

Reflection

Aspect 1

The relationship between research and design.

The objective of the thesis is to design a new prefabricated zero-energy renovation concept for post-war walk-up apartments, that integrates the building-services in a space and cost-efficient way. In order to come up with a good solution, a certain method is required to validate the result. Therefore, the first phase in the thesis consisted of a literature review with the aim of identifying the different parameters that can be found in renovation strategies and case studies. The parameters found were then used in the design phase afterwards. By using this method, the early research serves as the foundation for the design.

Aspect 2

The relationship between your graduation (project) topic, your master track (A,U,BT,LA,MBE) and your master programme (MSc AUBS).

My graduation topic is about making the existing built environment more sustainable with a new renovation concept that integrates technology and design. This fits within the Building Technology master track, because the emphasis of this programme is on the design of innovative and sustainable building components and their integration into the built environment. It also fits within my master programme, where I followed the courses Zero-Energy Design and Techno ledge Façade Design. These courses form a good base to answer my thesis main question of '*How can the integration of building services in façades, for zero-energy renovation methods in Dutch post-war walk-up apartments, be optimised in terms of space and costs?*'.

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.

In the scientific field, there is already a lot of research being done on making the existing building stock reach zero-energy levels. As a starting point for the research in the thesis, the 2ndSKIN project was used. This research could not be finished the way it was planned. It stated that more research and development is needed to end up with affordable solutions for renovating post-war walk-up apartments. Therefore the method used in the thesis first analysed the problems that the 2ndSKIN project encountered. They concluded that:

"The technologies available for integration as sub-systems in 2ndSKIN are currently still voluminous, heavy and costly. The various subsystems still need be scaled down, to become not only smaller, but also fitting to the actual demand, lighter and better integrated in the skin."

Based on this conclusion, the method in the thesis focuses on the different parameters that are used in zero-energy refurbishment so they can be optimised in the new design. This research can later be used in order to make a less voluminous, heavy and costly approach.

Aspect 4

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

Climate change is currently one of the most discussed problems that has to be solved. To do this, the Dutch government introduced the '*energy agenda*'. A major way to reduce climate change in this agenda, is the drastic reduction of fossil fuel usage. However, the energy agenda also notices the small impact of new more sustainable buildings, which only have a limited effect on making the built environment more sustainable. The biggest challenge is that of heating existing buildings with low CO₂ producing measures. In order to have a big impact on achieving the climate goals, existing buildings must be renovated. The post-war walk-up housing type, consist of 635.000 houses in The Netherlands. Deep renovation concepts for these particular types of buildings are still missing, making the results of thesis interesting in the wider social, professional and scientific framework.

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.

One of the ethical issues or dilemma encountered in renovation is the relationship between costs and sustainability. Of course people want to have a sustainable house or building, but if the costs are too high, the reluctance of taking sustainable measures grows. Therefore the design of less expansive renovation method can be a potential application for the practise.