PILOT SCALE BIOMETHANATION SYSTEM FOR CAPTURING AND UTILIZATION of CO_2 FROM EXHAUST GASES

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Scope

Biological hydrogenation of CO_2 into biomethane.

Mild temperature and ambient pressure | Low energy cost.

Valorisation pathway for CO_2 waste streams (especially from carbon-intensive industries and power plants using fossil fuels), which can also be coupled with carbon capture technologies.

Implementation and monitoring of the biomethanation process at pilot scale conditions.

Capture and utilize ~8.0 kg CO_2 per m^3 of reactor volume when operating in normal conditions (Gas Retention Time, GRT of 1h)

Pilot unit description

One stainless steel trickle-bed continuous reactor (~100Lt).

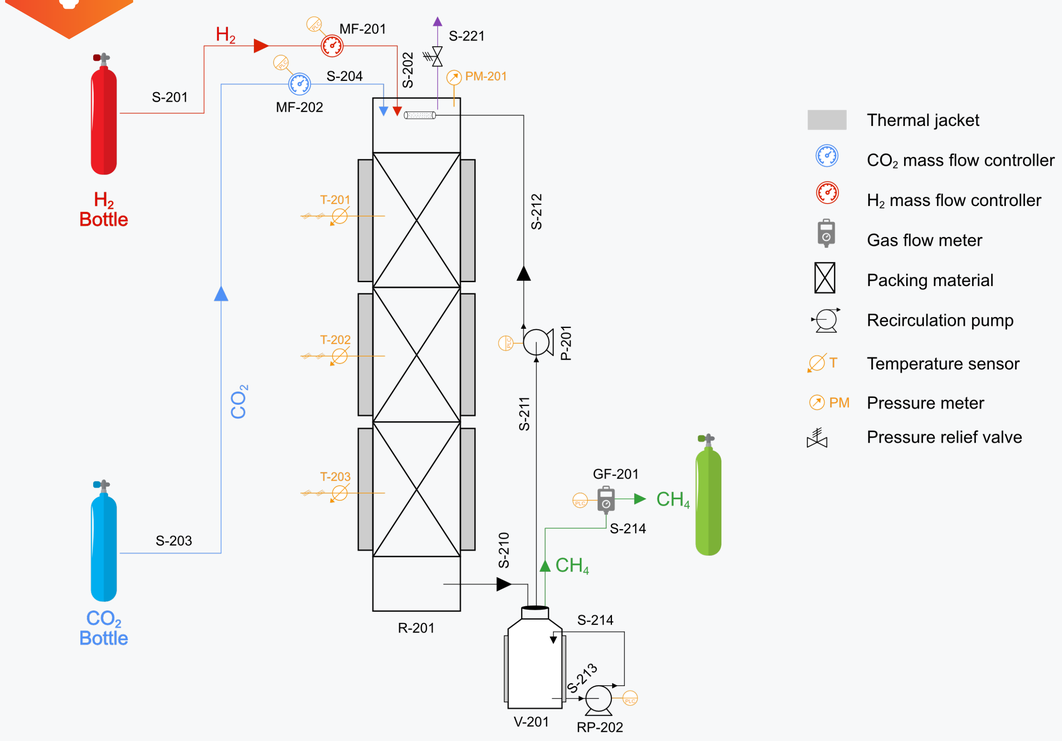
Temperature-control thermal jackets to maintain operation at a temperature range of 55 ± 2°C.

Peristaltic pump, recirculated the liquid inoculum aiming to achieve a homogenous wetting of the packing material.

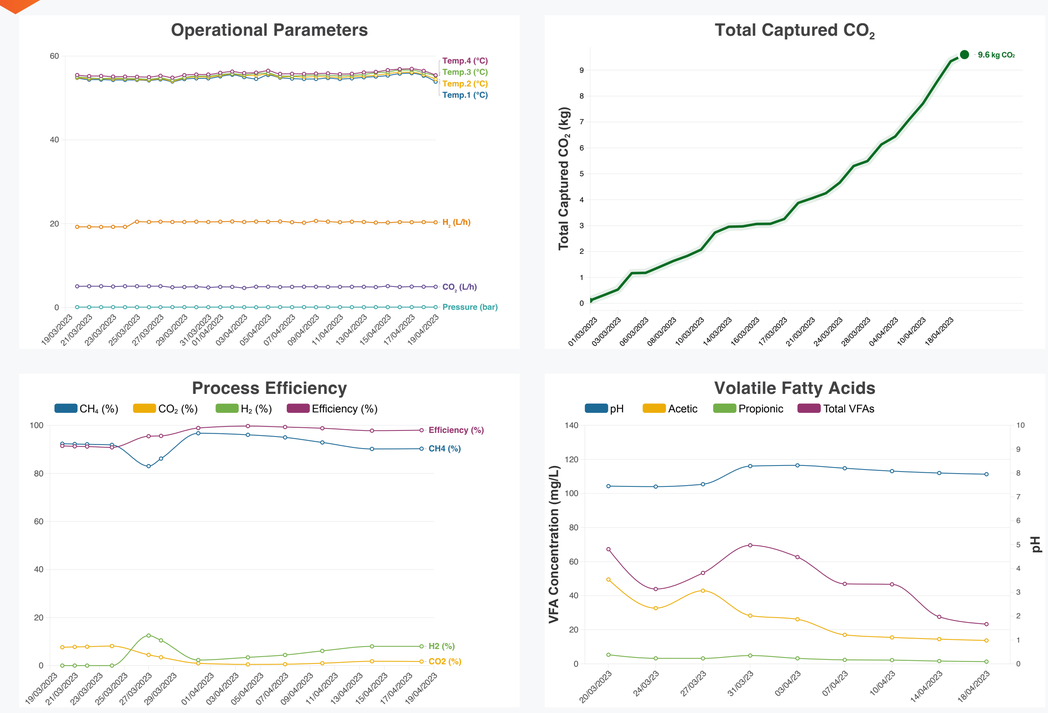
Fully automated operation, with continuous monitoring and recording of the main operating parameters.

Remote monitoring and control through PLC-based long-distance control modules.

Pilot unit scheme



Results



Innovation

Biomethanisation is carried out by naturally occurring mixed cultures of hydrogenotrophic methanogens, which can be adapted to work with non-refined sources of CO_2.

The CH_4 produced can be directly injected into the gas grid (after only minimal cleaning), allowing distribution and use for power generation and direct heat applications.

Steady operation with CO_2 capture and conversion efficiency exceeding 90%.

ACKNOWLEDGMENT

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