Final report | *transition through connecting Oud-Charlois*

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Rotown magic

Rotterdam is niet te filmen
De beelden wisselen te snel
Rotterdam heeft geen verleden
en geen enkele trapgevèl

Rotterdam is niet romantisch
heeft geen tijd voor flauwekul
is niet vatbaar voor suggesties
luistert niet naar slap gelul

't Is niet camera-gevoelig
lijkt niet mooier dan het is
Het ligt vierkant hoog en hoekig
gekanteld in het tegenlicht

Rotterdam is geen illusie
door de camera gewekt
Rotterdam is niet te filmen
Rotterdam is véél te écht

jules deelder

Source: Author

Preface

This final report is the outcome of the graduation track for the master track of Urbanism at the TU Delft. This research is part of the Complex Cities Studio and the chair of Spatial Planning and Strategy. During this period, a greater understanding of the complexity of the energy transition in urban context has been gained, as well as a better insight in the southern area of Rotterdam and Oud-Charlois in particular. Besides this, the importance of social energy in a neighbourhood became more clear and will hopefully form my basis during my professional life.

Table of Content

Cities become more and more attractive places for people to settle. New inhabitants from within the Netherlands and from abroad choose Dutch urban environments as their home. The economic interest of cities is a constant factor of its growth. In the last decade Rotterdam also functions as a magnet. Recent completion of icons such 'De Markthal', 'The Rotterdam' and the new central station contribute to the identity of and pride for the city of Rotterdam. These icons have helped to strengthen the image of the city.

This boost can also be seen in the data from CBS, which shows that around 1000 former inhabitants of Amsterdam choose for Rotterdam as their domicile (statline, 2016). Rotterdam can be seen as 'must see destination' since the Academy of Urbanism declared Rotterdam as European City of the Year 2015, the lonely planet marked the city number five of 'best travel 2016' and the Huffington Post placed Rotterdam in its top 20 of places to visit.

The major task for Rotterdam is to come up with strategies to how the south banks of the city can move with this improved reputation. This potential has started with the completion of the Erasmusbridge in 1996. Thanks to this bridge, 'De Kop van Zuid' was able to flourish, as well as adjacent areas, such as Katendrecht and the Julianapier.

To make an neighbourhood successful it is important to enhance the qualities of its inhabitants, but also the physical transformation of an area should lead to improved housing and living conditions for the inhabitants of this neighbourhood. A major problem in Rotterdam South is the fragmented ownership situation of the housing stock. Corporations are in comparison to private owned properties more easily to get involved in transformation tasks. In total, there are more than 10.000 properties which are in impoverished condition in the focal neighbourhoods of the National Program Rotterdam South (NPRZ, 2012). But the success of 'De Kop van Zuid' show how much is possible in a timeframe of 15 to 20 years.

The ambitions displayed on the next page describe the ambitions for the chosen area for this graduation project. The municipality of Rotterdam described its goals and targets for the area in several policy documents (NPRZ, 2012; Handelingsperpectief wijk Oud-Charlois, 2013; Gebiedsplan Charlois 2014 - 2018, 2014). Looking close into these documents show that a possible outcome of the municipal strategy is a strong gentrified neighbourhood where there is no longer place for the most vulnerable and least economically fortunate inhabitants of the city. Therefore the ambitions for the project are described to insure this group will still be able to live in the area after completion of this strategy but at the same time the goals set by the municipality will bet met.

The energy transition is the starting point of this thesis, since through this transition the living conditions of the inhabitants can be improved, living costs can be lowered and the area can function as the driving force for new developments throughout the city of Rotterdam. Besides this, a social and spatial transition should also take place in the neighbourhood. New connections should be found, for example between inhabitant groups, but als spatial connections, such as green elements and mobility patterns. Therefore this thesis is called 'Transition through connecting Oud-Charlois'.

