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	Jurre de Zwart
Student number	4846729

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Mauro Parravicini	Designtutor
Second mentor	Pierre Jennen	Researchtutor
Argumentation of choice of the studio	A strong interest in (sustainable) materials, their properties and how these can be used to their full potential in the build environment, with the believe that a structure can be visually pleasing, creating interesting spaces, so that it doesn't have to be covered with secondary materials.	

Graduation project	
Title of the graduation project	New Farming An overview in the growth, production and implementation of biobased building materials in local architecture in the sub-alpine zone of the Western Italian Alps
Goal	
Location:	Pian della Regina, the sub-alpine zone of the Italian Western Alps
The posed problem,	The abandonment of alpine farms that form the basis of alpine towns, and with this the loss of alpine agriculture, by the competition with larger and more efficient farms in the lower lands.
research questions and	Below
design assignment in which these result.	Below

Research question:
How can the growth, production and implementation, in local architecture, of biobased materials support the preservation of the farming-towns at sub-alpine elevation in the Western Italian Alps?

Sub questions:
What biobased building materials can be grown in the sub-alpine zone, looking at the specific soil, local climate and height, and how can this have a positive influence on the local biodiversity?

What biobased building materials can be produced from the grown plants?

In what way can the locally grown biobased building materials be implemented in the architectural typology of the Western Alps?

The design question is:
How can the traditional farms of the town of Crissolo in the Italian Alps be revived throughout the principle of new farming and the implementation of biobased materials, while maintaining the cultural identity and ecological biodiversity?

The design-assignment is: the design of an alpine farm through the principle of 'new-farming' and with the use of the full process of biobased materials, as researched in the research paper. The goal of this is to create a building and a process that allows the alpine farming to be revitalized in our current day society, while still maintaining the values of it's historical identity. The principle of new farming looks into the combination in farms of both agricultural activities as well as education or tourism. The new export from agricultural activities (building materials rather than food) in a smart (building) combination with other activities will be the base for its revival.

Process

Method description

The research will be a life cycle assessment, focussing on crops that are able to grow and be used in the build environment in the Western Alps. The life cycle assessment can best be defined in the systemic approach into evaluating products or processes in their full begin to end. In the case of building materials this means from 'cradle to grave', from the planting of the crops till the disposal after use. The assessment identifies the used energy, and with this the materials and wasted, obtained from and put into the process, as seen in figure 1. The two main objectives of the assessment in general are to specify and rate the process' environmental performance to make a decision between options and to perceive possibilities of improvement of a product or process, being in both the full process or a part (Ding, 2014).

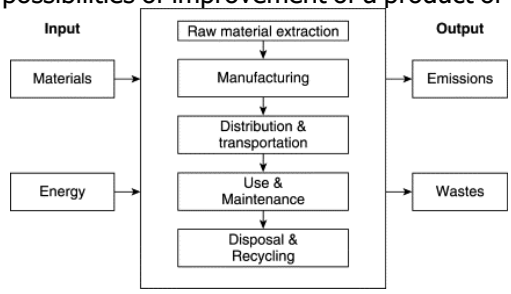

Fig. 1: Life Cycle Assessment (Ding, 2014)

The first two chapters will be a literature study on current knowledge. As the life cycle assessment is a way to structure the different influences, these first have to be gathered and identified in order to take a look at the full process. The first chapter looks into the growth of the materials, acknowledging the (positive) environmental impact these materials can have before they are being used as building materials. In his work, Robert Dodgshon analyses historical documents to identify the crops that used to be grown, the result of this work is the basis of this paper. Through analysis of the local (changing) environment and of the influence of farming on local biodiversity a framework is created for the process of farming biobased materials, taking into account both the export and environmental influence. This part has an influence on both the input (materials and energy) as well as the output, as the growth of plants has a negative emission sum.

The second chapter is also based on literature research, looking at the next step in the process: the creation of raw materials. For this the crops are organised into four groups, based on the fibre-type obtained from the materials. Using literature the accessory crops and their raw material products are being analysed on efficiency, workability and performance, focusing on the middle part of the LCA diagram. With this a conclusion is made on which materials are most suitable in creation of building systems.

Literature and general practical preference

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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)?*

The graduation topic looks into the use of newly found biobased building materials and their implementation into the build environment. With this research is being done on the creation and evolution of building systems into more widely used architecture by coming up with easy to use systems.
With the research a strong link is made between the use of materials from a more technical perspective, as well as the experience in construction as well as during use of the architecture. From my believe, the way we experience buildings is of large importance in the design of projects and should also be taken into account when choosing which materials are being used in construction. This gives a strong link in interests of a more experience based architecture and its technique (as being the focus of architectural engineering).

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

A research on the full process of biobased materials by using the LCA (Life Cycle Assessment) tool, from the growth of materials to their implementation in the build environment. The current status with biobased materials is that there is a lot of knowledge on the materials, though there is an extra step to be taken before it can be fully implemented on a large scale in our build environment. This research analyses the full process, but on a smaller scale, to function as an example.