Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

The graduation plan consists of at least the following data/segments:

Personal information	
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Studio	
Name / Theme	Urbanism, Urban Metabolism
Teachers / tutors	N. Tillie, K. Aalbers
Argumentation of choice of the studio	The energy transition can be seen as a new challenge for the 21st century in which we will have to coop with a lot of new urban topics like for example global warming, growing population in cities and new social structures

Graduation project	
Title of the graduation project	Empower the energy landscape of Friesland
Goal	
Location:	Trynwalden, Friesland, Netherlands
The posed problem,	There is not enough knowledge on the spatial impact and strategy of the energy transition and it slows down the transition towards a society that can fully rely on renewable energy resources. In order to ensure a successful transition, technological innovations should be linked to social innovations and spatial design.
research questions and	*"What is an effective strategy for villages and its rural surroundings in Friesland to make an energy neutral design and improve the spatial quality?"* Sub-questions (divided into themes): 1. What is an effective strategy? • What processes and actors play a role in energy projects in Friesland? • What local initiatives are there and how do they (dis)connect? • What is the role of an urbanist in this energy transitions process? 2. What does energy neutral mean? • What are the sustainability ambitions of Friesland by 2050 on the field of energy use? • Trias energetica: how to save energy, make renewable energy, make responsible use of fossil fuels? > vs. Nieuwe Stappenstrategie?

	• What are the spatial dimensions of different sustainable energy sources? • What is the impact of different sustai nable energy sources on spatial quality? 3. What is spatial quality? • What are the present spatial qualities of the Frisian agricultural site? • What does its history/morphology look like? • How can spatial quality be measured? • How can the energy transition bring new spatial qualities? In what way can renewable energy resources be integrated in the urban and rural site of Friesland?
design assignment in which these result.	**design goal** For this project the design goal consists of three different scenario's for the Trynwalden, a rural area close to Leeuwarden. The three designs will represent spatial design for the energy goals of Friesland. So the first design is the scenario for 2020, 16% renewable energy. The second scenario for 2025 in which 25% of the energy demand has to be generated by renewable sources. And finally the 2050 scenario in which the area is independent from fossil fuels. The scenarios together form one design. So the 2020 scenario is used as a base for the next scenario.

The research purpose of this thesis is to make the impact of energy transition for Friesland visible in a spatial design and together with that enhancing the spatial quality of the urban and rural landscape. This will be done through the five-step approach by Stremke (this will be further explained in the methodology part) and together with that the strategy part including a closer look upon bottom-up and top-down plans will be a major subject. Besides the design there will be thought of a strategy to connect the local initiatives together and bring to a higher purpose. This will enable a more grounded vision upon the energy ambitions of Friesland, which will be seen as a guiding strategic goal. For both these two aspects scenarios over different time periods can help to bring the project more feasible futures.

Process

Method description

Strategy research

In the strategic part of this research will be focussed on the process to get to the goals. How can the goal for 2050 be realised and what does it mean for the near- and far-future. How does the energy transition have an effect on social structures and how can the process be designed in order to speed up the transition.

Energy research

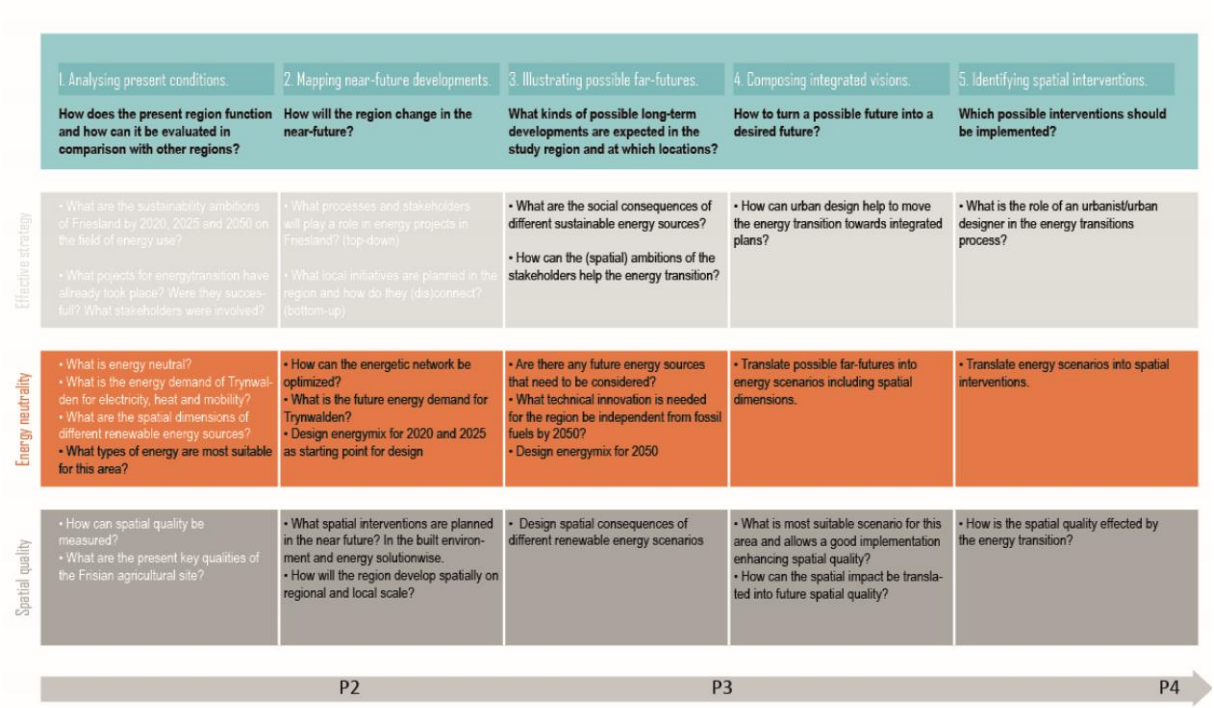
In the energy research will be focusses on the implementation of technical innovation of energy systems in the build environment. What does energy neutrality mean and what sources of renewable energy are suitable for the specific area.

