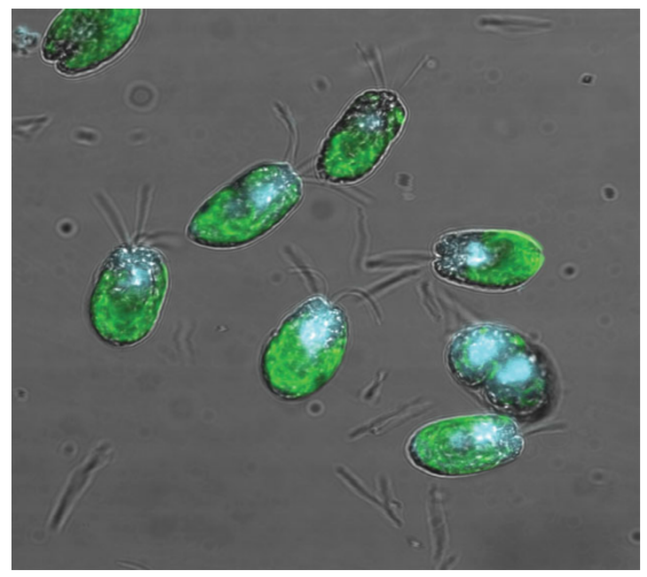

Fig 3. Confocal microscope image of the microalgae species, Tetraselmis suecica. Reproduced from (Greenwell et al. 2010)

References

Batstone, DJ, Hulsen, T, Mehta, C & Keller, J 2014, 'Platforms for energy and nutrient recovery from domestic wastewater: a review', *Chemosphere [In Press].*

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