# An LT- ready and economically feasible renovation façade design.

## REFLECTION

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# RELEVANCE AND REFLECTION

Relevance to the master track and programme

The graduation topic is very relevant to the master track Building technology since, the first aim is reducing the energy demand which is a sustainability issue, combined with climate and facade design. Knowledge taught and acquired during the master's courses, in energy transition, building physics, climate and façade design, are all needed and put in use. In my opinion, the theme is in tune with the overall direction of the track, to investigate new ways (even small changes) of doing with proper validation and with sustainability always in mind. A proof is the increasing number of papers and projects relative to energy efficient refurbishment the last years. As of the master programme MSc AUBS, the project is of great importance for the building environment and architecture as it is an energy refurbishment which aims to balance energy efficient and costs, but at the same time reach an aesthetically pleasing result suitable in the Dutch building context.

Relevance to society

The financial motives of the project are very important. An energy efficient refurbishment leads to reduced energy bills and the calculation of the payback time is easily calculated. As this project aims in a cheaper refurbishment solution the payback time will be, also, shorter. The refurbishment is going to also repair some of the physical problems of the old envelope and upgrade its performance and appearance. The aging houses are less attractive socially and their economic value is steadily decreasing. Thus, the refurbishment will increase the property's value. As scalable cheaper refurbishment strategy, it could become part of a plan in order to increase the value of other properties, the rent prices or even the gentrification and upgrade of now not so attractive areas. Thus, the refurbishment project is also relevant in the social framework. If successful it could be used in many apartment blocks to reform problematic areas and their socio-economic group of renters. Along with better housing for the residents, the renewed image of a sustainable building or neighbourhood adds value to the context. The social benefits include also the employment opportunities in the residential sector through the refurbishment market development. Last but not least, as the starting point of this project, the Co2 reduction and energy savings are a direct benefit for the society.

## Reflection

The project is a research by design to create a fast and economically feasible refurbishment strategy, that potentially could be applied to many buildings. The relationship between research and design is translated as a constant flow of using alternately the information found through literature study and created by the simulations and the designing process (initially the concepts and then a less costly and complicated facade element design).

So far in the process, I have made and accepted logical assumptions either to serve the purpose of the project or because of lack of information, for example for the case study building. The innovative insulation process is an assumption based on building physics rules and by following the methodology and with dynamic simulations I try to understand if the assumption could prove correct. That was a process of trial and error. In that process I have already found two obstacles in this research approach. The first one is the lack or difficulty to find information online regarding the costs of the facade elements. There is the same, repetitive information about the general prices but not in depth and in detail as my project needs to validate the final product. Thus, after discussing with my main mentor, the cost evaluation of the facade element will not be done with providing an exact number but as a discussion in a more general level. The second difficulty has to do with the limitations of the simulation program design builder, and the lack of knowledge on some pre- defined by the program options, which needed to be clarified. That was solved by contacting the Design Builder Help, that answered to my questions and by trying different options and comparing the results.

The project's aim is to be feasible and applicable in real life, keeping it not expensive and complicated. The strategy for the refurbishment of the facade, following the traditional ways of insulating or the proposed prefabricated solution, is applicable easily. The changing to low or medium temperature heating is the part, that although proved to be working, still needs to be tested and thought thoroughly. So far, the innovation process seems to be efficient and the project contributes to the sustainable development.

## Ethical issues

Regarding the ethical issues or dilemma's, every decision and step has been made based on my current state of knowledge and arguments but has consequences and possibly it could have been done in a better way. Ideally as architects we opt for no regret design, but the solution might prove obsolete in a few years. And that is a price paid when there are steps taken in the process that are innovative and have not been tested in the past. For example, this is categorized as a moderate refurbishment and it might be proven in the future that is not enough to reach the energy goals of EU in 2050. A second point is the issue of providing less comfort in return for lower environmental impact. This is a very important point in this project as it is a search for balance between making the solution feasible economically while decreasing the energy use but also not compromise on the residents comfort (a couple of examples: making the refurbishment less disturbing for them, keep the indoor temperature and ventilation rates in normal levels). Also, in the facade element design, in order to reach the Rc- value, I chose materials that have the properties needed but a bigger environmental impact. Using the insulation material itself is harmful for the environment because it costs raw materials and energy to produce, energy to transport, install and process it after demolition. But it is used because the energy required will be earned back in months or a couple of years by the energy saved. So, the fact that the building is insulated in such a way with the right material that is applied properly to achieve the goals is more important than choosing a less sustainable material.