Large-scale investors' decision-making strategies for portfolio-level energy retrofitting

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Motivation, research case, method

Motivation

- Energy demand and CO_2 emissions can be reduced with **renewable & energy-efficient technologies**.
- For new buildings, these technologies have been implemented widely and standards are near NetZero. However, **for existing building energy retrofits they are far from standard** due to each buildings' uniqueness, requiring techno-economic planning.
- In Europe, **less than 1% of the building stock is retrofitted p.a., 2-3 times less than called for by climate goals**. Retrofitting technology solutions are there – implementation strategies & policy are lagging.

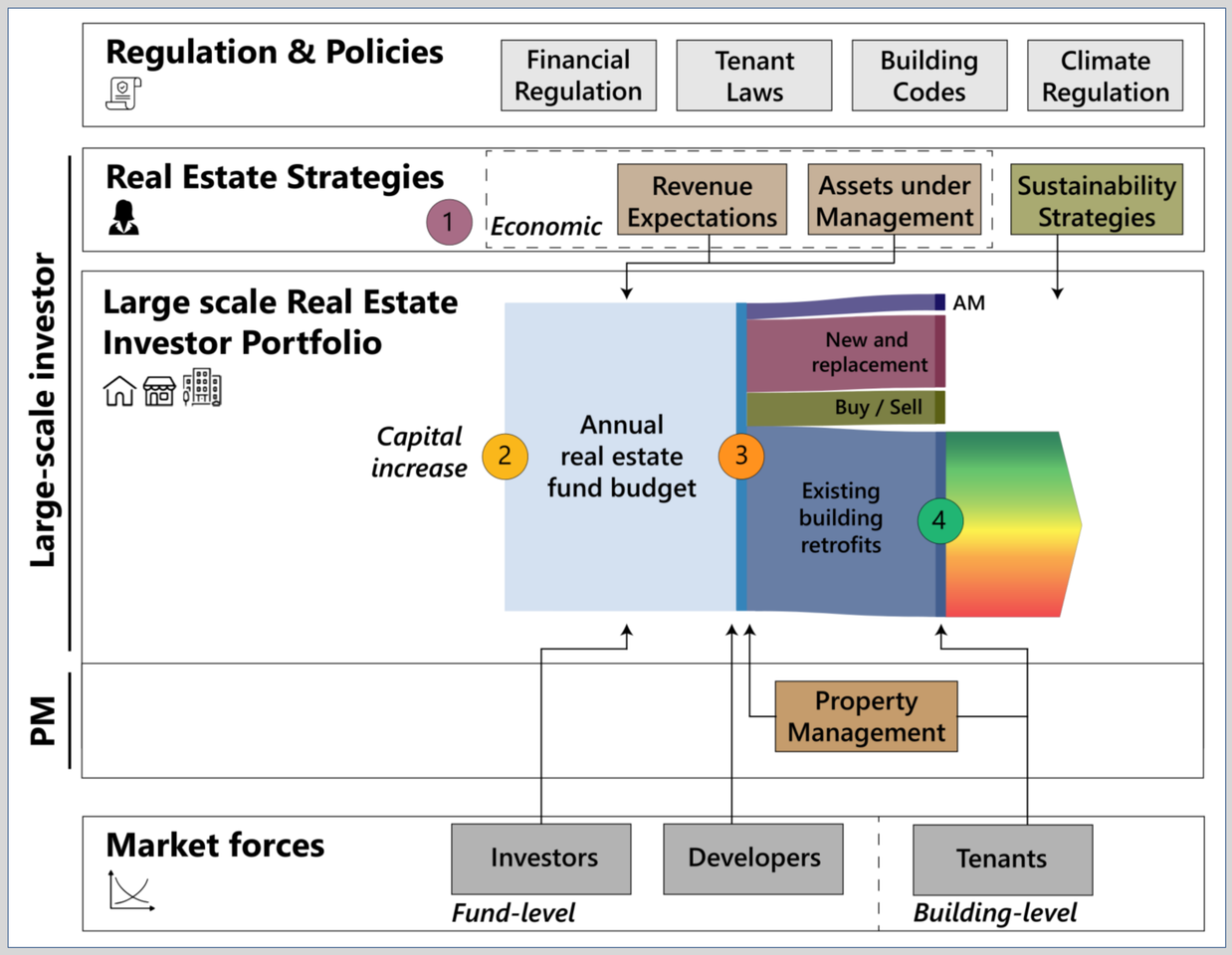
Case

- Motivations & barriers for retrofitting for new residential buildings and private homeowners are generally known.
- It is less clear how to support investments in **energy retrofitting across LSIs' building portfolios**.
  - LSIs can be public (e.g. cities, states), institutional (e.g. banks, trusts, insurance), or private.
- In Switzerland, LSIs hold a large share of annual building investments, **accounting for over 70% of annual building investments** in a country typified by one of the lowest home-ownership rates in Europe (40%).
- Residential accounts for 75% of the Swiss stock. The rest is commercial, retail, etc. - this is similar across the EU.

Method

- Global literature review of regulatory and techno-economic motivations & barriers and decision-making.
- Semi-structured interviews & workshops across LSI types.

LSIs' real estate budgetary and decision-making workflow



Main decision-making points are presented below. Arrows indicate influence.