Source: Author

Through ***restructuring***, ***transformation*** and ***new developments*** of the housing stock, meet the ***goals*** of the municipality, while ***preserve*** the ability for the current inhabitants to stay in the neighbourhood

By means of ***energy transition***, ***improve*** the living condition of the ***current inhabitants***. Use this transition to come up with pilot projects to ***revaluate*** the area

Enhance the ***strong characteristics*** of the area and make strides in the impoverished areas to get to ***improved social structures*** of Oud-Charlois

Oud-Charlois is one of the focal neighbourhoods of the National Program Rotterdam South dealing with a variety of issues, stretching from high unemployment up until a deprived housing stock (NPRZ, 2012). The neighbourhood is adjacent to a harbour area where transformation should take place in the foreseeable future. The municipality has as goal to connect the waterfront with the hinter lying neighbourhood which are currently separated by a dike and major infrastructural elements. There is a general consensus on the fact the shift to renewables is inevitable. This transition can be used for a revaluation of the neighbourhood. This issues have led to the research questions formulated on the next page.

Source: author

Research question

In what way is the ***transition*** to other forms of ***energy,*** other ***typologies*** and ***changed mobility patterns capable*** to ***revaluate*** the neighbourhood ***Oud-Charlois***.

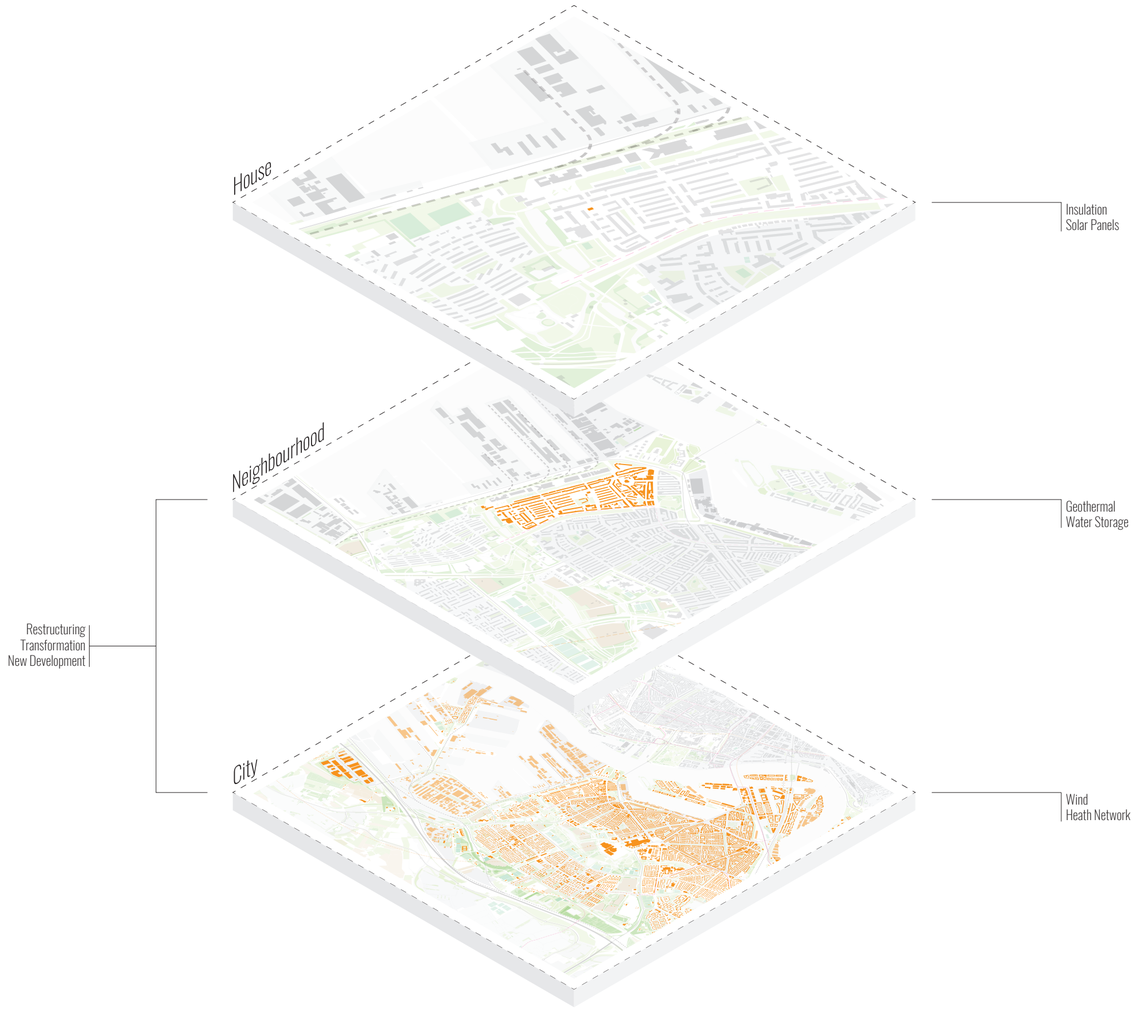
SubResearch questions

How to ***stimulate*** inhabitants, institutions and property owners to ***cooperate*** in the transition of Oud-Charlois towards a ***'smart neighbourhood'***.

