

RENOWAVE – energy refurbishment in Switzerland

Real Estate Management Competency Group



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Research Project Massive Decarbonisation of the Swiss Building Stock (RENOWAVE)

Project leader:
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Timeline:
February 2022 to January 2026

Partner / Funding:
Innosuisse (Flagship Initiative)

Buildings are a major source of Swiss CO₂ emissions, and the existing stock will represent the overwhelming part of the sectorial energy demand for several decades to come. Challenges to massive and efficient retrofit are numerous, multifaceted, interrelated, and transdisciplinary, from scientific as well as operational points of view. Four pillars have been identified with which the rate of energy refurbishment can be significantly increased.

The 1.8 million buildings, which have a heated surface of 700 million m², consume 94 TWh/year for space heating and domestic hot water. The Swiss building stock shows exemplary for Europe:

- 50 % of the primary energy demand in Switzerland/24 % of CO₂ emissions
- 70 % still heated with individual fossil fuel boilers
- 80 % of them were constructed before the 21st century
- 80 % with space heating demand higher than current normative value (40 % of them reaching more than twice this threshold; see Figure 1)

Challenges of energy renovation

The challenges of energy renovation are complex and multifaceted, and they vary depending on the type of building, the country, and the region. However, some of the most common challenges include high upfront

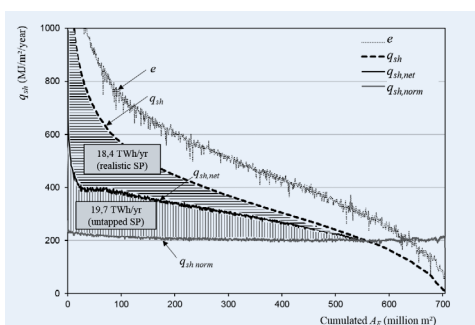


Fig. 1: Final and useful space heating demand of the Swiss building stock.

costs, long payback times, lack of awareness and knowledge, split incentives (where the landlord is reluctant to invest in energy renovation because they will not reap the immediate benefits), technical challenges, and regulatory barriers. The IEA EBC Annex 75 project on “Cost-effective Building Renovation at District Level Combining Energy Efficiency & Renewables” identified a number of specific challenges to energy renovation in districts, including lack of coordination and cooperation, lack of financing, technical challenges, as well as social and cultural challenges. After the literature review, we came to the conclusion that there is a need for massive and efficient retrofitting of the existing building stock, combined with a fuel switch from fossil fuel to renewable energy systems. The following challenges can be summarised:

Information and support

- Low information level, complex procedures
- Lack of integrated support tools
- Fear of potential conflicts (owner/tenants)
- Lack of information regarding financing and risks

Technology and architecture

- Inefficient envelopes and heating systems
- Long/intrusive retrofitting work onsite
- Risk aversion towards new technologies
- Lack of information on existing building stock
- Performance gap and user behaviour
- Increased costs due to regulations

Finance and regulation

- High investments/long payback times
- Cost sharing (owner/tenants)
- Lack of ambitious national and local regulations (e.g. CO₂ law)
- High variety of local regulations

Market and business

- Fragmented and complex market
- Segmented owner and enterprise structure

Pillars for decarbonisation

By addressing the challenges of energy renovation, the transition to a more energy-efficient and sustainable building sector can be accelerated. In Figure 2 below an overview of the different pillars to increase the rate of energy refurbishment is given.

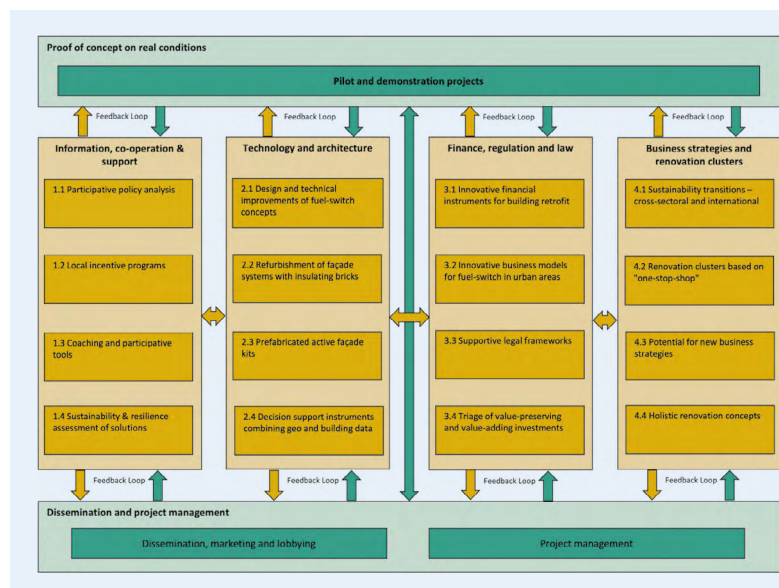


Fig. 2: Multisectoral, transdisciplinary and interdisciplinary interplay of the four pillars for decarbonisation.



