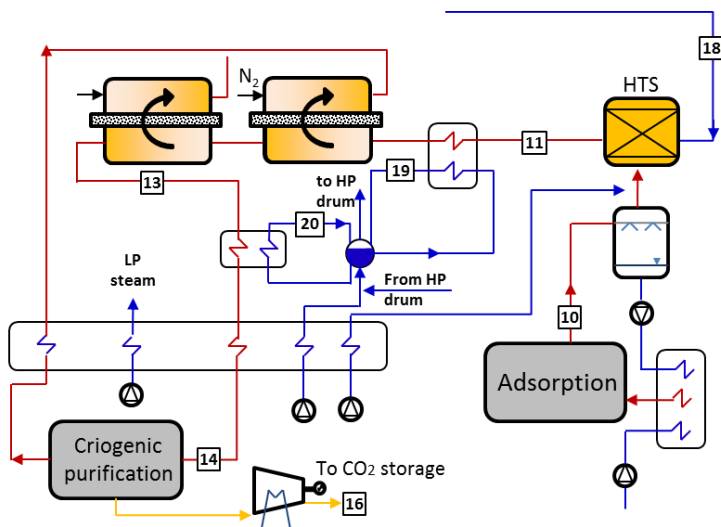


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Improving the energy efficiency of gas-separation processes in industrial applications



Under the guide of the Swiss Competence Center for Energy Research (SCCER), several possibilities for the development of advanced and innovative technologies are arising. In particular, novel gas separation processes are aimed to improve the efficiency of industrial applications.

People involved:
Paolo Gabrielli
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1. Simulation of multi-component membrane separator for gas applications

In the context of enhancing the efficiency of the energy sector, membrane-based gas separation has a great innovation potential. The modular nature of membrane operations is intrinsically fit for process intensification. In this direction, the process configuration is a fundamental aspect in reducing costs of membrane-based gas separation processes. The goal of this project is a detailed modeling and optimal design of a general multi-component membrane separation system.

2. Biogas sweetening through membranes, PSA and hybrid systems

The progressive substitution of fossil fuel-based natural gas with biogas is a promising solution to the energy challenge. Biogas production in Europe and Switzerland has steadily increased over the last years. Depending on the end user and on the production route, biogas requires sweetening and upgrading. Several techniques exist for both the acid gas and the CO₂ removal and are based on: (i) chemical absorption, (ii) pressure swing adsorption, and (iii) membranes. Goal of this project is the investigation and optimization of biogas treatment processes.

3. Review of optimization algorithms for gas separation applications

The applicative fields of numerical optimization are normally characterized by simulation-based problems, in which computational analyses can be heavily time and resource consuming. Gas separation technologies do not except this rule. A possible family of optimization algorithms used in this context is represented by meta-heuristic methods. Among them, genetic algorithm or ABC algorithm can successfully be applied. The goal of the project is a review and comparison of possible optimization methods in the field of gas separation.