Graduation Plan

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Name of studio
Architectural Engineering

Design mentor
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Research mentor
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Title
The Circular Textile Factory

Why choose this studio?
The aspect of aE Intecture that interests me the most is the 'flow' research method. Instead of seeing contexts as a collection of separated physical forms such as buildings, parks, and streets; this research method allows us to understand the city (or any other context) in a totally different way - as a system of flows. I believe that this method of research also allows us to create designs that solves problems in a more systematic (instead of formal) way.

Problem statement

1. Industrialization of peri-urban Kampungs
The project site, Cigondewah, is a typical example of a peri-urban industrial Kampung in Bandung, Indonesia. When looking at how the Kampung of Cigondewah has transformed over the past 100 years, it becomes obvious that the major changes in the Kampung have been brought about by industrialization and the introduction of textile factories into the area. Although factories improve the economy of the area, Kampung residents directly suffer from the environmental effects of the textile factories. The environmental effects can be categorized into two parts:

1. 1. Pollution - Because of lack of policies, factories often dump industrial waste directly into the river water, including waste water containing heavy metals and textile dyes. This directly affects the health and safety of Kampung residents, as they use the river as a source for washing and drinking water.

1. 2. Resource depletion - Textile factories aggressively deplete the resources from its surroundings. In Cigondewah, the water table has been lowered, and agricultural land (as well as other green spaces) have been diminished.

2. Lack of infrastructure in the Kampung
There is a lack of infrastructure provided for the residents of Kampung Cigondewah. Drinking water is either provided by the municipality in water tanks, or water is collected from drinking wells, which provides no insurance for water quality. There is also no sewage system in the Kampung, so human and household waste in dumped directly into the water without filtration, further polluting the river.
3. An unprecedented potential:
Sustainability initiatives of large clothing companies

Large clothing companies from developed countries, such as C&A, have recently started initiatives to explore more sustainable alternatives to the manufacturing of clothing. Not only does this improve the environment, it also gives a positive image to the clothing company. Although some may call this 'green washing', I think it presents an unprecedented opportunity to take advantage of the huge capital of textile factories to not only minimize the negative impacts of the factory on the surrounding environment, but to also provide infrastructure that benefits the local residents.

The idea of a factory that benefits instead of harms the environment and its workers is not new. Shortly after the industrial revolution, factory owners such as Titus Salt and Cadbury decided that it was unethical that their workers lived in squalid conditions with no access to good infrastructure. This resulted in factory owners designing and providing villages for their workers that included good housing and infrastructure. In the past, these factory owners' ethical standards were driven by their religious beliefs. Today, it is possible that ethical standards could be revived by the reality of climate change, and the desire to use sustainability as a advertisement campaign.

Objective
The objective of this project is to re-design the vertically-integrated textile and garment factory in the north of Kampung Cigondewah, PT Kahatex. The purpose of the design project is to propose an alternative, sustainable, and circular future of the textile company. The research and design of this project will focus on the flows of energy, and water in the factory and the Kampung, and the aim is to discover and explore ways of organizing these flows in a way that allows the factory and the Kampung to benefit each other. This can be achieved in two ways: the first way is to adjust the flows to ensure minimal (or zero) negative impact on the surrounding environment. This will involve dealing with waste, such as waste water, and treating it in order to turn it into a useful resource, such as clean drinking water. The second way is to provide infrastructure that benefits both the factory and the Kampung.

It is important to emphasize that this project will take an architectural approach, rather than the approach of a textile engineer. This means I will focus on the spatial impacts of the flows examined (water, energy). For example, what are the spaces required for harvesting water and solar energy? Or filtration of waste water? And is it possible that these spaces could also improve the working environment of the textile factory workers, as well as the living environment of the residents next door?

Overall design question
How to redesign PT Kahatex, a vertically-integrated textile factory in Cigondewah, Bandung, Indonesia, into a sustainable factory that minimizes negative impact on the surrounding environment, and allows for the factory and the Kampung to benefit from each other?

Thematic research focus
Main question:
Can a decentralized, circular system be used to provide energy and water to a industrial peri-urban neighborhood of 26,000 people in Bandung, Indonesia?

Sub-questions:
what are the environmental potentials of the site?
what are the decentralized technologies available to harness these potentials?
what are the spatial and architectural impacts of these technologies?

The purpose of the thematic research focus is to determine to what extent it is possible to provide and
water and energy system in a decentralized manner, using resources found within the neighbourhood.

Research method and outcome
1. Map of existing flows of water and energy
   **IN:** what is the source of water and energy for Cigondewah?
   **USE:** how are these flows transformed by the factory and the Kampung in Cigondewah?
   **OUT:** in what state do these flows leave Cigondewah? how much of these flows can be considered
   ‘waste’, and how much can be considered as a ‘renewable resource’?

2. Proposed facilities for the area
   After determining the flows for the area, the research paper will propose facilities that can be added to
   the area to allow for decentralized alternatives to the source, usage, and disposal of water and energy in
   the area. In order to propose suitable facilities, potential water, energy, and land resources within a one
   kilometer radius will be considered.

Relevance
In a context where large textile and clothing companies are now interested in becoming more
sustainable, this project will try to provide a tangible solution to this desire to create a better
environment in peri-urban industrial areas. The project's design would also like to explore how the
requirement for a more sustainable factory could potentially improve the atmospheric quality of the
factory, improving the working environment factory workers. Hopefully, the methods of research and
design that I will develop for this project could also be applicable to other industrial peri-urban contexts
around the world.

Bibliography

**Context - Bandung**


**Existing Textile Industry**


**Wastewater Discharge Trend Report.** (2016).


**Sustainability in textile manufacturing**


PaCT. (2014). *Case study - On the pathway to sustainability, Tarasima Apparels Ltd.*


PaCT. (2014). *Case study - Caustic Recovery Plant, Zaber and Zubair Fabrics Ltd.*


**Technical knowledge**


## Schedule

### MSc 3

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**Research**
- Flow map:
  - Data collection
  - Map drawing
- Future scenarios:
  - Data collection
  - Scenario creation
- Bandung Fieldtrip

**Deadlines**
- Graduation Plan
- P1 Presentation
- Research Paper
- P2 Presentation

**Other courses**
- Research methods

### MSc 4

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**Research**
- Scenario creation

**Design**
- Design
  - Drawings/models

**Deadlines**
- P4
- P5