

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

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Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examenscommissie-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 | Elisa Pastorelli |
| Student number | 5152801 |

| Studio | | |
|---------------------------------------|---|--|
| Name / Theme | | Architectural Engineering/ Intecture, Harvest_BK |
| Main mentor | Roel van de Pas | Architectural Design |
| Second mentor | Jos de Krieger | Research |
| Argumentation of choice of the studio | The choice was based on the possibility the studio offered to explore a personal fascination which is the relationship between nature and technology. Post-animal agriculture is developing at great speed and artificial food is going to replace conventional food. I'm interested in speculating how architecture can define the new paradigm of 'human' farming, promoting environmental sustainable principles and technology democratisation. | |

| Graduation project | |
|---------------------------------|-----------------------------|
| Title of the graduation project | Floating Dairy Farm 2.0 |
| Goal | |
| Location: | Noorder IJpolder, Amsterdam |

The posed problem,

_Global:

People are eating too much meat and dairy. The United Nation's FAO trends show that the demand for animal-based food will disproportionately increase as population will reach 9.8 billion by 2050 (The future of food and agriculture, 2017). According to Bill Gates (How to avoid a climate disaster, 2021) as people get richer, they consume more calories and thus more meat and dairy. To reach the zero hunger sustainable goal, aiming to end hunger and all forms of malnutrition and achieve food security by 2030, we must intervene on our food production systems. This means investing in infrastructures and technology to boost the production yields while experimenting sustainable and resilient practices to reduce the environmental footprint all along the food chains. (SDG-2)

_Local: The Netherlands is a dairy country and has the highest livestock density in Europe. This brings numerous environmental issues connected with GHG emissions, water use and energy consumption but the main concern is the availability of land for agriculture practices. Currently the 53,3% of the Dutch surface (about 2 million ha) is destined to agricultural practices ([pbl.nl](#), 2020) of which 1.1 million ha, divided into grassland and maize fields, is employed for livestock practices (ZuivelNL, 2019). Considering population growth and that the surface of the Netherlands is gradually shrinking due to the rise in the sea level, innovative alternatives for a more sustainable dairy production are vital to solve this pressing societal issue.

| | |
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| <p>research questions and</p> | <p>Main research question:</p> <ol style="list-style-type: none"> 1. How cultured/cow-less milk technology might be disruptive for the built environment? <p>Sub-questions:</p> <ol style="list-style-type: none"> 2. What is cultured/cow-less milk technology? 3. How cultured/cow-less milk is produced? 4. What are the potential environmental and societal benefits of cultured/cow-less milk technology? 5. What are the benefits of replacing conventional milk with cultured/cow-less milk production in the Netherlands? 6. What are the material, energy and water flows of a hypothetical cultured/cow-less milk farm? |
| <p>design assignment in which these result.</p> | <p>_Floating Cultured/cow-less milk farm:</p> <p>The new paradigm of 'human farm' defines a new boundary between nature and technology. The project will speculate about this new relationship, integrating nature and technology with principles of sustainability and ecology on a floating structure.</p> <p>The floating cultured/cow-less milk farm will be a production pole (on a neighbourhood scale) but also an educational and social hub. The transition to cellular agriculture should promote the democratisation of technology being transparent and engaging the community to build a new food culture.</p> |
| <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

_ Literature review:

Studying scientific papers about cultured/cow-less technology to understand the process and the potential environmental and societal benefits.

_ Comparison and elaboration of data:

the data collected from the papers are applied to the Dutch context and a comparison between conventional dairy production and cow-less milk production is assessed to understand the environmental benefits of the new technology in terms of GHG emissions, energy consumption, water use and land use.

_ Flow analysis:

A flow analysis diagram is elaborated to understand the material, energy and water flows of an hypothetical cultured/cow-less milk farm. A second MFA poses the Noorder IJpolder as system boundary to understand how to integrate the natural resources available on the site in the design.

Literature and general practical preference

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10. Garnett T., 2011, Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)?, Food Policy 36 S23-S32, Elsevier, doi:10.1016/j.foodpol.2010.10.010
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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)?
2. What is the relevance of your graduation work in the larger social, professional and scientific framework.