

# 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](mailto: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	Floor Eerden
Student number	4598377

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Mo Smit	Architecture Tutor
Second mentor	Jos de Krieger	Research Tutor
Third mentor	Gilbert Koskamp	Building Technology Tutor
Argumentation of choice of the studio	<p>I chose this studio to challenge myself to think more technically. Furthermore, I think techniques within architecture can substantially help tackle environmental problems. In previous projects, my strong suit was conceptual programming and human design. I love designing public buildings because they provide a better opportunity to enhance social interaction than housing. Now, I want to focus on the things I am a bit less comfortable with. I want to challenge myself to become more detail-oriented and provide strong technical and scientific arguments for design choices. The chosen studio: 'Architectural Engineering', is the perfect studio to experiment, innovate and envision new ways of living and architectural practices</p>	

Graduation project	
Title of the graduation project	Green House: The spatial and environmental impact of growing food vertically in a co-housing complex in Amsterdam
Goal	
Location:	Meteorenweg, Oostzanerwerf, Amsterdam Noord
The posed problem,	<p>Current agriculture and consumer practices significantly affect the environment and our climate. Food production and consumption make up 26% of global greenhouse gas emissions. 31% of these food-related emissions are from livestock and fisheries. That even excludes the emissions from crops for animal feed and land use for cattle, which make up another 22%. Transportation and the supply chain are also significant problems within the food industry. They make up 18% of agricultural greenhouse gas emissions. Lastly, there is the problem of emissions caused by food waste. They make</p>

	<p>up 6% of global greenhouse gas emissions. Over half of the food is wasted during transport (Footprint Calculator - Measure Your Impact - Global Footprint Network, n.d.; Jeanneret et al., 2021; Ritchie &amp; Roser, 2020). Therefore, carbon emissions of transport, waste, meat consumption and land use need to be reduced.</p>
<p>research questions and</p>	<p>What types of urban farming techniques can provide a community of 200 people with enough food to be self-sustainable? This question is answered by first answering a couple of sub-questions:</p> <ul style="list-style-type: none"> <li>• What diet and how much food does a community of 200 people need to sustain themselves?</li> <li>• What types of urban farming techniques can be used, and how do these technologies work?</li> <li>• Which urban farming techniques best suit the selected crops.</li> <li>• What are the architectural implications of these crops produced with their selected urban farming technique?</li> <li>• What is the water use and the water use reduction of growing the crops on-site?</li> <li>• What is the reduction of space use and land use of growing crops on-site?</li> <li>• What are the CO<sub>2</sub> emission reductions expected by growing the crops on-site?</li> </ul> <p>While answering these questions, a complete program of requirements can be formed for the design phase in the MSc4.</p>
<p>Design assignment in which these result.</p>	<p>To design a mixed-use building that consists of an urban vertical farm integrated with a co-housing complex. Besides this, shared spaces like a kitchen, laundry and living room, and public spaces like a market, educational spaces and garden are added to provide the community with all that they need in daily life.</p>
<p>Overall, the Graduation process will exist of several phases. The first is to research the space, water, and energy required to provide a community of 200 people with food. From there, a program of requirements can be made for the design of this community. This program of requirements will consist of food production spaces, housing, shared and public spaces. With the Program of Requirements, the design phase will be started.</p>	
<p><b>Process</b></p>	
<p><b>Method description</b></p> <ul style="list-style-type: none"> <li>• Analysis of Carbon emission reduction of the proposed project</li> <li>• Calculation of the required water, energy and space for the vertical farm</li> <li>• Design research into integrating the two functions: vertical farming and housing. The proposal contains an educational function and a market to stimulate the connection and cooperation between the two main functions and the neighbourhood. Therefore, I will be researching the societal and educational impact of urban farming.</li> </ul>	

