Bridging Boundaries

Transformation des cuves d'hydrocarbures de Vernier en catalyseur d'économie locale et circulaire

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Abstract

EN

Our énoncé théorique "Review from the Road" focused on the impact of the automobile on architecture and its future in society. We concluded that its used will eventually be compromised by oil depletion.

The hydrocarbon tanks of Vernier, in the canton of Geneva, intrigued us by their number and scale. With their obsolescence becoming clearer by the years, the question of their potential for reuse arose, and forms the core of our project.

We propose to conserve the tanks, taking advantage of their structural quality and the large volumes they house to develop a variety of activities ranging from food production to sustainable, local energy production. One part is dedicated to vertical farms and another to biogas production. These processes are interdependent to create a circular system, minimizing energy impact.

In parallel with the transformation of the tanks, we are proposing to reallocate the other buildings linked to the automotive sector into workspaces, repair and craft workshops. The former would be rented out to artisans, while the latter would be made accessible to members of the public. The addition of a system of footbridges and new entertainment programs will make it easier for local residents to move around and reinvest in the site.

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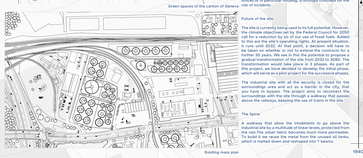
Notre énoncé théorique "Review from the Road" portait sur l'impact de l'automobile sur l'architecture et son avenir dans la société. Nous en avons conclu qu'à terme son utilisation sera compromise par l'épuisement du pétrole.

Les cuves d'hydrocarbures de Vernier, dans le canton de Genève, nous ont intrigués par leur nombre et leur échelle. Leur obsolescence devenant de plus en plus claire ces années, la question de leur potentiel de réaffectation se pose et constitue le cœur de notre projet.

Nous proposons de conserver les cuves métalliques en tirant parti de leur qualité structurelle et des grands volumes qu'elles abritent pour y développer diverses activités allant de la production alimentaire à la production d'énergie locale et durable. Une partie est dédiée aux fermes verticales et une autre à la production de biogaz. Ces processus sont interdépendants pour arriver à un système circulaire, limitant ainsi au maximum l'impact énergétique.

En parallèle de la transformation des cuves, nous proposons une réaffectation des autres bâtiments liés à l'industrie automobile en espaces de travail, de réparation et de fabrication d'artisanat. Le site actuel est morcelé et fortement divisé par des zones industrielles non accessibles au public. L'ajout d'un système de passerelles et de nouveaux programmes de divertissement permettent une fluidification des déplacements et un réinvestissement du site par les habitants.



Green spaces of the canton of Geneva

Existing mass plan

Evolution of the site until now

The hydrocarbon storage program is not insignificant because the first parcels on which construction began in the 1960s belonged to a family of industrialists in the petroleum sector who had a refinery in neighbouring Meyrin. Moreover, the construction of these tanks coincided with the modernisation of the Vernier gas-fired power station.

While construction of the tanks began, the site was the most industrial area in the canton. The railway line played a crucial role in the site's development. Initially, the railway ran along the Rhône, but it was later the greenfield nature of the site to keep this line.

From the late 1970s until the end of the century was the most important period in the site's development. It became dense, with the opening of housing estates such as "Les Avanchets" and "Cressy" between 1970 and 1980, the construction of suburban zones near the industrial zone, and the building of the motorway.

Future of the site

From the early 2000s to the present day, the site has been constrained by the development of the city and changes in its surroundings. Initially, the site was on the city's strategic and far from the city. In the 1980s, it no longer relevant. Today the site is embedded in a complex urban fabric, with a mixture of housing, industrial zones, offices or in particular housing, is strongly criticised for the risk of incidents.

Future of the site

The site is currently being used to its full potential. However, the climate objectives set by the Federal Council for 2050 and the canton of Geneva for 2030 are not in line with this. In this are the site's operating rights. At present situation, it runs until 2032. At that point, a decision will have to be made on whether to extend the concession for further 50 years. We see in this the potential to propose a gradual transformation of the site from 2032 to 2080. The current operator is Vitol, a leader in the field. As part of this project, we have decided to develop the initial phase, which will serve as a pilot project for the successive phases.

The industrial site with all the security is closed for the public and is cut off from the city. It is a "dead" area you have to bypass. The project aims to reconnect the surroundings with the site through a walkway that passes above the railways, keeping the use of trains in the site.

The Spine

A walkway that allow the inhabitants to go above the industrial site by a multitude of linear levels, protected from the rain.The urban fabric becomes much more permeable. The spine is a mixed-use space, with a mixture of tasks, which is market stalls and restaurant into 3 towers.

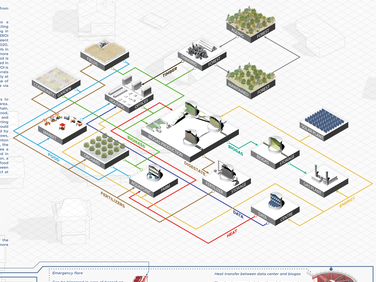
Program

The main intention of the project program is to move from a linear to a circular energy system in a circular network.

