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	TRISHITA CHATTERJEE
Student number	5108543

Studio		
Name / Theme		
Main mentor	Dr. Andy Jenkins	Climate design & Sustainability
Second mentor	Ir. Christien Jansen	Architectural Eng.+Technology
Argumentation of choice of the studio	Because of the close interlink between technology and sustainability for a greener outcome	

Graduation project	
Title of the graduation project	Urban Symbiotic Greenhouses
Goal	
Location:	Netherlands
The posed problem,	Coupling the synergetic performance of a greenhouse module that could utilize the building's waste energy flows with flexibility in its design and construction
research questions and	*How can modular symbiotic greenhouses be designed and integrated in buildings for an urban context, to utilize available waste resources in exchange for food production while reducing primary resources of the building, where possible?*
design assignment in which these result.	
To study, analyse and select different technologies which hold potential in achieving sustainable urban agriculture. These technologies will be applied to 3 different case studies for experimentation. To understand how organic waste flows from buildings can be utilized by small scale urban agriculture units for production of food and energy. And finally, To assess the general potential of urban production units in terms of building integration and compare the efficiency results of building with and without these units.	

Process

Method description

The problem statement points towards the fact that currently there are very few examples of urban agriculture that is in a symbiotic energy relationship with buildings. Furthermore, modularity of these units is not readily available either. This forms the basis of the methodology chosen, wherein research by design is implemented. The initial phase of the research starts by identifying the current scenarios and the problems arising out of it. This is a part of the literature review which will give an understanding of what needs to be solved. The next step is to formulate the objectives and propose a potential solution. A broad literature survey needs to be done before proposing this potential solution. The design guidelines formulated at the end of the literature study will help in designing the solution. The next step is to integrate this design into existing case studies. The case studies would be 3 different buildings which vary in scale, type, etc. Following are the types of buildings that will be studied:

1) Typical Dutch residential house
2) Office building in the Netherlands
3) High rise residential building in Netherlands

Standard values for such building configurations will be used. The last and final phase would be to assess and validate the performance of the proposed solution using a detailed excel data sheet and a SANKEY diagram. A further comparative analysis would be drawn between the building with and without the design solution and their respective performances. The research will end with a final evaluation of the entire process and reflection on the solution formulated.

Literature and general practical preference

The literature consists of various technologies currently available in the field of urban agriculture. Some real-world example projects will be studied alongside as reference. Since the topic involves quantifying data and analyzing it, government and other institutional standards will be referred to. Some of the reference links are as follows:

1) European Environment Agency (EEA), Climate Change Adaptation in the Agriculture Sector in Europe
2) Graamans, L., Baeza, E., van den Dobbelsteen, A., Tsafaras, I., & Stanghellini, C. (2018). Plant factories versus greenhouses: Comparison of resource use efficiency.
3) U.N. Environment Programme, Buildings and Climate Change
4) FAO – Food Security
5) CBS database, NL.

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)?

The topic of symbiotic Urban agriculture with a symbiotic approach is a link between food production and energy flows. It includes various technologies of production applied for farming integrated in the built environment. The chair for this topic is climate design and sustainability. Urban agriculture by itself is a method adapted to promote sustainability in urban settings by means of greening densely populated areas, local food production, community engagement, etc. Building Technology being the master track for the technical side of architecture, this topic includes innovative techniques for food production and energy conservation within building and farming.

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

Currently, the world is aiming towards a sustainable, clean future with less carbon emissions. Due to the increase in population, food demands and other environmental issues such as global warming, the need of the hour is to find sustainable alternatives to human needs. One such need is food, the demand of which is ever increasing. Presently, there happens to be various drawbacks in terms of food production and food security in this sector. With this project, the aim is to make this sector of agriculture as energy efficient and clean as possible with an aim to provide food for the coming generations.