1) Company real estate strategies and guidelines (which set the annual portfolio budget).
2) Budgetary decision to increase portfolio capital and annual budget (i.e. a stock issuance).
3) Budgetary distribution into the various interventions (buy/sell, retrofit, replace, etc.).
4) Regarding retrofitting, decisions for which buildings to retrofit and which retrofits to engage in.

Figure 1: Generalized overview of institutional LSIs' budgetary and decision-making workflows with relevant regulations and market forces..

- There is a **regulatory trade-off between** regulation **stringency (depth) & incentives (speed).**
  - The colorful gradient in step 4 represents an Energy Label scale for retrofit depth.
- **Between LSI types, managerial structures will be different**. Thus, they will react to regulations, policies, and market forces in disparate ways enabling varied retrofitting triggers, motivations, and barriers.
  - **Property managers**, often outsourced by LSIs, **have a high influence on retrofit trigger / initiation.**
- Retrofitting can be on **building or district-scales**, depending on adjacent property ownership or existing heat networks.

Iterative planning, budgeting, and valuation for portfolio retrofitting

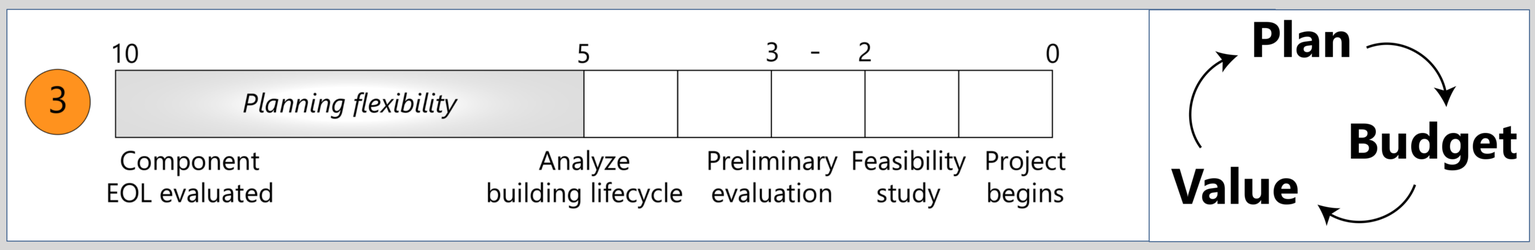


Figure 2: General 10-year planning workflow in step 3 of Figure 1. Over 5+ years away from the planned project start (year 0), the exact project is unclear, allowing for budgeting flexibility between projects in the portfolio. This sharpens in year 5 when building component lifecycles (i.e. urgency / risk) are analyzed. In year 3, a preliminary evaluation is conducted, followed by a more detailed feasibility study 2 years before the project.