Currently, Vernier oil storage facility is linked to a worldwide distribution network. The impact of extracting the raw material is significant, as it is the fossil fuel industry is responsible for 10% of global emissions. Energy Return On Investment was the energy equivalent of 1 barrel of oil consumed to produce 100 barrels. In 2 oil be 1 barrel of oil consumed to produce 8 barrels in 1970 and 1 barrel consumed to produce 3 barrels today. Various gains that cities forms of mines in which the oil is either mixed with sand (bituminous sands) or contained in rocks (oil shale) and must be extracted by heat. The energy costs rose: 1 barrel consumed to extract 0.5 and 1 barrels respectively. The crude oil is then either refined directly at the site or sent to other refineries. In the case of Vernier, a pipeline links the tanks directly to Nessette via the Lyon refinery.

Faced with this linear system, the project proposes to transform the oil tanks in order to extend them in the area. The tanks would no longer be used for fossil fuels, but would become a local hub for the production of food, biogas, energy as well as creating new employment and leisure spaces. The site would remain connected to the rest from the railways connection to the site. They would link it to various biomass harvesting points produced by farmers in a radius of 40 km, as well as to the Lyon refinery ports, public gardens and private gardens in the canton of Geneva. On another scale, that of the oil tanks site, the different functions of the site interconnect with a similar development. The new functions implemented in the tanks would be : vertical farms for food production, a biogas plant and a renewable energy production plant for the produced. The flow chart opposite shows the links between the main functions of the tanks and how they interact at two scales: that of the site and that of the canton.

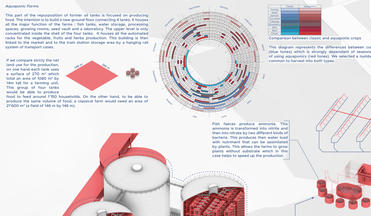
The diagram on the left shows the accessibility of the surroundings of the site. The more red it is the more accessible, in white it's not accessible.



Aquaponic Farms

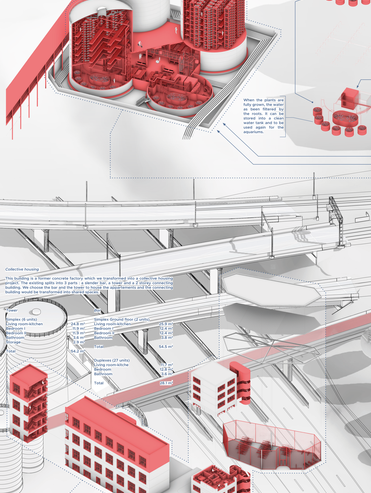
This part of the repurposition of former oil tanks is focused on producing food. The intention is to build a new ground floor connecting 4 tanks. It houses: a laboratory, a nursery for the fish, a greenhouse, a storage space, a packaging space, growing rooms, seed vault and a laboratory. The upper level is only concentrated inside the shell of the four tanks. It houses all the automated farms for the production of fish and vertical farms. The produce would be linked to the market and to the train station storage area by a hanging rail system of transport cases.

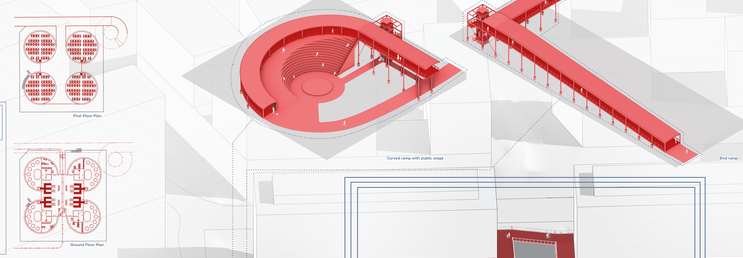
If we compare strictly the net area of the farm, it would take one hard-shell tank cases (1 tank = 1 farm) to produce a total an area of 1080 m² to 1ha tall for a leafy, gain production. The farm would be able to produce 1000 kg of fish per household. On the other hand, to be able to produce the same volume of food, a classical farm would need an area of 21600 m² (1 field of 146 m by 148 m).

