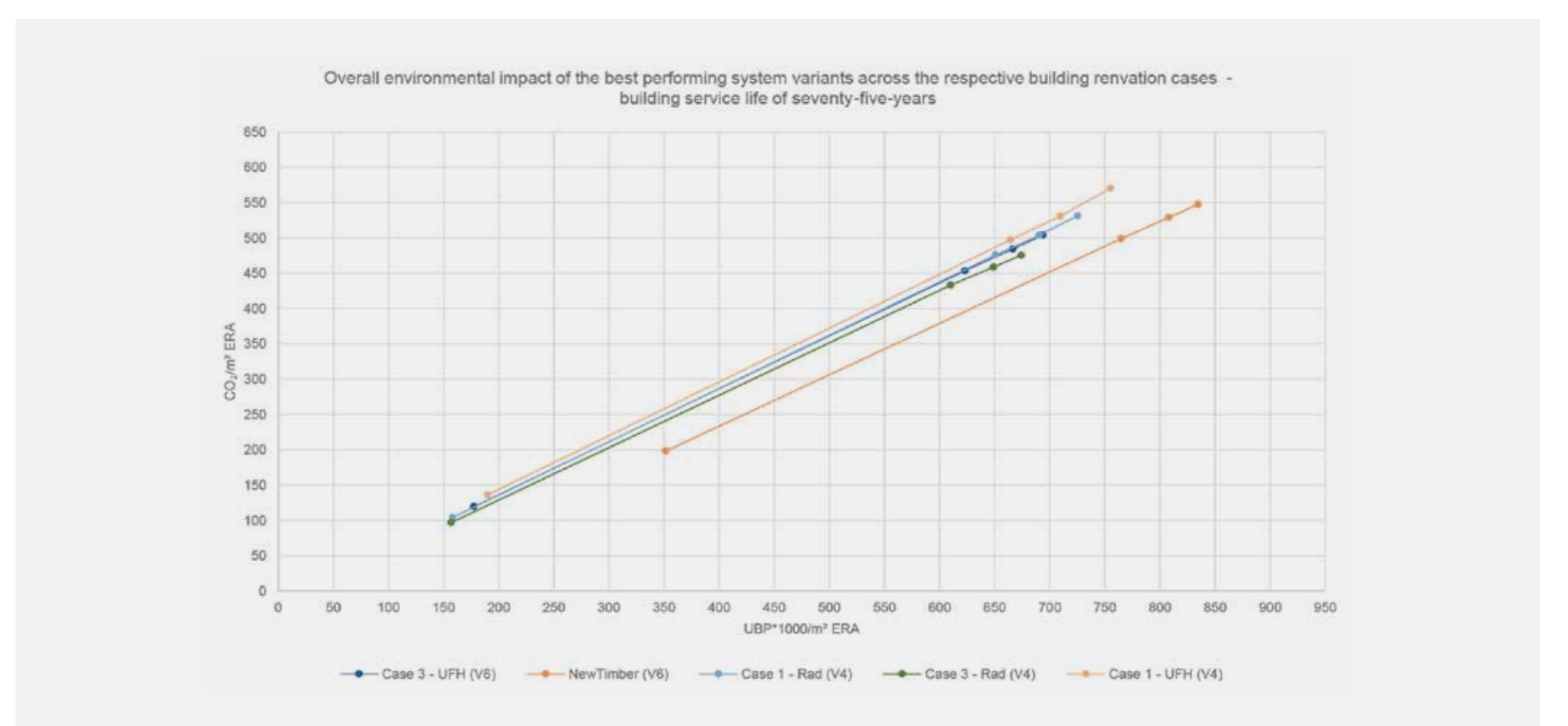
