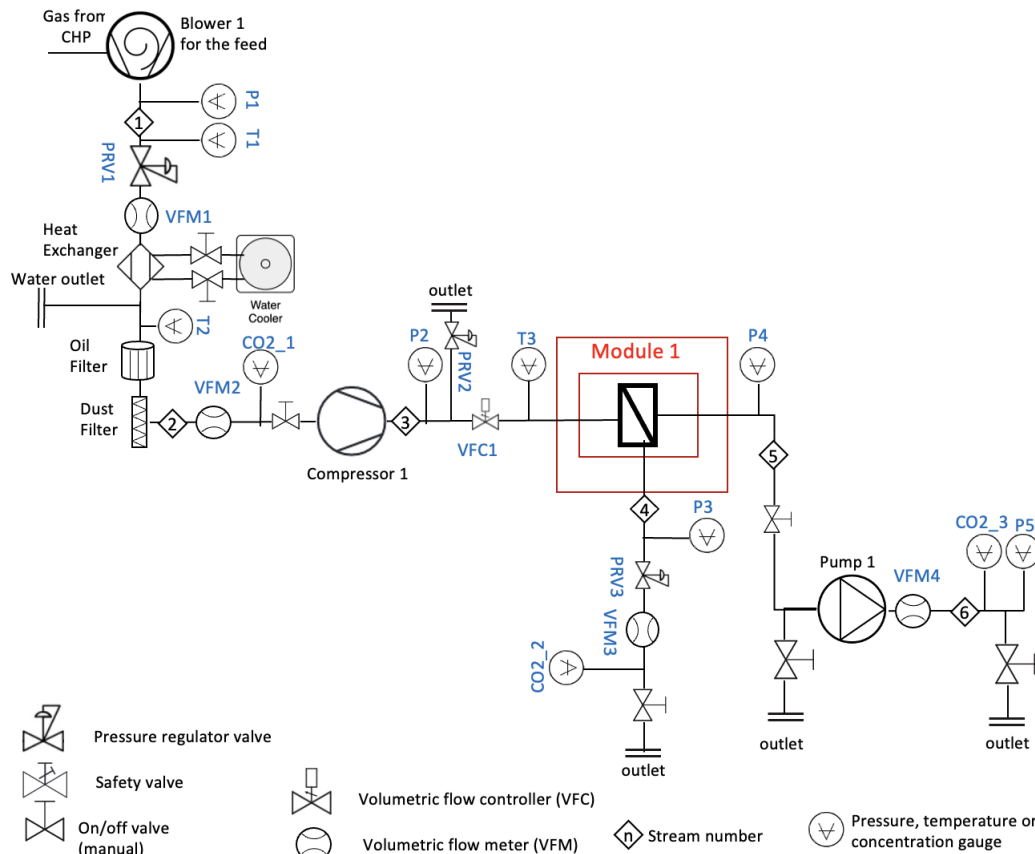


Title of the project: Build a point source carbon capture process



Context

EPFL is committed to aligning with the objectives set by the Swiss Federal Administration, aiming to reduce energy-related greenhouse gas emissions by 50% by 2030 compared to the levels in 2006. Furthermore, the institution is striving for "Net-Zero" status by 2040. As of 2022, 6% of the energy consumption on EPFL's main campus is still derived from gas, primarily for operating the boiler in the SV Faculty's animal house, resulting in an annual emission of approximately 1,400 tones of CO₂. Despite this, finding a viable alternative to the gas-fired boiler that ensures both a stable humidity level and a constant temperature within the animal house remains a challenge.

Presently, the SV faculty and the EPFL Carbon Team are collaborating to develop a system capable of capturing emissions before CO₂ is released into the atmosphere, known as point

source capture. The first semester of this project aims to construct a demonstrator for a membrane process unit, drawing inspiration from the design of similar units in Aigle and Sion.

Description

You will be tasked with constructing a two-stage membrane process. It will encompass a two-stage membrane process, along with essential components such as a vacuum pump, compressor, CO₂ sensor, pressure sensor, temperature sensor, flow rate sensor, and more. A key consideration is that the entire system should be accommodated on a mobile table, allowing easy transport to various sites. This flexibility is crucial for relocating the setup to the SV facility, where it can be connected to the flue gas supply with additional modifications, including the introduction of a cooling mechanism to eliminate excess moisture.

The ultimate objective of this project is to establish a system capable of separating CO₂ from N₂ in a simulated gas mixture sourced from a gas tank. If the initial setup proves successful, future semesters will focus on refining the system to enable the capture of CO₂ from the gas boiler in SV Faculty.

Requirements

- Knowledge in system engineering and in electronics.
- Knowledge in heat transfer.
- Knowledge regarding how to use a CAD software.

Bonus: experience in a lab or with other projects.

Tasks

- Build a two stage membrane process.
- Test its ability to separate CO₂ from N₂.

Contact

Supervising lab: LAS, Prof. Kumar Agrawal

Student supervisor: Louis Saix (louis.saix@epfl.ch)

Remarks

Project location: Lausanne.

The project can accommodate a maximum of 5 students.