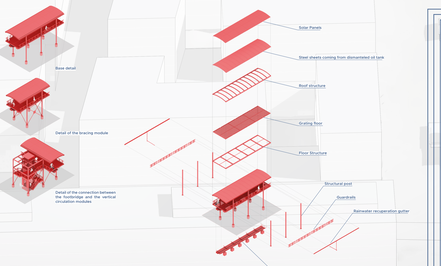


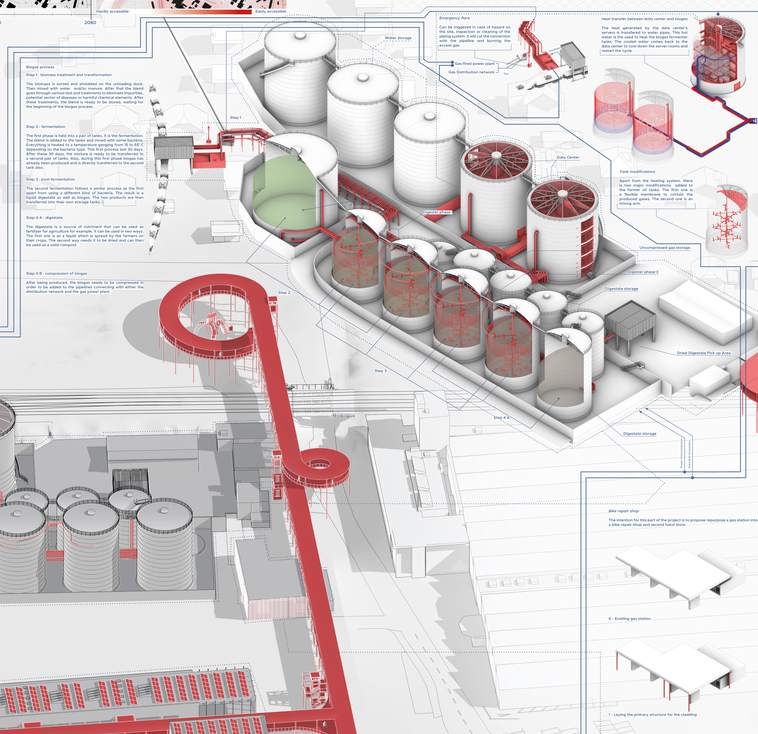
Comparison between classic and aquaponic crops

This diagram represents the differences between conventional agriculture and aquaponics. In the first case, the farmer must choose a field specialised in one crop. In the second case, the farmer can produce a variety of crops common to harvest into both types.









Collective housing

The building is a former concrete factory which we transformed into a collective housing. Initially, the building was composed of a single floor. We added 2 floors to the existing building. We choose the low cost the tools to build the additionnal floor and the connection. The building would be transformed into shared housing.

Studios (6 units)
Studio with kitchen
Bathroom
Bedroom
Living room
Total

Studios (27 units)
Living room-kitchen
Bathroom
Bedroom
Total

Simples Ground floor (7 units)
Bedroom
Bedroom
Total

Ground Floor Plan
First Floor Plan
Sample Plan - Ground floor duplex
Sample Plan - First floor duplex
Cross Section of the bar

Conversion of an automobile repair shop into a multi-sport facility

Before the intervention, this building contained mixed programs : automobile workshop, a restaurant and a nightclub. The nightclub and the restaurant related functions where concentrated in the basement and on the ground floor, while the offices were on the upper level.

We want to keep the existing as much as possible the office spaces as they're right now. However, the main intervention takes place on the ground floor which now host a multi-purpose sports hall for the school nearby, a climbing gym, a fitness center and a climbing gym. This intervention takes place as the second half of the new sport facility of the site.

The basement is becomes a parking and storage space for the site maintenance team.

Hub for sport activities

The Hub for sport activities use the topography and reuse of old concrete tanks to host a variety of sport activities. The roof of the tanks host a 400 m athletic track with multisport field inside to the volleyball fields. This hub allow the inhabitant of the Etang district to have closer sport activities. The tanks are used as a base for the footbridge and as a vertical circulation where outdoors activities can be situated in the round openings. The inside is dedicated to locker rooms, cafeteria and classrooms.

The Market

The Market reuse the biggest oil tank of the site, the position of the tank is in the middle of the neighbourhood and is easily accessible. The ground level is dedicated to the selling with the inside stalls which are long term rented. The space is connected to the outside ones, that are for short term rentals. The first floor is dedicated to the production of food. The second is storage for the food and all the process to prepare the vegetables. The food come from the vertical farms by the hanging rail system of transport cases. The food is transported by the rail system and distributed to the stalls. There is a second rail of boxes that takes the products to the train to be exported.

Market stalls

These stalls are designed to be easily assembled and disassembled in order to free the space for special events.

Moreover, modular allowing them to be stacked together or also adding parts like a roof for the outdoor.

The Workshops

The old concrete factory is composed of huge halls built mainly from glued laminated timber. The ceiling height is important and allows for large work on glass to the work of wood, the space can hold a lot of machines. The space between the buildings can be used as collective area. We would like to build a new shaped building facing the existing in order to house more workshops.

The Coworking Center

The building is nowadays used as car dealership. In the future we expect that the number of cars sold won't need this type of building and can be reused for new activities. The ceiling height allows for a mezzanine. The ground floor is mainly open space. We use the rest of the space for coworking for freelance workers. The entrance can be used as networking or reception space.

Train Station Storage

This building is one of the former gas stations for distribution trucks. In the project, it becomes a storage space bridging the oil transport and the market. It also houses monitoring rooms for the production of the farms, logistic control, gangging rooms and rest rooms for the workers.

Bike repair shop

The intention for this part of the project is to propose repurpose a gas station into a bike repair shop and second hand store.

0 - Existing gas station

1 - Laying the primary structure for the cladding

2 - Laying the secondary structure for the cladding

3 - Laying the cladding

4 - Finishing touches