Graduation Plan

Personal Information

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Studio

Name of studio: Architectural Engineering
Teachers: Annebregje Snijders(architecture)
          Jan Jongert(research)
Choice of the studio: The reason why I made the choice for the architectural engineering studio is that 1.I can get the freedom for deciding a subject. So I chose life-cycle as my research topic which I believe could be a trend in next few years and could be useful for work in the future. 2. To my opinion, technology is the basis of architecture. Any buildings could not be built without buildings technology. So I deeply believe that starting from engineering aspect to think a design may lead to generation of new building forms and make buildings better fit society and future.

Title:

F.E.E.L the west of Kerkrade.
F: Food  E: Energy  E: Entertainment  L: Landmark

Graduation Project

Problem statement

Parkstad area which is in the south of Netherlands is suffering shrinking from last century like other typical old energy-based cities after coal resources are used up. Many negative consequences of Parkstad are gradually exposed in social, energy and food, three aspects.

Social problem: shrinking population and vacant buildings, facilities. People started to move out of Parkstad area seeking more opportunities for jobs after mine factories were closed. It
caused less and less people living in Parkstad. As the population loss, buildings and utilities of Parkstad which used to serving local people are becoming vacant now. Why does my research respond to social problem? Because social problem is the main reason leading to Parkstad decline. So my research whose purpose is to active local area is unavoidable to face social problem.

Energy crisis problem which is not only existed in Parkstad area but also in the worldwide. Today most of energy in the world is provided by fossil fuels such as coal, oil and natural gas. These energy sources will be depleted in 50 – 80 years (Sergey S. Fedatsenka, 2014). At the same time, the combustion of these fossil fuels generates CO2, CO, SO2, particals... which pollute the environment badly.

Urban food supplied by rural area is a normal pattern in all the cities including Parkstad. Even though it is not a serious problem, but long distance transportation causes food cost increasing. If cities could supply food for their own citizens, it would be more economic efficient.

Objective

The objective is that I like my research not only focusing on seeking methods to active Parkstad but also contributing to energy and food problems. The next level of energy crisis and urban food supply pattern is that what kind of clean energy can replace limited fossil fuels and how to realize urban food self-supply. After the analysis of social, energy and food problems, my fascination is based on these topics, that mainly researches on 1. how to promote Parkstad? 2. How to use renewable energy? 3. How to close local lifecycle to realize food and energy self-supply in local area.

Overall design question

How to close local life-cycle using renewable technology to achieve local autarky and active vacant places in the west of Kerkrade?

Thematic Research Question

How to close food and energy cycles in the west of Kerkrade by introducing renewable technologies?

Sub-questions

Site research
1. Utilities analysis
1.1 What kinds of utilities are there in the site?
1.2 How are the existing stream flows?
Food flow, Energy flow, water flow...
1.3 How is the existing integrated flow in the site?
1.4 What kinds of companies are there in the site?

Renewable technology research
2.1 How many renewable technologies are there?
2.2 How to evaluate each renewable technology?
2.3 How to set up comparison criterias of each renewable technology?
2.4 How to choose the most suitable technology for the site to close life cycle?

Conclusion
3.1 How to close life-cycle in the site?
3.2 What’s the final closed flows in the site?
3.3 Are there any guidance for design that the research could provide?

Design
4.1 What’s the function of my design?
4.2 What’s the location of my design?
4.3 Are there any restriction of my design according to site analysis?

Methodologies

Literature
Books and scientific articles. I will start to understand life cycle process and learn about current state of self-supporting techniques. I will mainly focus on energy performance by reading references. Some books can give a clear guidance of how to integrate techniques into buildings achieving life-cycle. I can also get accurate datas of how many energy, food, water... which are important for a sustainable building.

Site visit
visit Parkstad area to find a suitable vacant building to renovate and also collect information of the site

Case studies
Sustainable buildings, green buildings, old building renovation, urban farms. Sometimes literature is obscure, not as clear as examples. There are not so many examples about the whole process of life-cycle. But after I divided the topic into sub-questions, there are many examples for me to study on energy flow, food flow, water flow...These examples could help me find a solution fit my design concept and research question.

Research by design
sketching, models and computer modelling. I will find out the most reasonable solutions for cavant buidings during the process of doing some sketches or making models. Some detailed technical questions will also be explored as the design progressed.
Plan
See Appendix

Relevance
Look at our increasingly worse living environment, buildings consume too much resources but still can't provide a comfortable space for people. It is the time for us having a responsibility to think about how to achieve energy neutral, CO2 neutral in order to reduce environmental pollution when we start to design a comfortable building.

With the rapid development of the city, there will be more vacant buildings. How to renovate them to meet modern society requires is a hot topic worth researching on.

The two problems are reflected in Parkstad area. How to active the declined region keeping building's identity at the same time achieve building life-cycle reducing impacting the environment becomes a valuable research question. The project is not a specific case, it has a universal meaning. The information of research can be reused in other locations.

Literature
Books:

Dejan Mumovic and Mat Santamouris, (2009), A Handbook of Sustainable Building Design & Engineering, MPG Books Ltd, Bodmin,


Michael Bauer, Peter Mösle and Michael Schwarz, (2007), Green Building – Guidebook for Sustainable Architecture,


Hassell, Cath; Coombes, Ben, (2007), Green Roofs - CIBSE Knowledge Series: KS11, CIBSE,

Alejandro Bahamon, Patricia Perez, (2006), Inspired by Nature Plants, Parramon Ediciones, S.A., Barcelona, Spain,

Research theses

Sergey S. Fedatsenka, Feasibility of CO2 neutral, energy producing mixed use building in Gothenburg, Sweden: design study
Marco van der Valk, How to design a food producing building within the abundance of knowledge fields for the architect?

Tom Armour, Chris Luebkeman, Josef Hargrave, (2014), cities alive,

Daan van Leeuwen, Transformable architecture in relation to the climate of a building,

X. Picot, Thermal comfort in urban spaces: impact of vegetation growth,

Abdeen Mustafa Omer, Energy, environment and sustainable development,

Case studies


Hassell, Cath; Coombes, Ben, (2007), Green Roofs - CIBSE Knowledge Series: KS11, CIBSE,

Alejandro Bahamon, Patricia Perez, (2006), Inspired by Nature Plants, Parramon Ediciones, S.A., Barcelona, Spain,
### MSC3

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#### Writing
- fascination
- graduation plan
- graduation paper

#### Research
- literature
- site
- case study

#### Design
- concept
- sketch design

#### Present.
- Preparation
- Reflection

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### MSC4

| Calendar Week | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Course Week   | Break | 3.1 | 3.2 | 3.3 | 3.4 | 3.5 | 3.6 | 3.7 | 3.8 | 3.9 | 3.10 | 4.1 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 | 4.7 | 4.8 | 4.9 | 4.10 | 4.11 |

#### Research
- case study

#### Design
- sketch design
- building design
- structure design
- technique/details

#### Present.
- Preparation
- Reflection