Review

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Cascading biomethane energy systems for sustainable green gas production in a circular economy

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Abstract

Biomethane is a flexible energy vector that can be used as a renewable fuel for both the heat and transport sectors. Recent EU legislation encourages the production and use of advanced, third generation biofuels with improved sustainability for future energy systems. The integration of technologies such as anaerobic digestion, gasification, and power to gas, along with advanced feedstocks such as algae will be at the forefront in meeting future sustainability criteria and achieving a green gas supply for the gas grid. This paper explores the relevant pathways in which an integrated biomethane industry could potentially materialise and identifies and discusses the latest biotechnological advances in the production of renewable gas. Three scenarios of cascading biomethane systems are developed.

Keywords: Anaerobic digestion; macro-algae; microalgae; power to gas; biomethane