

## Master or semester project

### Simulating the energy transition of St. Prex

#### Description of research:

Saint-Prex is a municipality of approximately 6,000 inhabitants located in the canton of Vaud, on the shores of Lake Geneva. Since obtaining the Cité de l'Énergie label in 2019, the municipality has developed a local energy strategy with the following quantified targets to be achieved by 2035: (i) reduce per capita CO<sub>2</sub>-equivalent emissions to 1.5 tons per year, (ii) decrease overall energy consumption by 43% compared to 2000 levels, resulting in an annual per capita consumption of 16 MWh, and (iii) reach a total of 1034 MWh/year of installed solar photovoltaic (PV) capacity. To date, several measures are in development; however, preliminary analyses suggest they will be insufficient to meet the 2035 targets. These include: (i) installation of PV systems on municipal and residential buildings, contributing 398 MWh/year for local self-consumption, (ii) deep energy renovation of the Vieux-Moulin building through insulation and replacement of the gas heating system with heat pumps, and (iii) expansion of urban greenery by doubling the municipal tree canopy by 2050, with 300 trees and 100 shrubs to be planted across five public sites.

HERUS/EPFL has been collaborating with St. Prex during the last two years in supporting them to design the energy transition. While the commune has developed clear goals and measures on how to achieve their goals, they miss a quantification of the effect of these measures and what additional measures are needed to reach these goals.

This Master thesis / Semester thesis aim at simulating measures in the building and mobility sectors for the commune of St. Prex. It addresses the following questions:

1. What are the energy flows in St. Prex? How have they changed over time?
2. How large is the theoretical potential for emission reduction in the housing and mobility sectors?
3. What interventions might be required to reach this potential? Which barriers exist?

#### Methods:

The thesis will develop a simple agent-based model (ABM) in NetLogo to simulate the effects of selected transition measures, such as new building regulations, increased renovation rates, and the adoption of electric mobility, on local energy use and emissions. It will build on previous and ongoing ABM work at the HERUS lab and integrate findings from participatory workshops and MCDA to reflect local dynamics and priorities.

#### Requirements:

- Knowledge of principles of ABM and coding
- Interest in the energy transition

#### References:

Binder, C. R., Knoeri, C., & Hecher, M. Modeling transition paths towards regional energy autonomy: the role of legislation, technology adoption, and resource availability.

**Starting date:** September 7<sup>th</sup>, 2025

**Duration:** 1 semester

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