

Comparative innovation system analysis of the Swedish and Swiss wood building sector: parallels and potentials

Pascal Vögeli, Anton Sentic, Jochen Markard

Description

• **Context & research aims:**

Wood as a building material has many advantages over other commonly used building materials such as concrete and steel: as glued binders, wood is one of the strongest building materials in relation to its own weight, it is a renewable resource and, when used as a construction material, it binds CO₂ and requires only a fraction of the energy during production that would be needed for steel or concrete. Wood is traded as a low-CO₂ substitute for conventional building materials, by the German Advisory Council on Global Change, among others (Churkina, 2016). Sweden is considered a pioneer in the use of wood in construction (especially in the area of prefabrication). In Switzerland, too, the timber construction sector has great potential and is attracting attention through innovations in processing and the development of new areas of application, as well as ever higher buildings made of wood.

• **Approach: 3 Steps**

- I) Selection of leading country in wood construction (here: Sweden)
- II) Innovation system analysis (Markard et al., ResPol 2009)

- Goal: Assess strengths & weaknesses of national innovation systems (here: around wood in construction and renovation)
- 1 Basic analysis: 1a) innovation characteristics, 1b) actors & networks, 1c) regulations & policies
- 2 Context analysis: 2a) existing socio-technical systems (here: construction industry), 2b) competing & complementary innovations, 2c) landscape developments

III) Comparison and policy recommendations

- Comparing innovation performance of Sweden and Switzerland
- Development of policy recommendations for Switzerland

• **Methods:** Document analysis & expert interviews

• **Preliminary results (1st findings):**

- Dominant share (~90%) of wood in Swedish one- to two-storey buildings (due to element construction), Growing share of wood in multi-story buildings (fig. 2)
- Concrete is the most important construction material in multi-apartment buildings in both Sweden and Switzerland, but in Switzerland also in one- to two-storey buildings
- Bricks hardly used as construction material in Sweden, in Switzerland around one third of total buildings
- In renovations and extensions, wood already has a significantly larger share of 30% in Switzerland, compared to new buildings
- In both countries there has been an increase in the use of wood in multi-apartment houses due to regulatory changes and new manufacturing techniques

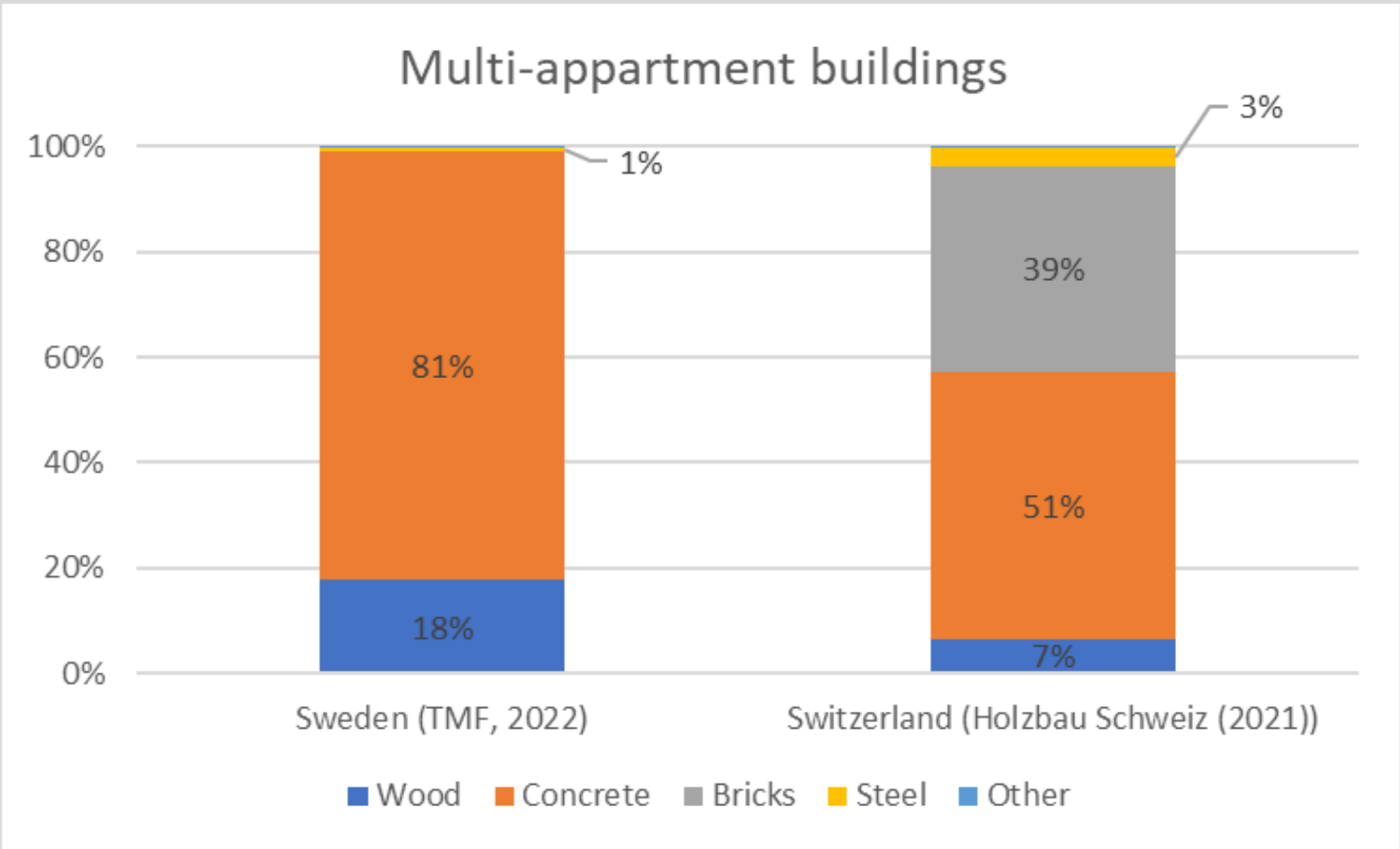


Fig. 1: Share of construction materials in multi-apartment buildings by country, survey period: 2019-2022

