

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	Nikoletta Dimitriou
Student number	5356016

Studio		
Name / Theme	(Inspired from) Green Light District	
Main mentor	Andy van den Dobbelsteen	Climate Design and Sustainability: Smart Bioclimatic Design - Zero-Energy Design - Climate Adaptation – Energy Transition
Second mentor	Olga Ioannou	Façade and Product Design: Product Development, Circular Design & Networks, Systems Thinking
Argumentation of choice of the studio	[Argumentation of choice of the studio]	

Graduation project	
Title of the graduation project	Plan for the adaptive reuse of social housing units driven by zero-energy and circular principles the case of the refugee settlements of Alexandra's Avenue in Athens, Greece
Goal	
Location:	Athens, Greece
The posed problem,	<p>Currently 4 billion people live in urban areas globally. By 2050, this number is expected to be increased to 7 billion. This corresponds to two thirds of the global population (Ritchie & Roser, 2018). At the same time, buildings are accused to be responsible for an average of 60% of carbon emissions and even up to 80% in some cities (C40 Cities, 2021).</p> <p>In the city center of Athens, Greece, over 60% of the buildings were built before 1960. Of these, more than 85% need interventions to restore, modernize and improve their functionality and energy efficiency. On top of it, approximately 25% of the residential building stock in the city center is abandoned (Triantafyllopoulos, 2018).</p> <p>The Fiscal Crisis and the country's bankruptcy of 2010, that followed the Global Financial Crisis of 2007-08, lead to increasing numbers of unemployment and an escalation of the average rent prices, in the following years, making it more difficult for locals to find adequate accommodation arrangements. The immigration wave of 2015-16, brought more than 1 million forcibly relocated people in the Greek</p>

	<p>land (UNHCR, 2022), who often face overcrowding and inadequate housing conditions or have no housing solutions at all. Greece is placed within the first 15 countries globally with the biggest numbers in homelessness, with 40.000 homeless people (Mavridis, 2018).</p> <p>To face this triptych of problems - carbon emissions caused by the cities, empty and unused buildings, homelessness - we need to, firstly, take advantage of the available building stock, restore, improve and upgrade it, in order to minimize the need of new constructions, and, secondly, establish a new model of collective social housing accessible and affordable to everyone.</p>
research questions and	How can adaptive reuse of the available building stock, using zero-energy and circular principles, be the tool to fight against climate change, energy poverty and social inequality?
design assignment in which these result.	Circular transformation of a 30's refugee building complex into a zero-energy neighborhood of collective social housing units.
<p>[This should be formulated in such a way that the graduation project can answer these questions. The definition of the problem has to be significant to a clearly defined area of research and design.]</p>	
Process	
Method description	
<p>This study follows and combines three methods of research, which are: literature review, case studies and research by design.</p> <p>First of all, the study is divided in 4 main pillars: adaptive reuse, social housing, zero-energy design and circularity. Each of these is examined and analyzed, through selected literature, in line with the research question. For this part, scientific sources, articles in e-journals, educational books, articles in local newspapers, statistic data and reports have been (and will be) processed.</p> <p>The research arguments are, then, supported by case studies that combine two or more of the above mentioned study fields. For example: an applied research project on cohousing and collective ownership models for reclaiming affordable habitat quality in Athens (Co-Hab Athens, 2022), the sustainable approach of adaptive reuse through case studies in the Netherlands (Thomsen & Van Der Flier 2009), a renewable energy community in public housing settlements in UK (Walker, 2008) and in Greece (Botsaris et al., 2021), a deep energy renovation in social housing units in Athens (Cattani, 2016).</p> <p>Finally, the design proposal, for an energy transformation of an existing building complex, gathers, includes and combines all the data derived from the research. These data form the main axis on which the design moves, and the criteria to evaluate and review the proposal.</p>	
Literature and general practical preference	
At the end of this document.	
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)?	

Green Light District project is about carbon-neutralizing and “greening” the historic inner city of Amsterdam, through, among others, zero-energy renovation of the existing buildings. Firstly, my graduation project was aiming to a transformation of this project into the historic city of Athens. However, social, economic, cultural factors lead to related, but probably more suitable to the context subject. This graduation project shares common principles with the primary one, such as: restoration of the existing building stock, reduction of carbon emissions, reduction of energy demands, development of renewable resources, circular renovation techniques, energy and social upgrade and inclusion of the local community.

This “plan for adaptive reuse” is highly related to the BT master track, since it analyzes techniques and principles of sustainability and circularity in the built environment. The design part concerns a transformation of an existing energetically poor performing 30’s building complex into a zero-energy neighborhood. Energy transition of existing building stock, especially in densely populated urban areas, is the future construction challenge.