In the Netherlands, in the context of sustainable energy and heat often the Trias Energetica is used as a guiding principle. In consists of three steps: 1. Limit the demand, 2. Use renewable sources and 3. Make efficient use of fossil resources. In the REAP method the trias becomes expanded with an additional step namely the step of introducing the reuse of waste streams (Tillie et al., 2009). This strategy is called the “Nieuwe Stappen Strategie” (NSS). See the appendix for the whole scheme. On different scales, building, neighbourhood/district, and city/region different actions are described how to go to a more sustainable energy system by the four steps of the NSS. A closer look on the REAP method will be one of the subjects of the energy research.

Design research

The book of Stremke and van den Dobbelsteen (2012) explains how the five-step approach is a useful method for sustainable energy landscape design. The five-step approach can be employed to compose long-term visions such as for the development of sustainable energy landscapes. To put together imaginative but realistic long-term visions, (Healey, 2009), we argue that the current projected trends, critical uncertainties, and the intended change must be integrated into the design process. Each of these three modes of change give rise to the steps in this five-step approach. The steps are as follows:

1. Analysing present conditions.
2. Mapping near-future developments.
3. Illustrating possible far-futures.
4. Composing integrated visions.
5. Identifying spatial interventions.



Literature and general practical preference

The research will be based on the following methods:
REAP and the Nieuwe Stappen Strategie
Five-step approach to the design of sustainable energy landscapes
As guiding goals for the energy transition the goals of the Province of Friesland will be taken as a starting point.

The thesis is partly done as a part-time internship at the Province of Friesland. In this internship I want to learn how practice and policy can work together in spatial plans for the energy transition.

Reflection

Relevance

Social relevance

The project aims to come to spatial solutions for the energy transition in Friesland. Questions to be answered are for example: what can de Province do to achieve the goals on renewable energy set by the European Union? By doing research on how the spatial impact of energy transition can look like, the product can be used as an example to show a possible future. To inspire or to make people think of even better ideas. By including the (interactive) process towards a growing percentage of renewable energy it is relevant for all the stakeholders, so including the inhabitants and so society.

Speeding up the transition requires a smart combination of bottom-up and top-down control. This re-orientation of government policy is needed; guidance which connects to this phase of the transition in which we are still seeking for the best solutions to fit. Nowadays, for example, huge discussions about "horizon pollution" by windmills cause a lot of resistance. People are aware of this new sustainability projects but won't participate when there's nothing in it for them. Therefore this research aims to get an understanding on how to include the different stakeholders in this process and to see what can be in it for them.

Scientific relevance

The energy transition can be seen as a new challenge for the 21st century in which we will have to coop with a lot of new urban topics like for example global warming, growing population in cities and new social structures. With the growing concern of climate change and atmospheric pollution, the use of the urban metabolism model has become an important element in determining and maintaining levels of sustainability (and health) in urban regions and cities. Urban metabolism provides a unified and integrated view of all activities of the city in one single model. Within Urban Metabolism the different flows within cities and regions like food, heat, waste and energy are investigated. In this field the energy transition is an interesting topic since designing with these new renewable energy sources brings new possibilities and chances but also challenges for the (mainly) well appreciated current built environment and landscape. "The changing relation between energy and space, in the context of energy transition, has not yet been extensively discussed" (Sijmons, 2014). The implementation of new energy sources needs a lot of new understanding of the flows in the current and future design of urban areas. Especially since the renewable energy will bring new spatial elements, land use and a new scale which has to be integrated in the existing landscape and built environment.

Time planning

January	Week 4	Spatial dimensions sun / bio energy / geothermal energy Investigate energy storage possibilities / dimensions ***analysis***	1. Analysing present conditions.
February		Calculate possible energy reduction in built environment Investigate energy waste streams in Trynwalden ***analysis, mapping*** Calculate possible energy mixes for scenarios (2020, 2025 and 2050) What are posibilities for energy neutral mobility? Trynergie: spatial ambitions for scenarios, ***interview*** Near future design 2020, ***mapping*** Possible far future design 2050. What are the social consequen ces of different sustainable energy sources? ***analysis***	2. Mapping near-future developments. 3. Illustrating possible far-futures.
March **P3** period	Week 9	Are there any future energy sources that need to be consider red? ***analysis***	
	Week 10	Visualisation of design scenario 2020 Visualization of design scenario 2025 Visualization of design scenario 2050 Check design scenario's with current spatial qualities	4. Composing integrated visions. 5. Identifying spatial interventions.
April		Integrated vision for scenarios for Trynwalden towards 100% renewable in 2050 What is the role of an urbanist/urban designer in the energy transitions process? Investigate the feasibility of the designed plans How is the spatial quality effected by the energy transition in the far future in case of Trynwalden?	
May		Preparations for P4 Final conclusions for the thesis	
P4 period	Week 19		
	Week 20	Final adjustments Preparations for final presentation.	
June			