How can the transition towards a 'smart neighbourhood' improve the ***social cohesion*** and ***economic resilience*** of the ***current*** inhabitants and attract new, ***more prosperous*** inhabitants.

What ***technical*** and ***spatial implications*** are needed in the researched area to come to an ***improved urban fabric*** through ***restructuring***, ***development*** and ***transformation*** of the ***public domain*** and ***housing stock***.

The transition to the use of energy generated from renewables is an extremely complex question. It is not only a technical question as much as a social question and a quest for the use of the right sources in the right location. It is a search what the role of the urban designer is in a more decentralized system of energy generating. In the case of Oud-Charlois, the emphasis should lay on getting the different stakeholders involved, such as the municipality and housing corporations who own a large majority of the housing stock present in the area. How can this energy transition be used to increase the living conditions of the current inabitants? And can it help to meet the goals set by the municpality and attract new groups of inhabitants to the neighbourhood? Examples can be the effects of linking geothermal energy to the existing heat-network. How can this implementation be used to higher the living conditions of the inhabitants of the area? But also when looking at the smaller scale, the house, there might be a role for the urbanist in getting inhabitants of Oud-Charlois involved in the transition towards the generating of sustainable energy. Concluding there can be stated the transition to other forms of energy, not only electrical, but social or spatial energy as well, gives considerable opportunists for the restructuring, transformation and development of Oud-Charlois into a neighbourhood with mixed demographics and high living conditions.



Source: Author

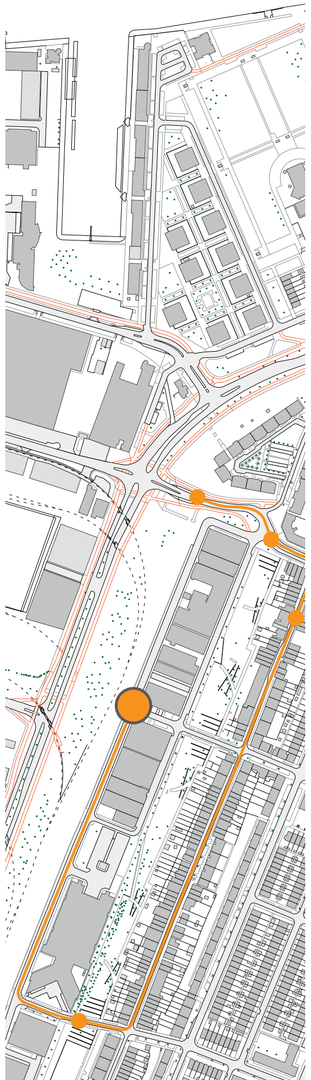
The methodological framework describes the steps to take in this research. This iterative process is characterized by different requirements that must be met to get a complete storyline covering the facets of a design and research project of this nature, and is based a framework for Geodesign, described by Dr. Carl Steinitz, professor of landscape architecture at Harvard University. In the current stage, the context has been set and greater number of the analysis and research are completed, although more research has to be done. The final output of this thesis will be a design in which spatial implications of the energy transition in Oud-Charlois play an important role, taken into account the different stakeholders involved in the process as well as the social consequences of this switch to different use and generation of energy. Finally, the findings will be analysed and recommendations will be given for the chosen area, as well as general outcomes regarding an energy transition, the social facets and spatial effects in Oud-Charlois.

Source: Author

Source: Author

Source: Author

The following pages show impressions of the current situation in Oud-Charlois. A representative image of the neighbourhood is given in this way. Strong characteristics are shown, as well as weaknesses present in the existing urban fabric.



The neighbourhood lacks an attractive entrance. Unappealing housing on the one hand is being interchanged with deprived industrial area on the other.

