

Title of the project: Gas composition Analysis

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.

Description

As a first step, we would like to measure the characteristics of the gas leaving the boiler, such as temperature, pressure or species composition (CH₄, CO₂, H₂O...). The aim is to be able to use this information to build an installation capable of generating a gas with the same characteristics, so that the CO₂ capture system can be tested and optimized before being installed downstream of the boiler. These measurements would also be used to identify the presence of species that could damage the equipment, in order to determine whether or not a treatment unit to be installed upstream of the capture system should be developed. Finally, the study of the gas leaving the boiler would be used to develop a simulation model capable of determining the optimum location in the duct system on which to integrate the graphene membranes to capture the CO₂.

Requirements

- Knowledge in measurement and analysis of gas stream.
- Knowledge in small electronics (sensors)
- Knowledge in fluid mechanics.

Bonus: experience in a lab or with other projects.

Tasks

- Build a system to extract samples of the gas stream located in the exit of the gas boiler.
- Measure the gas composition of the samples by using a mass spectrometer which will be provided by our team.
- Determine the optimum location on which to integrate the capture system.

Contact

Supervising lab:

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