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

<table>
<thead>
<tr>
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<tbody>
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### Studio

<table>
<thead>
<tr>
<th>Name / Theme</th>
<th>History &amp; Heritage vector</th>
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<tbody>
<tr>
<td>Teachers / tutors</td>
<td>First mentor: Ir. Teake Bouma</td>
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<td></td>
<td>Second mentor: Ir. Gerdy Verschuure-Stuip</td>
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**Argumentation of choice of the studio**

[Image of a diagram titled "Sustainable Community Development" with four pillars: Economic Prosperity, Cultural Vitality, Social Equity, Environmental Sustainability.]


We always learned about the three pillars of sustainability; profit, people and planet. I really believe that our culture and our history is also a way of sustainability and that preservation and transformation is a way to maintain our culture and our history. I also love to tell the story of a certain project or site, in this studio the focus is on telling the story and the history of the object that you are working with. I love to dig deeper into the real story behind these objects and what makes heritage, heritage and why people love to be around these kind of sites or areas.
<table>
<thead>
<tr>
<th>Graduation project</th>
<th>The Future Oilscape – The Transformation of the Oil Industry Area of Pernis in the Harbour of Rotterdam</th>
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<tbody>
<tr>
<td><strong>Title of the graduation project</strong></td>
<td>The Future Oilscape – The Transformation of the Oil Industry Area of Pernis in the Harbour of Rotterdam</td>
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<tr>
<td><strong>Goal</strong></td>
<td><strong>Location:</strong> Pernis industrial area, Harbour of Rotterdam, The Netherlands</td>
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<td>The posed problem</td>
<td>The Pernis industry area is the first big oil expansion in 1929. It was the first large step into the future of oil and the promising future of the harbour of Rotterdam. However, nowadays the oil area is decreasing and its production will, according to several sources, become 1/3 of what it is now in a couple of decades and in the future maybe even disappear. A lot of big structures in the landscape will remain and remind us about oil and cannot be forgotten or demolished because they can be of value for people.</td>
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<tr>
<td>Related problem which requires new developments and transformation of the area: The pollution caused by the oil industry plays a role in the new developments and a cleaner future. The Pernis industrial area has the most polluted soil of the harbour and causes light, smell and noise pollution for the surrounding residential areas.</td>
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<tr>
<td>research questions</td>
<td>How can we transform the Pernis industry area into a new function while maintaining the physical elements of the past oil industry?</td>
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<td>To be able to answer the main research question, a series of more specific questions should be answered first.</td>
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<tr>
<td></td>
<td>1. How did the harbour of Rotterdam develop?</td>
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<td>2. How did the Pernis industrial area develop?</td>
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<td></td>
<td>3. In what way is the area of Pernis polluted and polluting?</td>
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<td></td>
<td>4. How is the current energy transition developing?</td>
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<td></td>
<td>5. What physical elements are there, reminding us about oil and how can we use this?</td>
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<td></td>
<td>6. What are the possibilities for a new function (and what is needed)?</td>
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<td>design assignment in which these results.</td>
<td>In the end of this project, I would like to relate back to the fact that the energy transition is and will be a worldwide problem and the fact that there are a lot of similar sites to Pernis. Through the design experiment, where I will make one masterplan for the whole Pernis industry area and work out two parts of the whole masterplan, which depends on the new functions, I would like to develop several design principles that can be used for future developments of similar sites.</td>
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In the scheme in the illustration above is shown how this project is structured. The project is divided into a theoretical and a practical research. The outcome of these two researches will help formulate a design experiment. This design experiment will concentrate on the possibilities of a new function for the Pernis industry area. This design experiment will eventually lead to design principles which can be used in similar sites, since the energy transition will become a worldwide problem.

In analysing, a lot of methods are used to answer raised questions. In the following chapter, there will be an explanation on how and in what way certain methods of analysing will help answer the sub research questions mentioned in the previous chapter. To answer the main research question, the
design experiment is needed. In this way, a conclusion is drawn on the possibilities for future developments and transformation of the Pernis industry area.

1. How did the harbour of Rotterdam develop?
By analysing how this structure developed and what kind of conditions where already there that made the Port of Rotterdam one of the most important ports in the world, an understanding on how certain structures where developed in certain periods can be developed. In this, it is important to know why the harbour grew the way it did. Conditions of the past are necessary for understanding the possibilities for the future.

2. How did the Pernis industry area develop?
By analysing the historical structures of the landscape laying underneath the industrial structures of Pernis, conclusions can be drawn on how current structures have developed in the development of the industry.

3. In what way is the area of Pernis polluted and polluting?
The answer to this question can be found in the method of mapping. A lot of maps are available to analyse the conditions area. Soil pollution maps are a start to question how unhealthy or damaging the pollution is and what kind of interventions are needed for certain new functions. Industries cause a lot of pollution, not only through the products they produce, but also by the noise the production methods make and the smell it releases. These impacts have a big influence on the surrounding residential areas. Through development and transformation of the Pernis industry area most of these problems will be solved, if the right transformation is used.

4. How is the current energy transition developing?
This sub research question will be addressed in the theory paper. The aim of the theory paper is to analyse in what way industrial heritage is important and of value for people and how it can be used in future developments. The question of what industrial heritage actually is and how people appreciate it, is of great value to answer this sub question. Heritage gives people something which they all have in common, the past. Even though they appreciate or like it or not.