A first look on the long lines present in the area. Also clearly visible is the non-used green space. The warehouses visible are partially vacant.

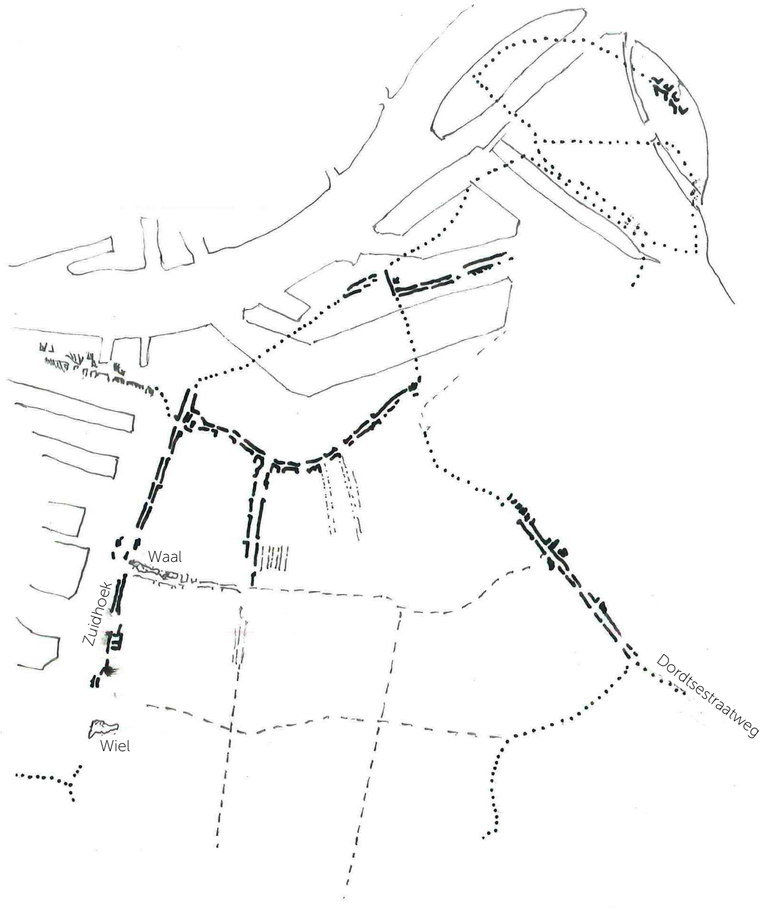
The historical core has strong qualities and is relatively green compared to other residential areas in the neighbourhood. Small entrepreneurs and artists are located in this part of the neighbourhood.

Zuidhoek is a historical street in the area, this is visible in the typologies present. The street lacks green and the majority of the street is used for parking.

A major height difference is present in the area. Also recreational facilities are present, although in poor condition. There are only two baskets, where in the past there used to be four. The two are situated on the same side of the field, which will lead to interesting games of basketball.

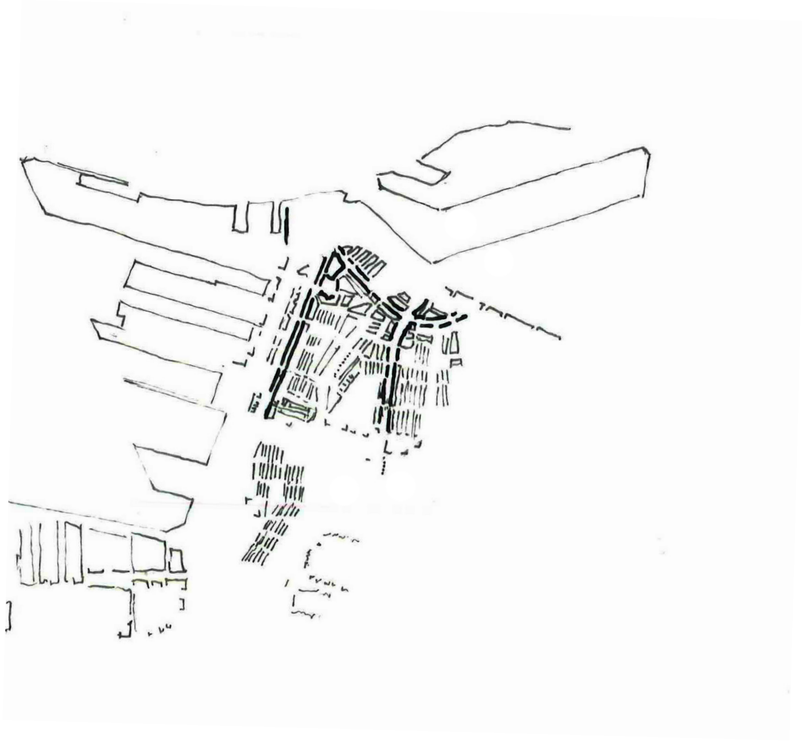
Again the long lines in the area are shown, a quality of the neighbourhood. Also the difference in scale between the neighbourhood and the harbour facilities can be distinguished, when comparing 'Zuidhoek' with this impression. The harbour cranes can be seen when man looks over the one and a half meter high dike.