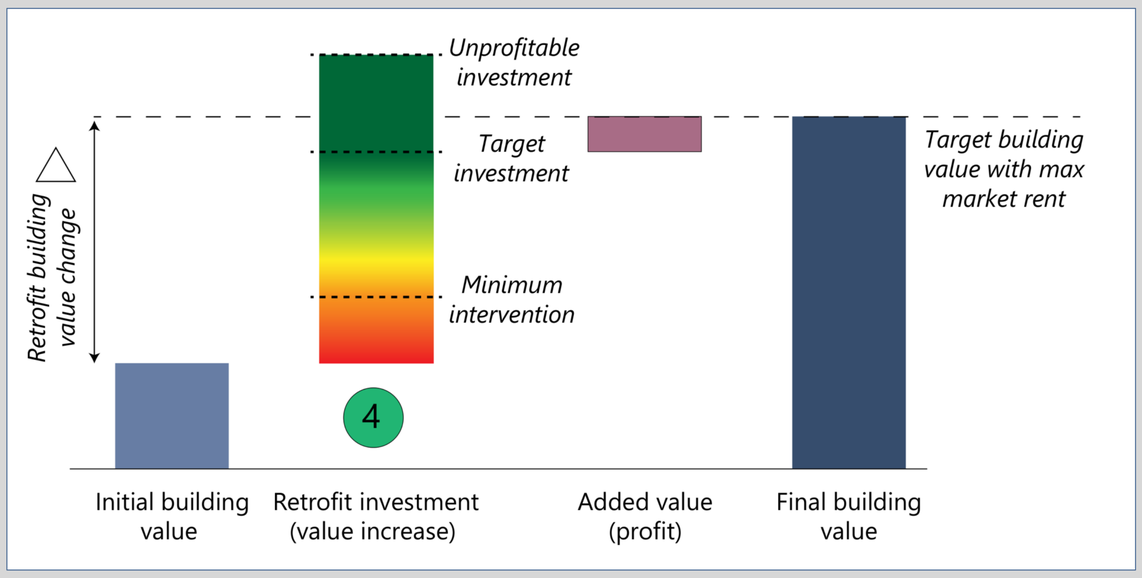


Figure 3: Schematic representation of the iterative cycle of retrofit budgeting and valuation done in the preliminary evaluation and feasibility study stages of Figure 2. The retrofit budget is set in accordance to the (maximized) target final building value.

The retrofitting budget is highly determined by the **maximum attainable building value change**, illustrating the **importance of building valuation methodologies.**

This illustrates the importance of **transparency of real estate sustainability methodologies**, both in building valuation and portfolio reporting.

Triggers

- In contrast to energy retrofitting studies focusing on **payback periods**, these are **not influential** for most LSIs. The focus is on **aligning staggered component lifecycles balanced with urgency and potential to increase building value**.
  - Payback/ROI for retrofitting is done after valuation.
- Real estate **company sustainability strategies** highly influence project scenarios, but not so much the **trigger**. These are important for benchmarks (e.g. GRESB) to show investment 'impact'. **Internal technical guidelines** steer tech. selection.
- **Tenants laws** (i.e. retrofit pass-on value), **rent caps**, among others have a high influence on retrofitting triggers and depth. Many LSIs point to reducing vacancy as a motivation – "a building is not sustainable if it is vacant".

Speed and depth

- For most LSIs, building energy codes are **minimum standards** and do not differentiate to building value. Instead, they **prefer to steer themselves toward labels** (e.g. LEED, BREEM, etc.) or **self-developed label proxies** for 'green' buildings.
- LSIs prefer to **minimize interventions in a building lifecycle**, thus **coupling value-increasing and non-energy renovations** such as kitchens and bathrooms **with retrofits** of windows, insulation / façade, and heating systems.

LSI perspective and future outlook

LSI perspective

- A LSIs' portfolio has financial targets, meaning any retrofit done must be **beneficial for returns**.
- From the LSI perspective, **buildings are an instrument to gain cash-flows** rather than a structure with systems.

Preliminary conclusions

- Building valuation methods need to **accurately account for long-term uncertainties** (policies and techno-economic) impacts' on building value and thus triggers.
- Some buildings on the market are possibly **over-valued** as valuation methodologies do not weigh their **'preparedness' for more stringent future regulations**.
  - This is differentiated in markets - higher retrofit rates and depth are seen in 'top' locations.
- **Strategic retrofit planning tools are necessary for long-term planning under** regulatory, technical, and economic **uncertainty** related to sustainability aspects.
- High up-front costs of retrofitting technologies, their rapid technological learnings, and split-incentives in their implementation **increase the long lifetimes of sub-par existing technologies** while decreasing deep-retrofit possibility. LSIs can focus on **minimizing risk of urgent retrofits and future regulatory impacts**.

Funding and contact information

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