

# ENERGY ACADEMY

| POWER TO THE PEOPLE |



Complex Projects

AMS Mid-city Studio

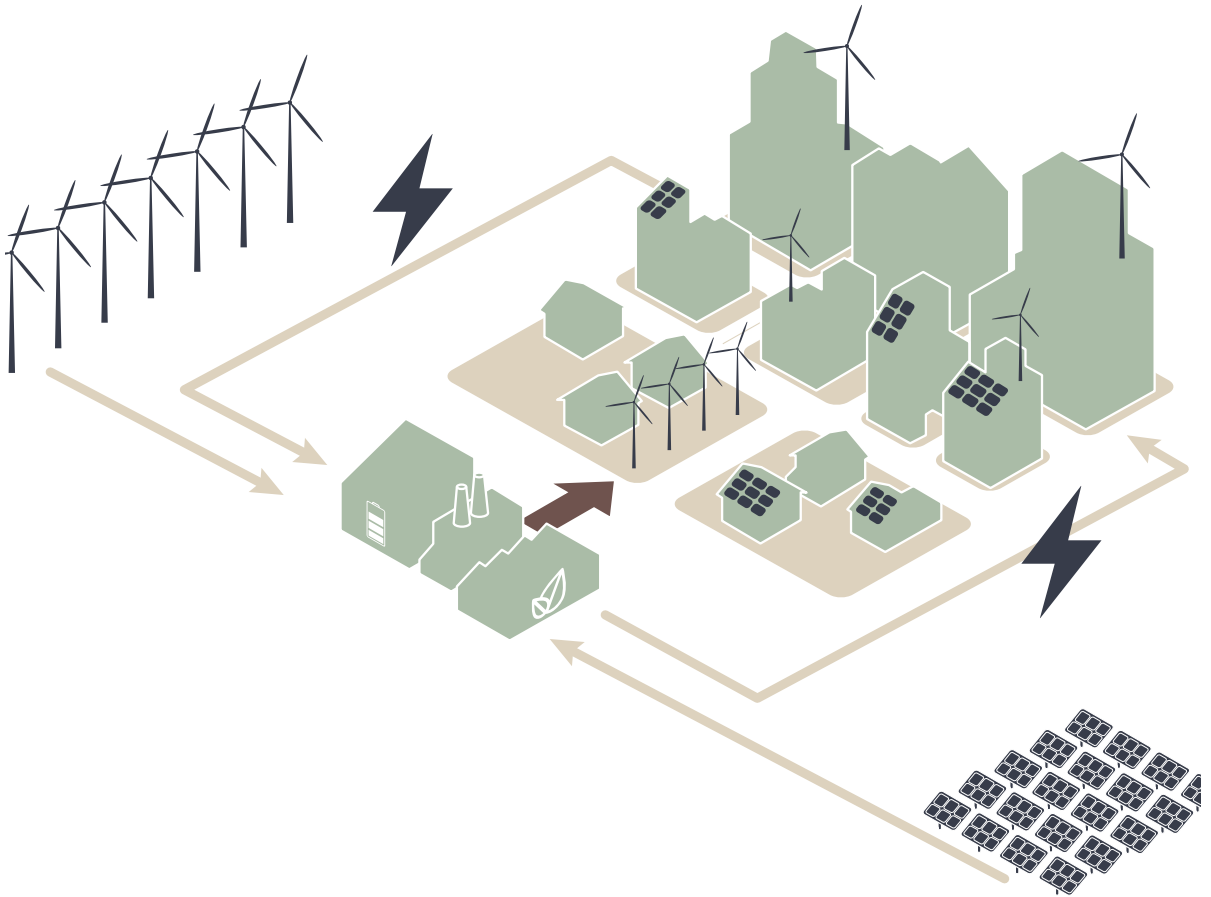
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## **Project description**

The world is facing a great challenge with the transition from conventional fossil fuelled energy towards renewable and clean energy sources. The demand for reliable and affordable sources of energy are already a prominent aspect of our contemporary society and remain if not increase in importance in the future. The city of Amsterdam realises this and looks for ways to reduce their dependency on fossil fuels. Their vision for the future is to become a circular city which produces most of its own resources while providing its inhabitants with a healthy and liveable environment. The posed question thus is how Amsterdam can provide its citizens with a clean, reliable and affordable source of energy, while creating an added value in economic, social and environmental aspect?



With developments in solar, wind and other renewable sources of energy, local energy production seems very possible. Renewable sources of energy however pose a big problem, the problem of variability and intermittency, which means that power is not constant and not proportionate with demand. I propose a power to ammonia facility, which transforms energy to ammonia to be stored and redistributed when necessary. This method provides a means to store energy in an easier way than electricity. Our current view on energy production is mostly negative, one of pollution, exclusion and large infrastructures. In order to implement new clean power facilities in the city a transformation has to be made from the conventional negative plant, to a positive, inclusive facility.