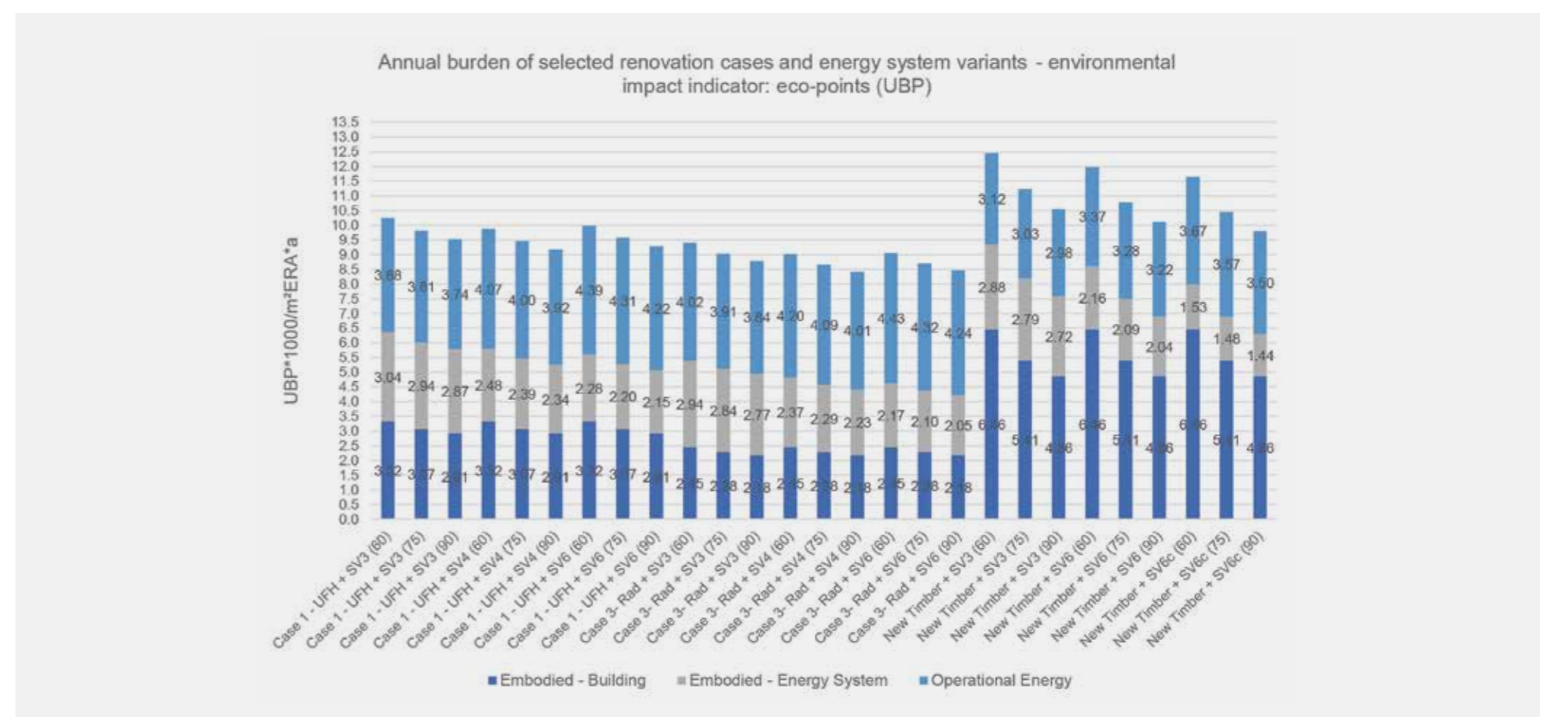
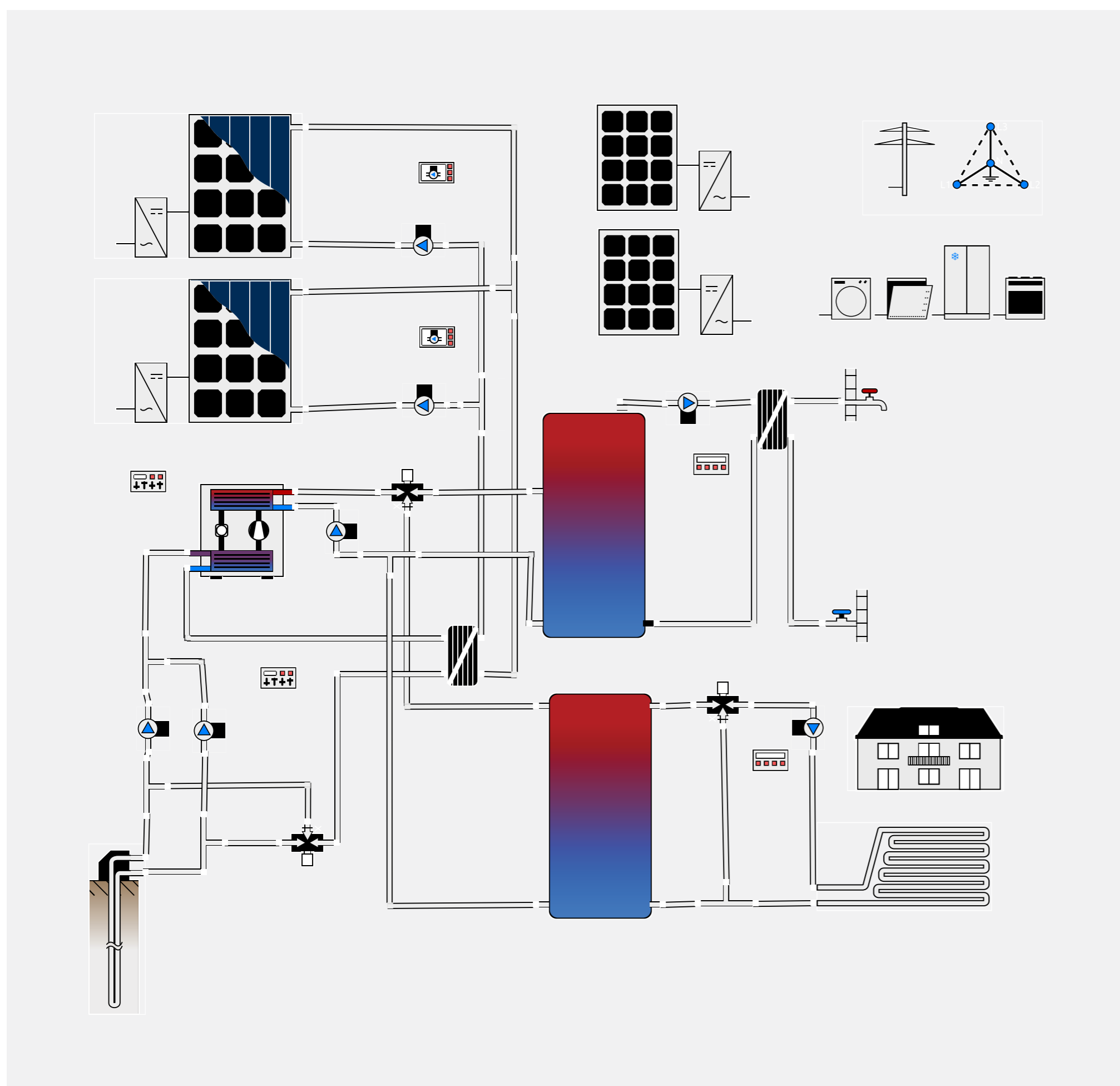