Along with the above mentioned, a socioeconomic aspect is added to the research, concerning vulnerable groups of people, social inequalities and new forms of affordable, collective housing, accessible to everyone, values clearly connected with Architecture, Urbanism and the Building Sciences.

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

This project aims to propose a way out of the climate and energy crisis related to urban environments, while at the same time takes into consideration the social, economic and cultural factors that may affect each context and combines scientific research with sustainable and social design.

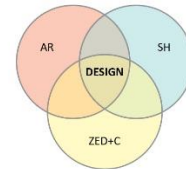
GRADUATION PLAN

TITLE: Plan for the **adaptive reuse** of **social housing** units drive by **zero-energy** and **circular principles** | the case of the refugee settlements of Alexandra’s Avenue in Athens, Greece.

The posed problem: in 3 statements: carbon emissions caused by cities, empty and unused buildings, homelessness.

The research question: How can adaptive reuse of the available building stock, using zero-energy and circular principles, be the tool to fight against climate change, energy poverty and social inequality?

The design assignment: Circular transformation of a 30’s refugee building complex into a zero-energy neighborhood of collective social housing units.



A. THEORY

Literature Review

First of all, the study is divided in 4 main pillars: adaptive reuse, social housing, zero-energy design and circularity. Each of these is examined and analyzed, through selected literature, in line with the research question. For this part, scientific sources, articles in e-journals, educational books, articles in local newspapers, statistic data and reports have been (and will be) processed.

1. Adaptive Reuse [AR]

- what is it?
- why to choose adaptive reuse over demolition and reconstruction?
- why is it necessary to adaptively reuse the existing building stock in Athens, Greece?

2. Social Housing [SH]

- what is it? is there a single term?
- the history of social housing EU?
- the absent of social housing sector in Greece and the need of a new model of social housing.

3. Zero-Energy Design [ZED]

- what is it and why is it important?
- the stepped strategy of reduce - reuse - produce translated in the Mediterranean climate.

4. Circularity [C]

- what is it circular economy and how does it affect the urban metabolism?
- what are the principles of circularity in reconstruction (restoration) and demolition?

B. CASE STUDIES

The research arguments are, then, supported by case studies that combine two or more of the above mentioned study fields. For example:

AR + SH

An applied research project on cohousing and collective ownership models for reclaiming affordable habitat quality in Athens (Co-Hab Athens, 2022)

AR + [ZED+C]

The sustainable approach of adaptive reuse through case studies in the Netherlands (Thomsen & Van Der Flier 2009)
Embodied energy on refurbishment vs demolition, a case study in Portugal (Gaspar & Santos, 2015)
Environmental Sustainability for the Refurbishment of the Early 20th Century Buildings in Mediterranean climate (Napoli et al., 2020)

SH + [ZED+C]

Renewable energy community in public housing settlements in UK UK (Walker, 2008) and in Greece (Botsaris et al., 2021)
Innovative energy systems in social housing in the Netherlands (Hoppe, 2012)
Deep energy renovation in social housing in Athens (Cattani, 2016)
Energy rehabilitation of residential buildings in Spain (Aguacil Moreno, 2018)

C. DESIGN

The case of the refugee settlements in Alexandra’s Avenue.

The design proposal, gathers, includes and combines all the data derived from the research. These data form the main axis on which the design moves, and the criteria to evaluate and review the proposal.

3 STAGES

1. Map:

- history of the building complex
- mapping the existing situation: site plan, plan layout, functions, materials, etc.
- current energy consumption
- climate analysis of the area

2. Design:

- following the stepped strategy:
 - reduce
 - reuse
 - produce
- as a result of the combined theories

3. Evaluate:

- evaluate the proposed design, according to the 4 pillars of the study
- if needed, go a step back, rethink and reassess

References (by topic):

Adaptive Reuse:

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<https://popaganda.gr/stories/ti-simveni-sta-prosfigika/2/>

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Emmanuel, D. (2006). The social housing policy in Greece: The dimensions of an absence. *The Greek Review of Social Research*, 120, 3-35. doi: <https://doi.org/10.12681/grsr.9496>

Gkouvousi, S. (2012). *Public housing estates in Greece: potential and prospects of upgrading housing complexes of workers' housing organisation (WHO)*. Aristotle University Of Thessaloniki (AUTH).

Goudis, M. (2020). *Housing policy and the European state: the case of Greece*. University of the Aegean.

Hansson, G. & Lundgren, B. (2018). Defining Social Housing: A Discussion on the Suitable Criteria. *Housing, Theory and Society*. 36 (19), 1-18. <https://10.1080/14036096.2018.1459826>

Housing Europe (2021). *The State of Housing in the EU 2021*. Housing Europe, Greece

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Tsigkou, A. (2019). *Social housing in Greece as a product of the city's problems: Examination and cases for Athens*. Research Study. University of Patras.

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