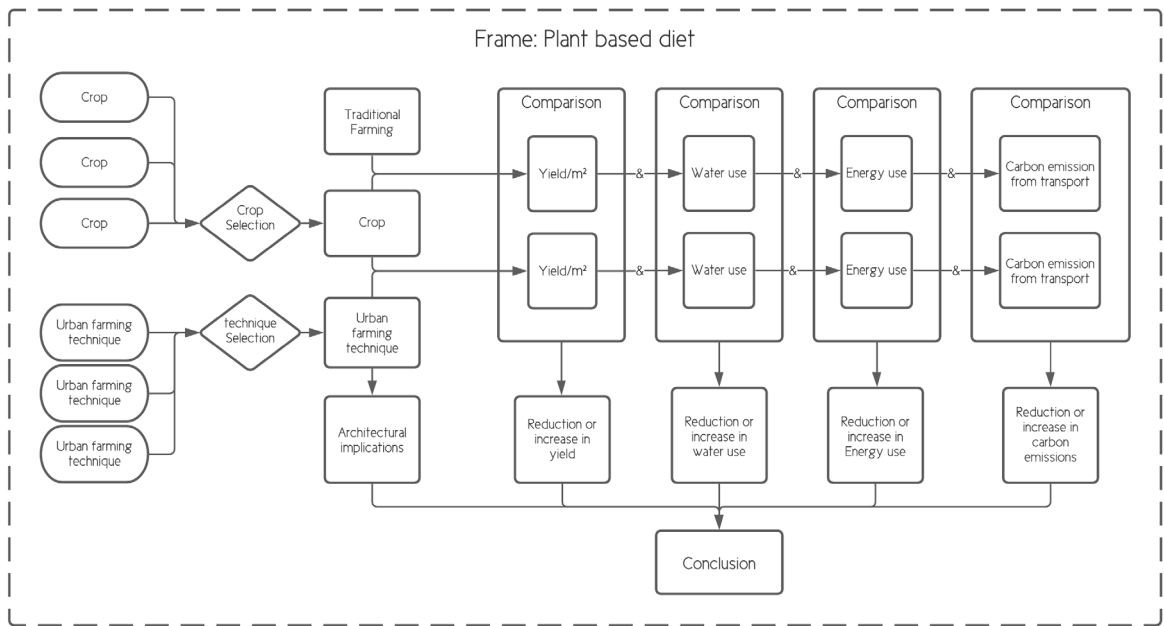


Figure 1: Thematic Research Method Diagram (own image)

Besides data on the water, energy and space use of the integration of urban farming into a housing community, the research eventually will also deliver a calculation model that works as follows:

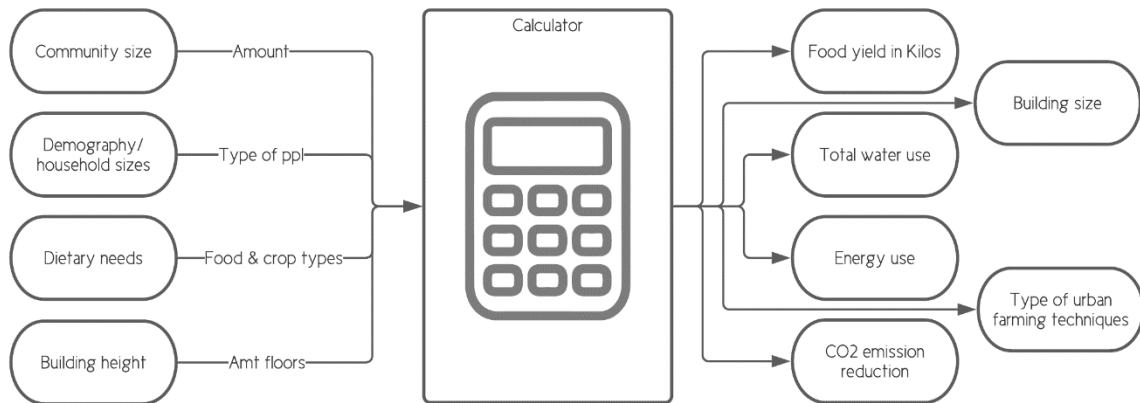


Figure 2: Community Resource use Calculator (own image)

This 'calculator' will serve both as a tool to be used in other architects' designs in the future and for the graduation studio design: Green-House.

After the more prominent thematic research, I will be doing case study analysis on the existing or planned co-housing communities, eco-villages, urban farming initiatives, and Collective Private Commissioning projects. Part of this will be ethnographic research, in which I will be interviewing people that are part of the initiative or design team.

## Literature and general practical preference

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## **Reflection**

1. The whole master programme AUBS has been focusing increasingly on sustainability within architecture and the built environment. That can present itself in many ways; changing lifestyle, material choice, circularity, ecological inclusivity, amongst other solutions. Lowering the footprint of a housing community by on-site food production could contribute to a more sustainable society. I chose the theme 'Flow' within the studio to be able to get more into the Food, Water, Energy nexus. That means researching the community's food, water, and energy demand and finding out how to provide them with this.
2. I think it is essential to look for ways to live more sustainably as a society. I will research in the field of architecture and agriculture. These fields can significantly contribute to a more ecologically inclusive world. Of course, it could happen that this proposed community will not quite work as it was intended. It could, for example, happen that not all habitants of the housing community eat plant-based, or they also want to buy processed foods such as pastries, bread, baked goods, snacks or soft drinks. That would mean the community still utilises external resources. However, even if half the community lives by the proposed values, the impact of such a community could be tremendous, especially when replicated. I recognise that it takes a lot more than a mixed-function building that attempts to change people's lifestyles by offering different food and education about food value. A considerable shift in our society about how we perceive food and consumption is needed to make this project work. This shift can be aided by providing a flexible design that can be changed over time, just as society is expected to do. Designing a community that is (almost) fully self-sufficient, shortened or eliminated the food supply chain by not relying on the import of food could significantly reduce greenhouse gas emissions and be an impactful solution to global warming. This community-building alone will not be enough. Society has to change as well. This graduation project is built on the premise that this change will come.