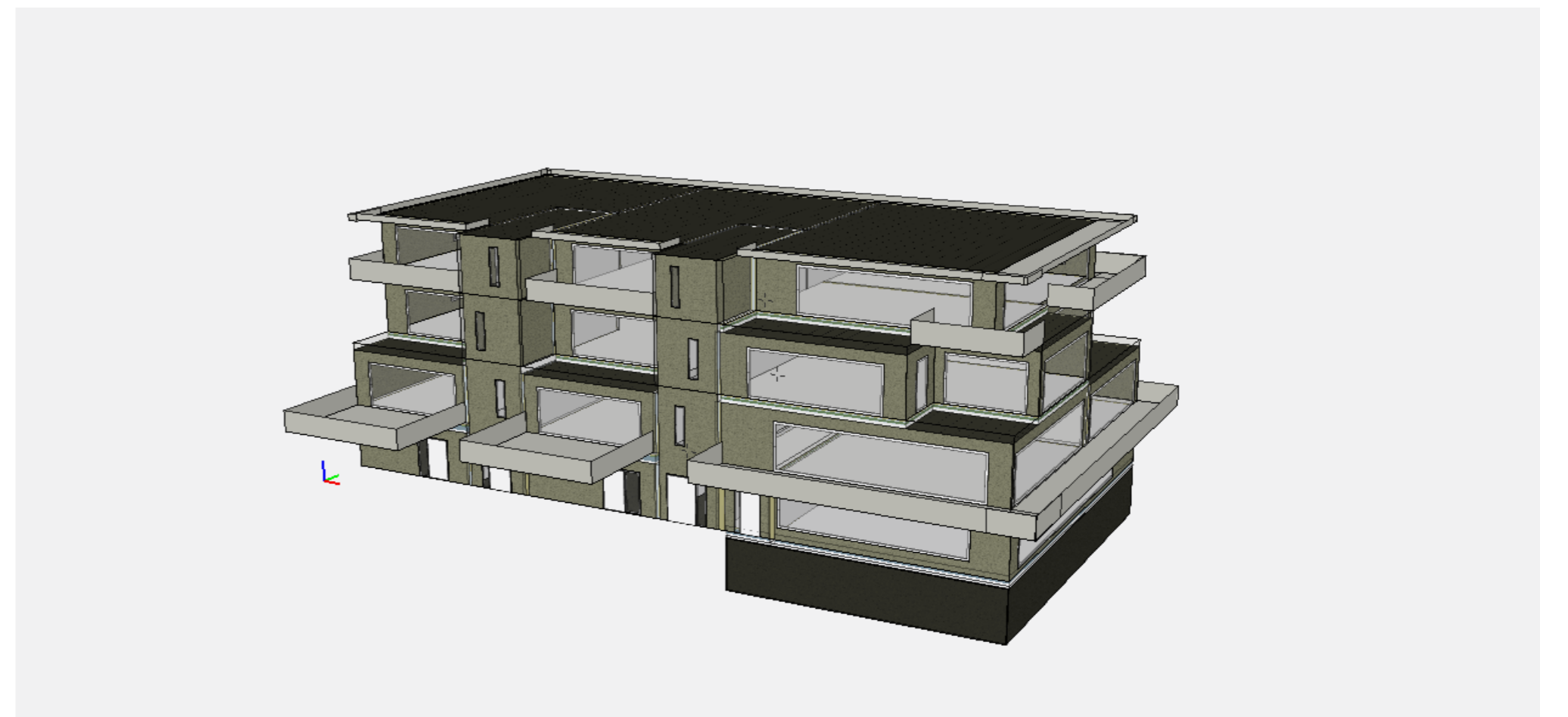