The main goal of the project is to provide Amsterdam with an energy facility which can store and manage sustainable sources of energy and let communities reconnect and be educated about their energy supply, while providing the community with an attractive place to meet.

## **The relationship between research and design**

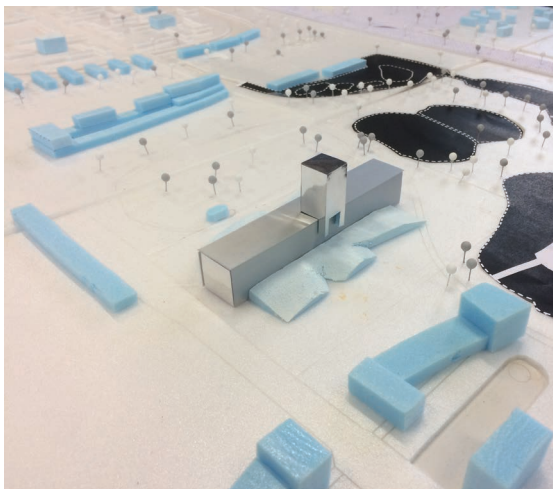
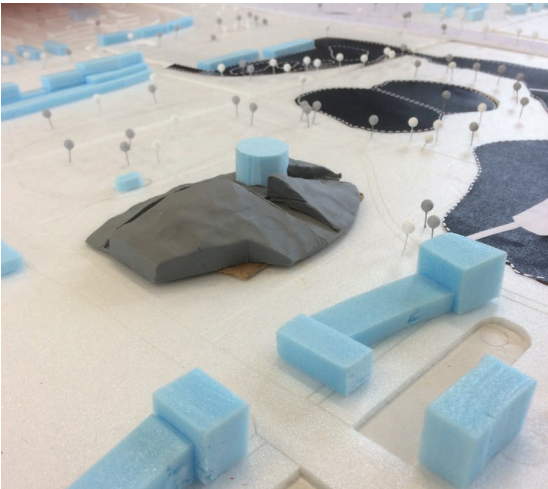
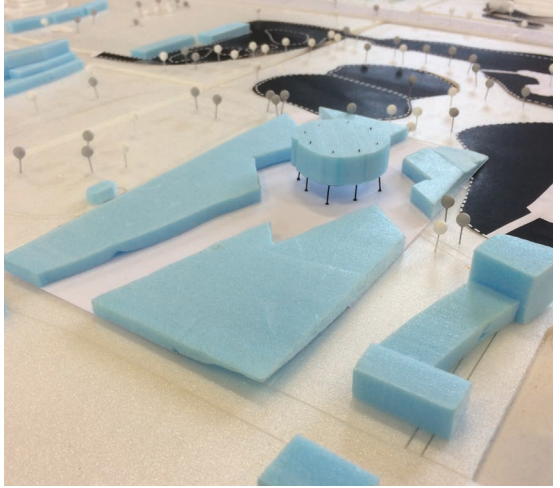
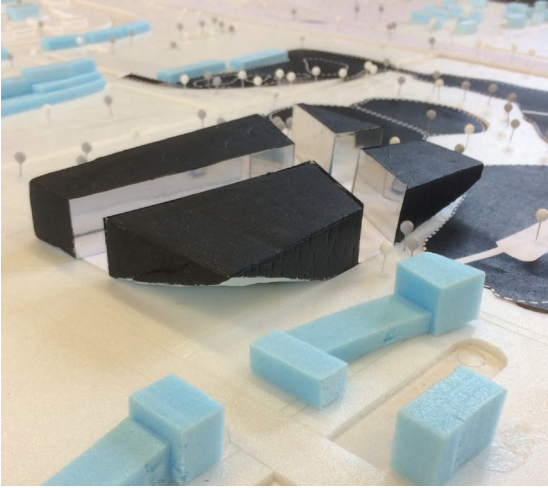
While architecture isn't a practice which can solve all the problems we are facing today, I believe that with smart design our build environment is able to contribute to a better future. In order for architecture to contribute to a changing society a clear research is necessary to actually contribute in a correct and positive way. The chair of Complex Projects (CP) is well known for their research based design approach and instead of providing you with a specific topic, building or site they only provide you with a general theme in which you have to define your own project. In this aspect research becomes a very important aspect in order to define your own design proposal.

The ambition of the studio is to develop new urban scenarios and investigate architectural typologies for the city of Amsterdam in a time horizon 2050. While Amsterdam is a familiar city to me I found that in order to design for a possible future, research is essential. The variety of scales, topics and trends I've looked into only made it more clear to me that as an architect we always have to design for a certain future. While this future may not be as far away as I had to design for during this project, I believe that we always have to be able to look at our society through a variety of roles and on different scales to design in a lasting and beneficial way.

