

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information		
Name	Hidde Schunselaar	
Student number	5086124	

Studio		
Name / Theme	AR3AH105 Graduation Studio Adapting 20 th Century Heritage	
Main mentor	1) Mrs. ir. T. (Telesilla) Bristogianni 2) Prof. Dr.-Ing. Uta Pottgiesser	1) Applied Mechanics Structural Design / Building Engineering 2) Professor of Heritage & Technology. Department of Architectural Engineering + Technology
Second mentor	3) P.L. Tomesen	4) Architecture and the Built Environment, Architectural Technology
Argumentation of choice of the studio	<p>I chose the Resourceful Housing studio because it aligns with my interests. I am intrigued with the idea of revitalizing existing structures and infusing a renewed purpose into buildings. Within the studio of heritage, it is possible to develop such an idea. Because this studio specifically focuses on sustainable redevelopment of the young monumental buildings within Amsterdam Nieuw-West.</p> <p>In addition, my enthusiasm for the field of housing influenced my decision. Having previously enjoyed the studio on the Fundamentals of Housing design, I aspired to apply the skills I acquired there to the Resourceful Housing studio. From the outset, I intended to engage in a project related to housing, fostering a seamless continuation of my exploration and application of design principles within this domain.</p>	

Graduation project	
Title of the graduation project	Preserving the past, Energizing the Future <i>'ASSESSING THE INTERPLAY OF INTERVENTION STRATEGIES ON HERITAGE VALUE AND ENERGY EFFICIENCY'</i>
Goal	
Location:	Amsterdam, Nieuw-West, Plesmanlaan 1
The posed problem,	Despite the growing recognition of heritage value and the need for sustainable redevelopment (Aigwi et al., 2023), the challenge remains in implementing interventions that improve both the operational efficiency and the heritage value of a property, without significantly increasing the embodied energy. This research focuses on identifying strategies that offer a balanced approach where sustainability and heritage conservation go hand in hand.
research questions and	The research question for this research is: <i>How can redevelopment interventions achieve a balanced approach that enhances both operational efficiency and heritage value, while minimizing the increase in embodied energy?</i>
design assignment in which these result.	The assessment of different design strategies based upon three indicators: Heritage – Operational energy – Embodied energy
Process	
Method description	
<p>This research explores the relationship between sustainability and heritage building value assessment, focusing on embodied and operational energy. The methodology follows Loussos et al.'s (2015) research, with an added step of a case study analysis examining embodied energy, operational energy, and heritage value. This analysis informs preservation decisions, identifies heritage value, and assesses operational energy if the building were in use today.</p> <p>The subsequent literature review delves into design strategies for embodied energy, operational energy, and heritage. Subsequently a material comparison classifies materials, based on embodied energy, leading to the creation of a sustainable materials palette. Using this palette, various design strategies are tested in a design case, focusing on facade, roof, and overall building elements. Each strategy has multiple variants, comparing their impact on embodied energy, operational energy, and heritage value. In conclusion, the results are presented graphically, and will help with guiding decisions in the project's design phase and can be seen as the research's end product</p>	

Literature and general practical references

Different types of literature were used for the study. Several academic sources were used. Below I have noted some commonly used sources:

- Akande, O., Odeleye, D., & Coday, A. (2014). Energy efficiency for sustainable reuse of public heritage buildings: The Case for Research. *International Journal of Sustainable Development and Planning*, 9(2), 237-250. <https://doi.org/10.2495/sdp-v9-n2-237-250>
- Dixit, M. (2017). Life cycle analysis of embodied energy in residential buildings: A review of literature to investigate embodied energy parameters. *Renewable & Sustainable Energy Reviews*, 79, 390-413. <https://doi.org/10.1016/j.rser.2017.05.051>
- Guidetti, E., & Ferrara, M. (2023). Embodied energy in existing buildings as a tool for sustainable intervention on urban heritage. *Sustainable Cities and Society*, 88, 104284. <https://doi.org/10.1016/j.scs.2022.104284>
- Havinga, L., Colenbrander, B., & Schellen, H. (2020). Heritage attributes of postwar housing in Amsterdam. *Frontiers of Architectural Research*, 9(1), 1-19. <https://doi.org/10.1016/j.foar.2019.04.002>
- Loussos, P., Konstantinou, T., Van Den Dobbelsteen, A., & Bokel, R. (2015). Integrating life cycle energy into the design of façade renovation for a post-war residential building in the Netherlands. *Buildings*, 5(2), 622-649. <https://doi.org/10.3390/buildings5020622>

In addition, using NIBE's materials dataset and programs like Grasshopper & Climatestudio helped me a lot in substantiating and doing various calculations.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

In my graduation project I try to find a holistic approach on which heritage properties can be energy effectively redeveloped. It forms the basis of the design assignment and choices will be based upon the results of the research.

I think that with regard to the master track Architecture, in general also the energy efficiency of buildings should be considered, in order to achieve sustainable building construction.

So there is a relationship between the studio and the master track regarding the importance of energy efficient design.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework?

This study outlines and assesses the impact of different intervention strategies on three aspects. It looks at the impact on heritage value, operational energy, and embodied energy. With this, the study aims to provide insights, in terms of the relation between energy efficiency of redevelopment strategies and the impact these strategies have on the heritage value. These insights can be instrumental during a decision-making point, in which different possible scenarios are being discussed. Because this relation has yet not been made this research is relevant to the larger social, professional and scientific framework.