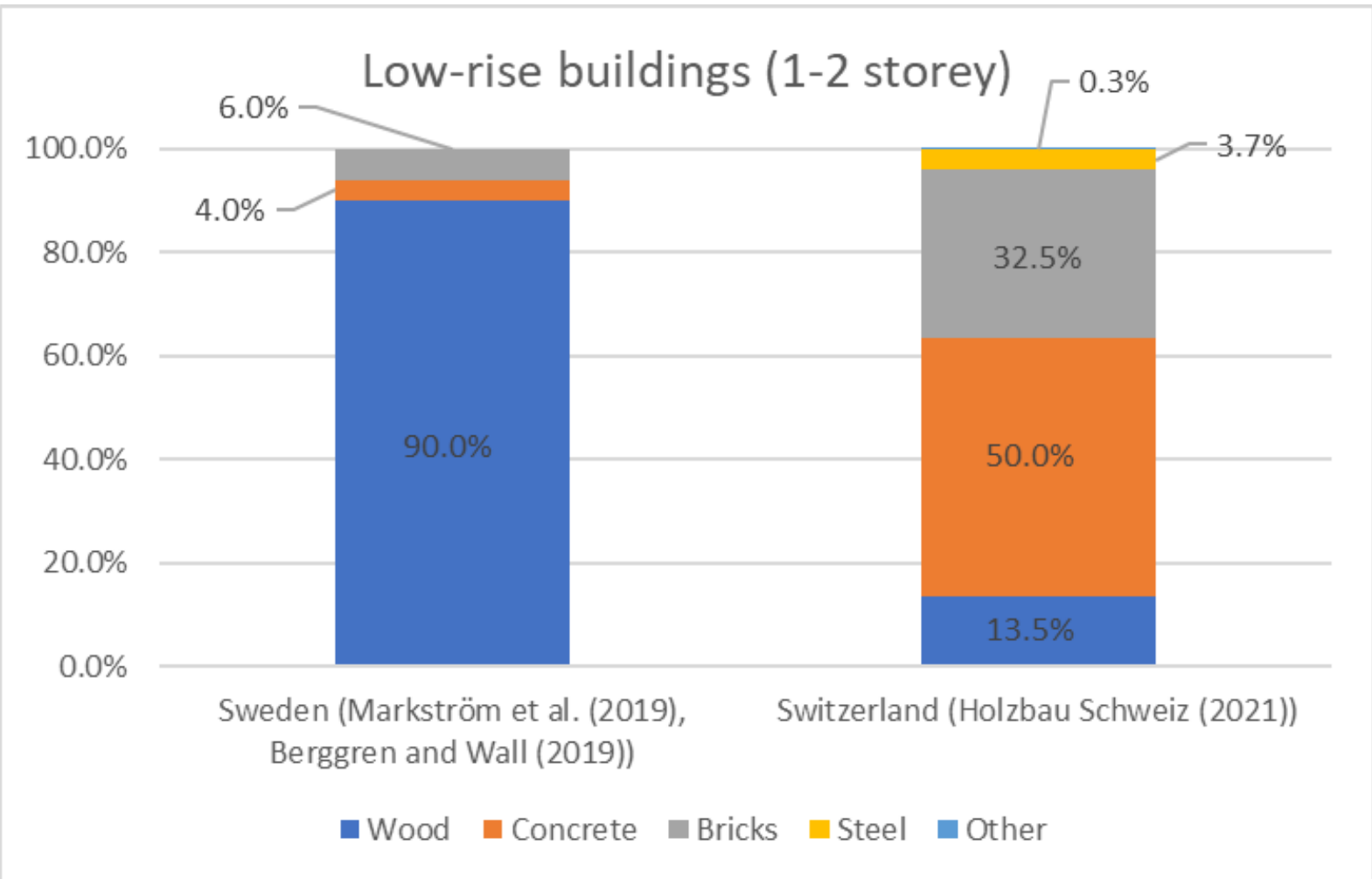


Fig. 2: Share of construction materials in multi-apartment buildings by country, survey period: 2019-2022

Added value – exploring case studies

- *Wood as a low carbon substitute for steel and concrete: high decarbonization potential*
- *Nonetheless, buildings are still very often constructed with conventional building materials, which leads to increased CO₂ emissions*
- *Currently lighthouse projects in Switzerland and Sweden involving multi-storey construction / skyscrapers / wood-based basements*
- *New process technologies enable the processing of hardwood and its use in framework construction (e.g. Fagus Suisse)*



Fig. 3: Roof beams and crane tracks made of Swiss beech wood (Fagus Suisse)

Next steps

Re-Use of building materials in renovation processes

- *Re-use in the building and renovation sector can be seen as a process innovation*
- *High decarbonization potential through both re-use of embodied carbon in buildings and the reduction of primary material demand (lower extraction and manufacturing emissions)*
- *Initial re-use activities in CH focused on the broader building sector --> but also potential for renovation*
- *current activities: small scale projects, R&D, re-use material markets and provision of re-use services*
- *However, there are still both sector-specific and systemic challenges, among others availability of data on materials, comparatively high cost of re-used materials, guarantee questions for the materials and safety concerns*

