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MoleculeWorks
Efficiency for a Sustainable World

Compact and high throughput modular unit for carbon capture

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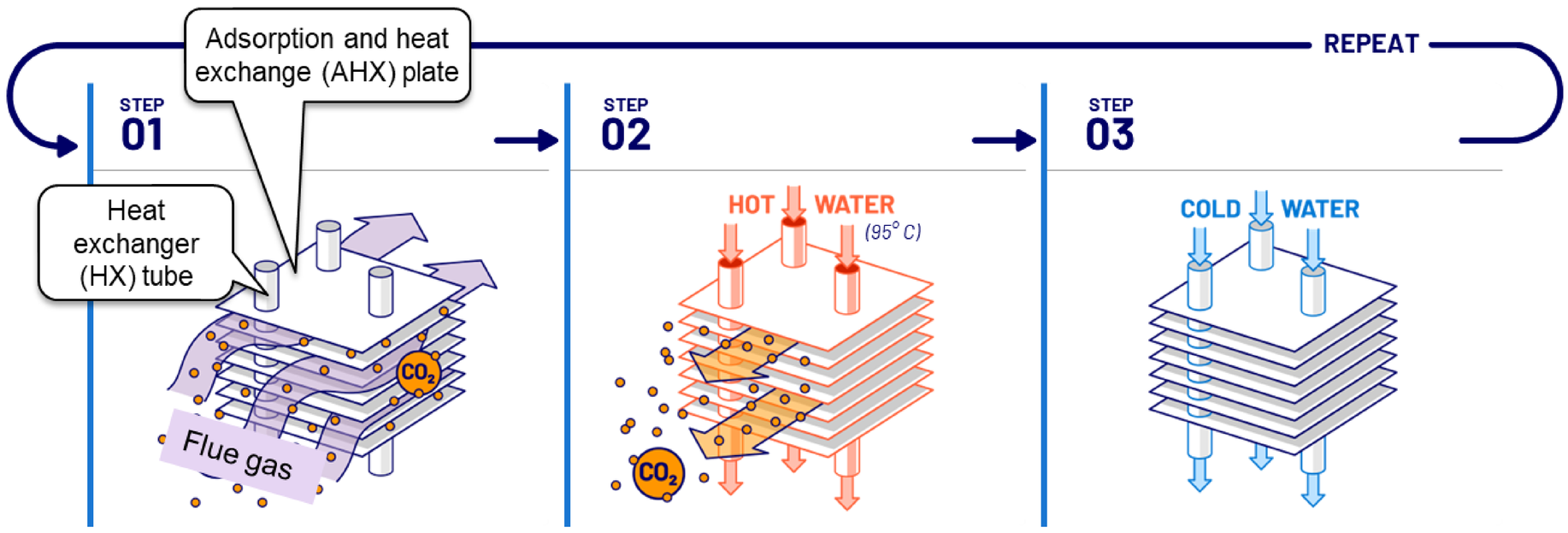
I. Molecule Works' innovation of adsorption and heat exchange (AHX) reactor for reduction of capture capital cost and energy consumption

- Encapsulate adsorbent materials in a AHX plate of high thermal conductivity at high loading with both high mass and heat transfer rates
- Capture CO_2 at high space velocity and low pressure drops over the bed of uniform temperature
- Regenerate the adsorbent by rapid and uniform heating and cooling of the bed with respective hot and cold thermal fluid (water).

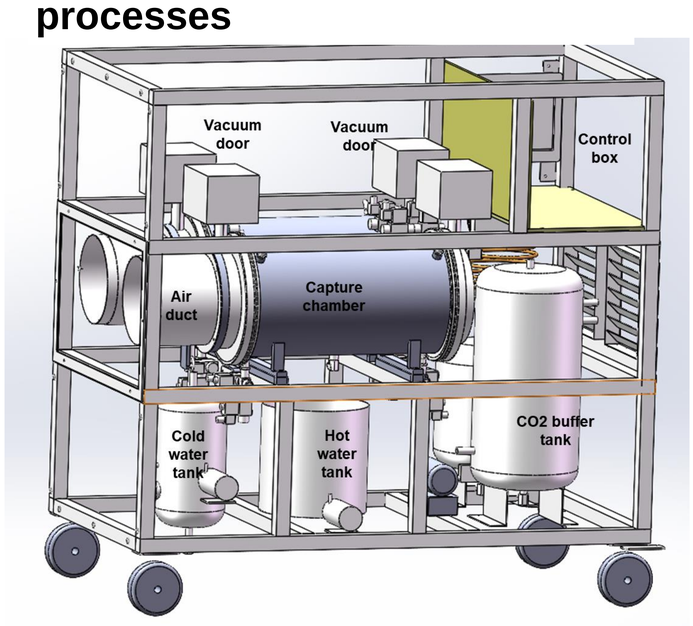


II. Development of the AHX technology from single small cell (~100cm²), multi-cell prototypes (~4 m²) to commercial demo application (~1000 m²)

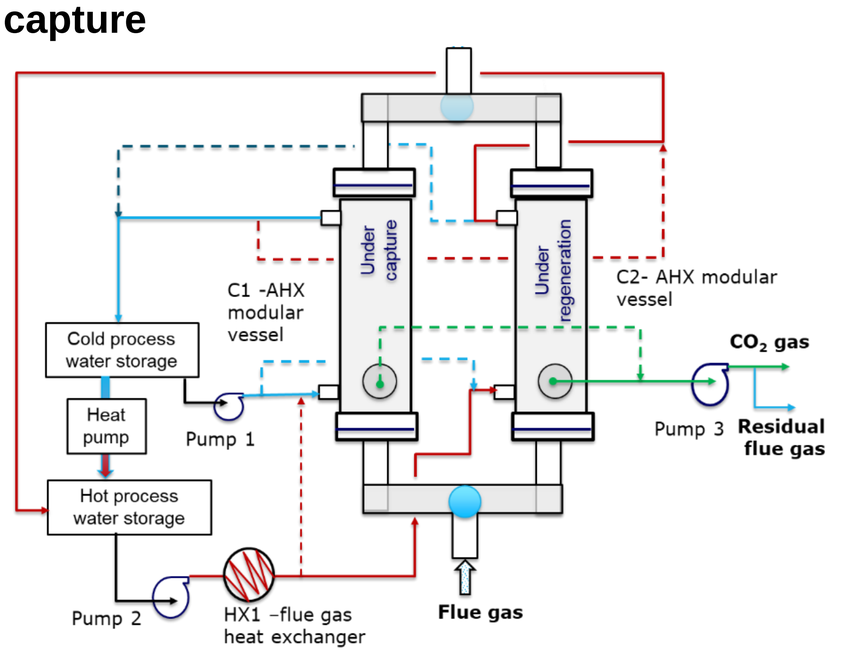
- Scaleup is to number up of the AHX plate area.
- The performance is the same for small and large scales as long as basic design features and materials are kept the same

Single-vessel unit for screening of materials and design parameters

Two-vessel prototype unit to simulate scaleup capture processes



Process flow diagram for flue gas CO_2 capture



III. DOE project phase I objective

Develop basic process design and conduct TEA of the AHX capture unit for CO_2 capture on ships at flue gas exhaust rate of 700 kg/min.

- On-board storage of the captured CO_2
- Onboard electrochemical conversion of captured CO_2 back to oxygenated fuels

Acknowledgement

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