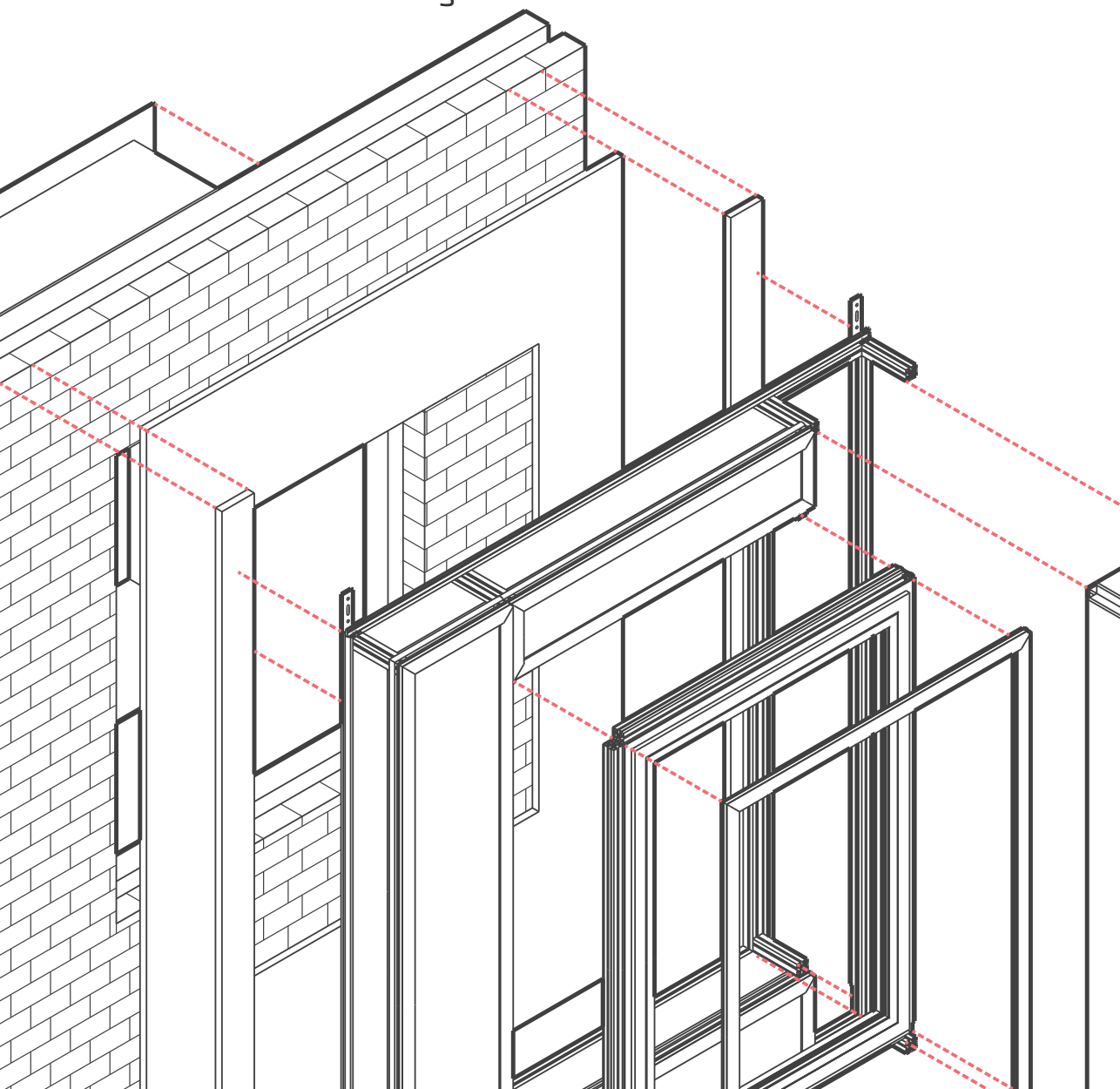


# RE<sup>∞</sup>NOVATE

Upgradable Building Envelope System for Energy  
Reduction Renovation of Dutch Post-war Apartments

## REFLECTION

Mick Simmering



### **Aspect 1 | The relationship between research and design.**

Due to the vast amount of literature available on the topic of renovation and prefabrication, the research in the first phase took a, in hindsight, too dominant role and overshadowed the design process. After the P3, the decision was made to completely focus on the design and to trust the acquired knowledge was sufficient to come up with a suitable design solution to the research question. When the design of the façade system reached a more defined point, more precisely could be searched at additional literature that could enhance the design. In the end, the design phase balanced out with the literature review phase in effort and time.

### **Aspect 2 | The relationship between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS).**

Building Technology is a graduation studio that seeks out to solve architectural problems in multiple fields in a technically and architectural sound way, focussing on current and imminent issues. The graduation project combines architectural, technical and building physical (in a lesser degree) subjects with a current issue, renovation, which makes it highly relatable to the master track.

### **Aspect 3 | Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.**

#### *The objectives of the thesis:*

- Create an overview of the current situation of the Dutch building stock eligible for renovation. Focussing on the energy consumption, assessment of energy performance and building physical problems.
- Create an overview of the parameters and principles necessary for adequate renovation. Focussing on the current requirements, as well as the future requirements.
- Assess current state-of-art prefabricated systems based on criteria formulated from the second objective to gain an understanding of implemented strategies.
- Formulate a design methodology consisting of criteria, tools and assessment method based on the literature.
- Utilise design methodology to formulate a design for a façade system that satisfies the formulated criteria.

- Implement the façade system on a case study and construct two separate scenarios with different timelines to evaluate the present day and future performance of the façade system.

The thesis followed an analytical path utilising a formulated design methodology with a list of criteria and design tools to form a solid basis for the design phase. The formulated design methodology could be reused to come up with a different outcome. The research is very relevant at the moment of writing, the European Union is extensively searching for new and more adequate solutions for the high energy consumption of households and subsequently CO<sup>2</sup> production. At the current rate, The Netherlands are not achieving the set goals, this research project, and of course many others, thrive to help to answer how the renovation of the building stock can be achieved in a more controlled and responsible matter.

**Aspect 4 | Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.**

Global warming is seen as one of the biggest issues of the 21st century, with many parties trying desperately to counteract or to alleviate its damaging effects in the future. Energy consumption in households make up more than a quarter of the total energy consumption in the European Union, due to large stock of older buildings with poor thermal performance. The project is not aiming at one singular case, but at large portion of the building stock. If the renovation were to take place on a large scale the effects of the energy reduction could be significant.

**Aspect 5 | Discuss the ethical issues and dilemmas you may have encountered in (i) doing the research, (ii, if applicable) elaborating the design and (iii) potential applications of the results in practice.**

Currently, a lot of discussion is going on about in what ways the renovation process of buildings in the Netherlands should place. The discussion mainly revolves around the costs of renovation, and who is going to pay for it. Main issue are the high initial investment costs and low annual return. The design proposal suggest are more constructive path towards the goal, with lower initial investments to spread out costs over many years. The final design might not be best solution to do this, but the principle of spreading costs could be very beneficial and lead to more widespread acceptance from the public.