5. What physical elements are there, reminding us about oil and how can we use this?
The answer to this question can be found in the method of mapping. The big structures, such as tank terminals, pipelines and quay are visible on maps and from the air in google Earth for example. In this analysis, a search for clear and recognizable structures on a map is important, but also if the structure is visible on street level. The (human)scale of such structures is very important to know for the future transformation and function possibilities. Through mapping I will get a clear vision on how the Port of Rotterdam is structured.
6. What are the possibilities for a new function (and what is needed)?

The answer to this question can be found through case studies and vision reports of different stakeholders. There are already examples of abandoned industry areas which are transformed into several other functions, such as residential areas (Strijp-S, Eindhoven), parks (Emscher Park, Germany) and even theme parks (Wunderland, Kalkar). By analysing these cases I can find out what is possible with these areas. But these are just functional transformations. By mapping of the area, I can find out if these functional transformations are even possible (regulations, pollution and so on) or what should change to make this possible.

**Literature and general practical preference**

![Diagram of Hubbert's Peak Oil Theory]

**HUBBERT THEORY**

In 1956, Hubbert already said that no finite resource can sustain for longer than a brief period such a rate of growth of production. The curve in the figure shows the method of this prediction. According to Hubbert, any finite resource follows a bells shaped curve in its production. (Towler, 2014) This means that the production will eventually decrease the same way that it made its way up. Eventually in this sentence means that the peak rate and the timing depends on the total reserves that still exist and the reserves are to be discovered. (Towler, 2014) The same curve is visible in the other figures on the left. If we compare the three lower figures, it is striking to see that, even if they were made in 1969, 2011 and 2014, all three of them predict the same. In the year 2035 the oil production will be almost 1/3 of what it is now. Of course there are oil fields yet to discover and develop, which is also shown in figure 4 and 5. But the world will rapidly change within 20 to 30 years from now.


Related sources:
PRESERVATION BY RE-USE

Many sources say that re-use of industrial sites is the best solution to preserve the objects that are of value. (Douet, 2012) Protection could only be achieved by transformation and finding a new destination for these sites. (Janssen et al., 2013) But there are of course many ways to re-use a site. It is important to realise what the designer is dealing with. Re-use has the role of extending the existence of an object, as well as putting it to its best use. (Florentina-Cristina, George-Laurentiu, Andreea-Loreta, & Constantin, 2013) Opportunities for re-use must be recognised in a way that it highlights the architecture, economic usefulness and culture. (Florentina-Cristina et al., 2013) The historical objects of the industrial past must be treated with respect towards its original structures. Evaluating the capacity of the industrial objects must come before the choice of the new function and making radical changes or adjustments. (Romeo, Morezzi, & Rudiero, 2015) Carefully thinking about the new functions and transformations is important to respect the former structures of the industrial site and preserve it in its best way.


Related sources ‘Importance of Heritage Preservation’:

Reflection

Relevance

Social relevance:

According to some sources we know that at the end of the twenty-first century there is almost no oil production left in the world. In this time, every single person grew up within the era of oil, where almost every product was produced with or transported with oil. At some point the use and consumption of oil becomes much less, but a lot of physical elements will be still there. The big industrial areas that we all know must transform into something else.

According to Carola Hein (2016) there are five different physical impacts of oil on society shown in the illustration above:
- Industrial
- Retail
- Administrative
- Ancillary
- General infrastructure
The industrial footprint of the oil industry consists of storage, transformation and transportation. These structures are huge in both investment and size, and are clearly visible from the air. The retail business consists of the gas stations that are spread all over the world along road infrastructures. The gas stations form a more flexible element in the landscape of oil. The third impact on society are the headquarters and research centres of the oil industry, the administrative impact. (Hein, 2015) The ancillary and the general infrastructure consists of the build structures to support the three impacts mentioned before, such as tunnels, airports, motor/railways, but also housing and public buildings.

The industry of oil has a huge impact on our lives. The impacts mentioned before are just the clear physical impacts, such as visible structures. But there are also mental impacts, also called mindscapes. As Franco Bianchini stated in 2006, mindscape is something which exists between the physical landscape and people visual and cultural perception of it (Hein, 2015). Changing the mindscape of people is the first thing to do if we want to be free of the fossil fuel landscapes.

Scientific relevance

In the history of oil, there has already been a lot of literature about the use, consumption, war, and all the aspects of this era. But also, literature about predictions on when this oil production comes to an end. There is a limited stock of oil left in the world and at a certain point we have to use other materials for our products and fuels. Fossil fuels of coal, oil and natural gas are called non-renewable energy resources. The energy from these sources is an isolated energy potential. To initiate the supply of energy for practical purposes, external action is required. (Twidell & Weir, 2015) It is widely recognized that renewable energy supplies, such as solar radiation, wind, biomass, tides, geothermal heat, and other continuing resources, are necessary for security, sustainability and standard of living. (Twidell & Weir, 2015) The future is renewable energy and the industry of the fossil fuels will someday become much less or even disappear, but will still be remembered as an era of great influence. In the literature, there is a lot been written about the future, but there is almost no literature about what to do with the remains of this influential era. With this project, I am trying to find a solution for this future problem.

Time planning

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<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
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<tbody>
<tr>
<td>problem analysis</td>
<td>theoretical research</td>
<td>practical research</td>
<td>case study</td>
<td>design solutions</td>
<td>completion</td>
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