

# Assessment of the energy integration of HTHP (high temperature heat pumps) to the food and beverage industries using machine learning methods

Contact: Daniel Flórez-Orrego, daniel.florezorrego@epfl.ch

Semester/Master project in collaboration with ELSA (MIGROS) Estavayer Lait SA

## Objectives

The goal is to use machine learning methods to study the integration of high temperature heat pumps in the dairy processes using Osmose platform.

## Profile

- Interest in energy systems and energy integration methods.
- Knowledge on refrigeration and compression systems.
- Knowledge on Rmarkdown, Python and Lua is desirable.
- Knowledge on machine learning methods.

## Project plan

The study includes:

1. Description of the industrial processes,
2. Definition of hot and cold streams and graphical representation,
3. Study of the energy integration and exergy analysis of the heat recovery processes,
4. Use of a pre-defined heat pump superstructure model to identify the most suitable fluids and temperature levels,

5. Application of machine learning models to predict and screen the performance of the HTHP for different process curves,
6. Techno-economic and environmental impact of the heat pump system envisaging opportunities for renewable energy integration.

### **Observation**

The project is related to the International Energy Agency Annex 58 on High Temperature Heat Pumps, in collaboration with OST, ELSA, CREMO, SPIESS, CSD, OFEN and EPFL.

### **Sources**

See more at: <https://heatpumpingtechnologies.org/annex58/wp-content/uploads/sites/70/2022/03/description-of-swiss-team-for-annex-58.pdf>

### **Supervisors**

Daniel Flórez-Orrego, [daniel.florez.orrego@epfl.ch](mailto:daniel.florez.orrego@epfl.ch) Francois Maréchal, [francois.marechal@epfl.ch](mailto:francois.marechal@epfl.ch)