



Tools for promoting the quality and sustainability of renovations

Renovation of the building stock is an essential part of Switzerland's energy strategy in response to climate change. The Swiss Confederation has the stated goal of seeing the majority of the country's buildings renovated energetically by 2050. However, despite the implementation of numerous support measures and a clear legal framework, the renovation rate is currently stagnating at around 1 % of the building stock, without mentioning the questionable quality of some of the renovations. For the School of Engineering and Architecture of Fribourg (HEIA-FR) and three of its research groups (all associated to Smart Living Lab), the key to the success of the Swiss Confederation's strategy lies in gaining a deeper understanding of the built fabric and in increasing support for sustainable renovation. Project RenoBAT-FR therefore has the aim of creating typological sheets and renovation roadmaps for specific types of buildings and neighborhoods. A suite of tools will be made available, offering guidance to owners, decision-making authorities and industry professionals.

"The market for new buildings is shrinking," explains Stefanie Schwab, architect and associate professor at the HEIA-FR's TRANSFORM Institute. "Transformation, renovation and densification of the existing stock will play an increasing role in coming years. Until very recently, however, renovation figured only minimally if at all in the architectural curriculum. This has to be fixed, and the tools made available to architectural offices have to be updated as well."

Transforming a building sustainably and efficiently requires a firm understanding of how it was built. "So much focus is being placed on energy efficiency," adds Stefanie Schwab. "But renovation is not limited to the building envelope. Due to the ongoing evolution of construction methods, a wide variety of factors have to be considered. Trying to improve too simplistically on individual elements can result in problems further down the line."



Stefanie Schwab
Architect and Associate Professor,
TRANSFORM Institut, HEIA-FR

"We observed that the easiest to implement measures result by themselves in important efficiency gains at a reasonable cost. Being aware of these potential impacts makes it possible to define logical priority levels for building owners."

With more than ten years of experience in the renovation sector, the TRANSFORM institute is the source of several key publications. Some of these are now an essential reference for actors, especially in the context of global approaches to energetic renovation in French-speaking Switzerland (projects eREN and eREN2) and the rehabilitation of aging rural buildings. RenoBAT-FR is one of the follow-up projects to eREN et eREN2 with a specific focus on the greater Fribourg area.

Building and neighborhood typologies

"Whereas the 2016 project focused primarily on apartment blocks, the current project also covers smaller buildings such as terraced villas, semi-detached houses and single-family houses," explains Mylène Devaux, civil engineer and associate professor at the HEIA-FR's ITEC Institute (Institute of Construction and Environmental Technologies).

The first step was to establish a representative typology of residential buildings and neighborhoods for the city of Fribourg. "The city center is very old, and the further out you go, the more recent the buildings," notes Stefanie Schwab. "On the outskirts we find large apartment blocks dating from the 1960s and 1970s, while the greater Fribourg conurbation typically has villa neighborhoods built in the 1980s and 1990s."

To identify the relevant types of neighborhoods and buildings, data from the Federal Register of Buildings and Dwellings (RegBL) and Google Earth Pro were used. In total, thirty types of buildings, distinguished by their period of construction and their architectural, constructive and structural characteristics, have been defined.

Roadmaps for sustainable renovation

"The next step was to develop roadmaps for sustainable renovation within reasonable timelines," comments Mylène Devaux. "Renovation is rarely considered holistically. Homeowners are lured in by energy estimates that only take into account heating and insulation. Other important issues such as fire safety, vulnerability to natural hazards (including earthquakes), air quality, user comfort, access for people with reduced mobility, etc., are left out of the equation."

Improving the quality and quantity of renovations

The renovation roadmaps developed under RenoBAT-FR propose a range of measures for every building type and describe their estimated impact concretely in terms of energy use and energy savings. This is supplemented by a set of tables to assess the condition of the building's elements and a helpful color code indicating the priority of the measures to be taken.

"We observed that the easiest to implement measures result by themselves in important efficiency gains at a reasonable cost," explains Stefanie Schwab. "Being aware of these potential impacts makes it possible to define logical priority levels for building owners." Moreover, "in a new applied research project (ASS4.2), we are developing a powerful support tool that will guide owners at the beginning of the renovation process," adds Mylène Devaux.

"To keep up with the Swiss Confederation's objectives, the rate of building renovation has to jump from 1% to 3%. Our tools will hopefully contribute to this acceleration, but the overarching aim is simply to improve the quality of renovations by going beyond just energy savings."



The project in brief

Title

RenoBAT-FR – tools for the global renovation of Fribourg's building stock

Team

Stefanie Schwab, Stefania Boggian, David Rollo, Jean Luc Rime, Mylène Devaux, Léandro Balestrieri, Paride Uboldi, Thomas Jusselme, Lucile Schulthess, Yasmine Priore, Marilyne Pasquier

Domains

Design interactions and processes
Energy systems
Construction technology

Groups

ENERGY Institute (HEIA-FR)
TRANSFORM Institute (HEIA-FR)
ITEC Institute (HEIA-FR)

Partners

Building Renovation Competence Center (CCRB),
Fribourg Energy Office, Fribourg Building and
Residence Monitoring Center,
Fribourg School of Management

Start-End

2021-2023

Keywords

Buildings, renovation, energy, heritage

Website

www.smartlivinglab.ch/en/projects/renobat-fr

Text: Sophie Roulin, December 2023
Pictures: Sonia Villegas