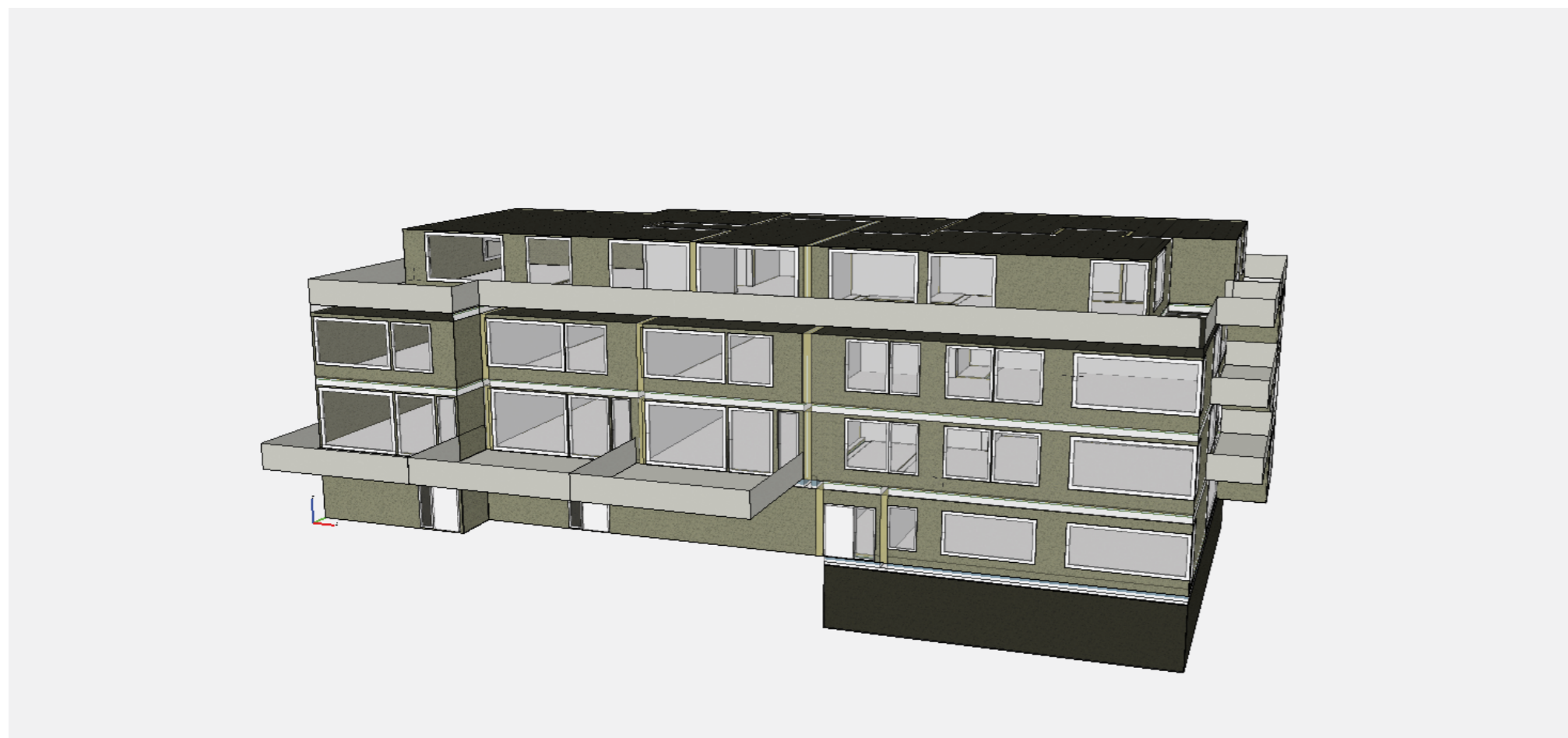


