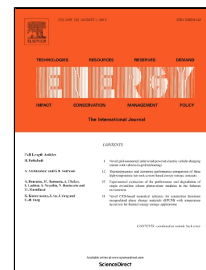


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Abstract

Biomethanation by hydrogenotrophic methanogens has been proven as a potential process for managing renewable power intermittency and upgrading biogas. The present work aimed to enrich hydrogenotrophic methanogens under different mixing conditions (gas recycle *vs.* mechanical mixing) and temperatures (mesophilic *vs.* thermophilic conditions) for biogas upgrading. The synthetic gas ($H_2:CO_2=4:1$) was fed to the reactor bottom at a hydrogen injection rate (HIR) of $1.6 L H_2 \cdot L^{-1} \cdot d^{-1}$. The gas recycle ($100 L \cdot L^{-1} \cdot d^{-1}$) under thermophilic condition was found to be the most effective, reaching over 96% H_2 conversion to CH_4 within 15 d of operation. Archaea community analysis performed by 454 pyrosequencing showed

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