Benchmark Technisches FM im Gesundheitswesen

Benchmarking im Spital

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Benchmarking ermöglicht es Facility Managern Daten zur Performance von Prozessen in Gebäuden strukturiert zu sammeln und zu vergleichen. Mit Fokus auf das Technische Facility Management (FM) können Spitäler in einem nationalen Benchmark nicht nur die eigene Entwicklung der Leistungen jahresbezogen betrachten und plausibilisieren, sondern im Vergleich mit den anderen Spitälern Optimierungspotentiale erkennen und mit Unterstützung durch die ZHAW Best-Practice-Ansätze diskutieren. Die dazu nachvollziehbare und eindeutige Datenerfassung wird seitens der BEG Analytics AG unterstützt. Für das FM in Spitälern passende Bezugsgrössen sind dabei Grundlage, damit wirklich «Äpfel mit Äpfeln» verglichen werden können. Ausgehend von einer Datenerhebung für das Jahr 2022 werden die Key-Performance-Indikatoren für die Leistungen des Technischen FM jährlich strukturiert aufbereitet und im Sinne der teilnehmenden Spitalpartner kontinuierlich weiterentwickelt. ■

Pillar 1: Information, cooperation and support

- Policy analysis and development of information and facilitation programs at local (municipality) level
- Integrated support tools for implementation of coherent and successful retrofit strategies
- Comprehensive Life Cycle Sustainability Assessment framework for holistic decision-making

Pillar 2: Technology and architecture

- Fuel-switch from fossil to HP systems: technological developments, guidelines and factsheets
- Innovative solutions for retrofit of building envelope (prefabricated active facade kits, insulating bricks)
- Decision support instruments combining geo and building data

Pillar 3: Finance, regulation and law

- New forms of public-private partnership to finance the building retrofit and the switch to renewables
- Necessary adjustments of the regulatory framework
- Qualification of value-preserving and value-adding investments of building retrofit in relation to owner/tenant dilemma

Pillar 4: Business strategies and renovation clusters

- Best practices of building retrofit in relation to adjacent sectors (waste management, ICT, ...)
- Renovation clusters based on “one-stop-shop” (customer-centred model, with single interface)
- Improving proficiency of real estate owners in developing and managing their assets
- Holistic renovation concepts based on energy master planning ■

Neue Projekte

Organisationsforschung für ein Kantonsspital

Dauer: 01.10.2023–31.10.2024

Projektpartner: Kantonsspital Winterthur KSW

Weitere Projekte

zhaw.ch/ifm/projekte

Weiterbildung

22.08.2024

CAS Strategisches Real Estate & Facility Management

29.08.2024

CAS Energiemanagement

29.08.2024

CAS Workplace Management

05.09.2024

CAS Life Cycle Management Immobilien

Infos und Anmeldung

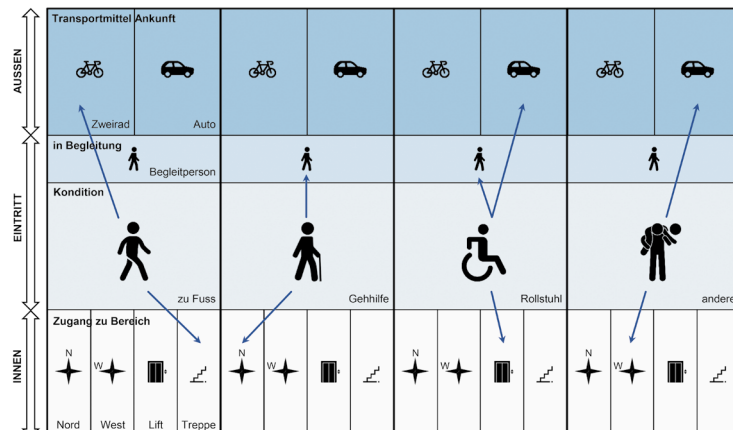
zhaw.ch/ifm/weiterbildung

Personenströme im Spital

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Für die Steuerung von Personenströmen sind Kenntnisse zur Anzahl täglicher Passanten notwendig, um den reibungslosen Verkehrsfluss sicherzustellen. Aufgrund eines Umbaus bedarf es im untersuchten Spital temporärer Anpassungen der Personenströme. Im Gegensatz zu Büroumgebungen, wo die Nutzung von Räumen mithilfe einer Space-Utilization-Study analysiert wird, mangelt es an einer Methode bei der Erfassung von Personenströmen in unübersichtlichen Eingangshallen. Auf der Gebäudestruktur basierend, wird im Projekt die Analyse der Personenströme des Spitalhaupteinganges entwickelt. Beobachterinnen und Beobachter sammeln zwischen 7 und 17 Uhr anonymisierte Daten. Diese umfassen die Art der Anreise im Aussenraum (Auto, Zweirad), Nutzung von Hilfsmitteln (Gehhilfen, Rollstühle) sowie Anzahl Personen, welche die Korridore passieren. Basierend auf der Analyse können Überlastungen in Bereichen identifiziert und Empfehlungen für Veränderungen des Innenraums insbesondere in Bezug auf die Wegführung formuliert werden. ■



Mögliche Personenströme im untersuchten Spital