Master-Thesis Engineering, Fachgebiet Civil Engineering and Building Technology

# Overall Environmental Impact of Buildings on the Swiss Plateau – An Analysis by means of a Case Study



## How to best manage the existing building stock?

From environmental burdens incurred during the operational phase to impacts embodied within the original and future building materials, buildings account for a great portion of environmental impact our society generates. The aim of this study was to assess the overall environmental impact of proposed renovations on an existing building as well as that of a proposed new construction. The case study evaluated typical façade renovations in combination with state-of-the-art building technology systems for a typical multi-family home located in the climatic region of the Swiss plateau.

## Method

With the aid of energy-simulation tools and life cycle assessment methodology, the overall environmental impact was investigated. Four different façade renovation alternatives together with a new proposed timber construction were modelled with the simulation software IDA-ICE, determining annual energy demand requirements for space heating, lighting, and devices.

The resulting energy demand profiles were analysed together with eight different energy-system concepts. The energy-system concepts were simulated with the help of Polysun software in order to determine annual end-energy demand. These end-energy demand profiles were used to assess the environmental impact associated with the operational phase of the proposed concepts.

Life cycle inventory data was used to quantify the embodied environmental impacts associated with both the building materials and the building technology systems.

The various building and building technology combinations were analysed over service lives of 60, 75 and 90-years respectively. As well as varying service lives, the reduction in impact of future replacements due to technological advances was also explored.

The impact indicators of greenhouse gases (global warming potential) and eco-points (Swiss-specific) were used for the environmental evaluations.

## George Fewkes

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