## **The relationship between the methodical line of approach of the graduation lab and the chosen method.**

The graduation studio is divided in several phases in which research maintains a strong influence. The first phase consists of collecting general information about Amsterdam and future developments in the areas of health, mobility and energy. This data gathering was done in group collaboration and collected in a book in order to provide a consistent and clear

overview of the collected data. Through writing several essays a personal fascination was further developed and researched from which a proposal for a design was formulated. The second phase was more personal and focused on defining this proposal through finding a location and program for the project. In order to understand the environment the project had to be placed in the research on future developments and trends was very important to me. While the data we had to work through sometimes seemed never ending, it was a valuable source of information throughout my design process. To be able to design for a future that far away we had to develop several scenarios from our research and with our group we set out the boundaries for our projects. This really helped in making a clear environment for our projects to take place in. Another important method which I adopted was the use of typological studies. Since I proposed a function which currently isn't present in our build environment I researched several power plants, storage facilities, educational facilities and communal facilities. With the data I acquired from these typological studies I not only developed my program, but also a set of architectural design elements I could use to develop my new typology. Next to this I had a meeting with Ir. Bob Weehuizen from Protonventures, a engineering firm which already developed power 2 ammonia solutions on a small and large scale.





### **Location and reason for the project**

With technology dependent on electricity increasingly pervading our everyday life the access to energy becomes a driver for our general development and wellbeing. While the access to energy seems as something trivial there is a growing number of people which are unable to pay their electricity bills and are disconnected from the energy grid. With growing energy prices and the need for a costly large scale transition towards sustainable sources of energy this vulnerable group of people will only increase in the coming years. Amsterdam Zuidoost has a large population with low income and low education, while also existing of a large social housing stock of poor building quality. The possibility for this group to make their own housing self-sufficient or even less energy demanding is very low. Through the implementation of a power

to ammonia (P2A) plant in this region they can have access to an affordable and clean source of energy. The idea behind this is the possibility of this plant to buy in very cheap sustainable energy at moments when there is no demand and storing this for later times. This energy can then be redistributed during peak demand and provide the region with a constant and cheap source of energy. Furthermore can a city be divided in different zones based on the land use, economical land value, density of living and working and intensity of a variety of activities. Zuidooost as a periphery of Amsterdam also provides the best circumstances in relation to land value, proximity, density and available land to implement this P2A plant. Local energy production creates substantial numbers of job opportunities and thus contributes to the local economy, provides social and environmental benefits and improves energy security. The P2A plant will be combined with

educational facilities ranging from vocational to higher educational training and providing the neighbourhood with consultancies on energy usage, possible home interventions and information on energy in general. The Nelson Mandela park will be the exact location of the building, providing a central location in Zuidooost with enough room to implement the plant.

### **The relationship between the project and the wider social context**

The supply of our energy has transformed substantially in the last centuries. Before the 1800s, economic growth was presumed to be limited by decreasing returns on the productivity of land, a fixed resource. But beginning in the 19th century, abundant and cheap energy, initially coal and later oil, began to replace biomass fuels and human and animal labor, decoupling economic growth from the availability of land, labor, and organic energy resources. This ignited a massive acceleration of growth far beyond what was believed possible. With the ever increasing pervasiveness of technology, energy becomes increasingly important and is coupled to human growth and development. However our energy usage currently has a great impact on our environment, through pollution and climate change. A transition has to be made in which we move towards a circular economy in which we use clean and renewable sources of energy. The transition in the energy sector is one of the greatest challenges of this century and this project aims to act as an example of the possibilities of local energy production and distribution. With the aim of Amsterdam to become a circular city the need to increase local energy production is a clear vision and Amsterdam has already selected regions in and around the city in which additional power generation through sustainable sources, such as solar and wind can be achieved. An overlooked

problem with sustainable energy however is the aspect of storage and redistribution. The current plans of the Netherlands are to invest large sums into adapting our current centralized energy system to be able to handle sustainable sources of energy.

Local energy production however has several advantages, first it being egalitarian. Centralised systems are controlled by expert specialists and organizations that can leverage the requisite capital; as such, they are divorced from democratic decision-making processes. Centralized system also tend to centralize costs and benefits, which often accrue to different parties at opposite ends of the system: benefits go to those who control the systems. Local production however involves the community and benefits can be returned to the community. Local energy production provides the community with increased amount of job opportunities and investments stay within the region. A local decentralised system has the advantage of being more resilient than a large centralised network, being more flexible and able to adapt without large capital investment. My project tries to propose a solution in which the circular and local energy aspect is achieved. The project can work as a case study for new storage facilities located within or in the vicinity of the city and as an example for transforming our energy sector from polluting negative facilities to positive and inclusive facilities, strengthening our bond with our energy production.