Oud-Charlois is the historical core of the larger neighbourhood Charlois. The borders of the area are formed by the 'Dorpsweg' in the east, the 'Kromme Zandweg' at the south side, the railway-yard of Waalhaven-Oostzijde and the northern border is formed by the river 'Maas'. Structures are formed by former dikes and polders.

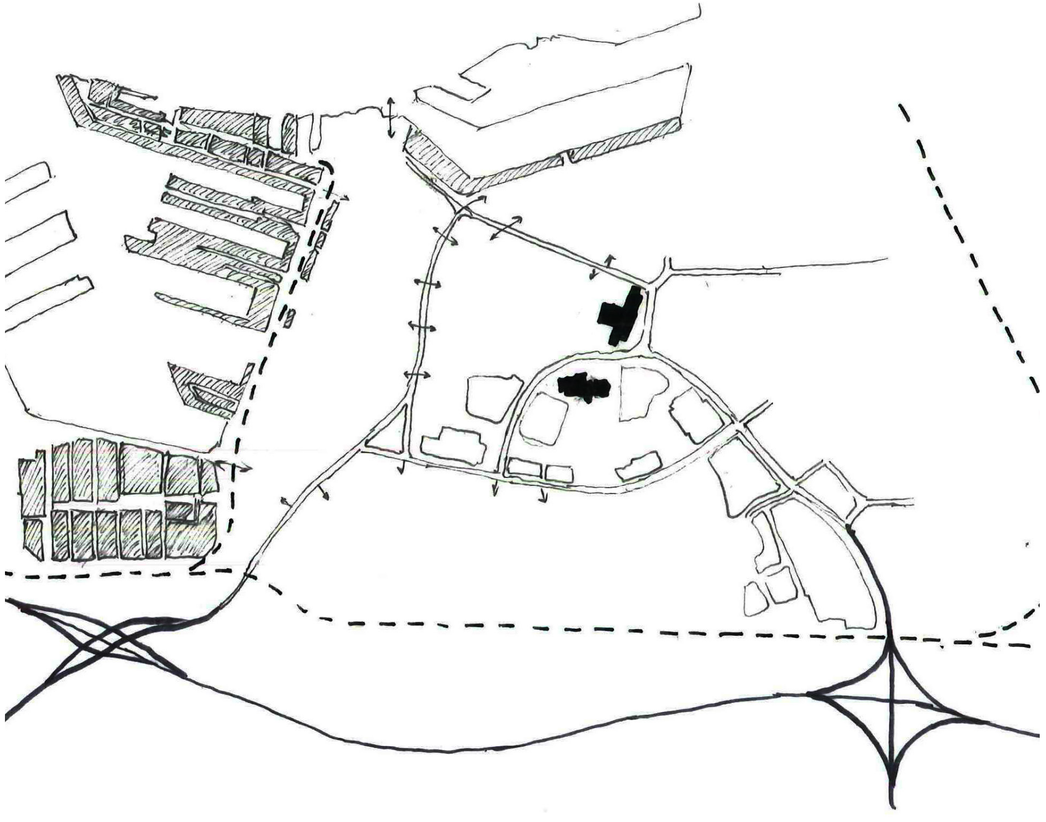


Source: Author

As the map on the adjecent page shows, n the current situation still the historical structures and long lines can be recognised in the parcelling of the area. In the northern part, the traditional structure is still visible. 'Zuidhoek' is a historical street with alternating buildings.



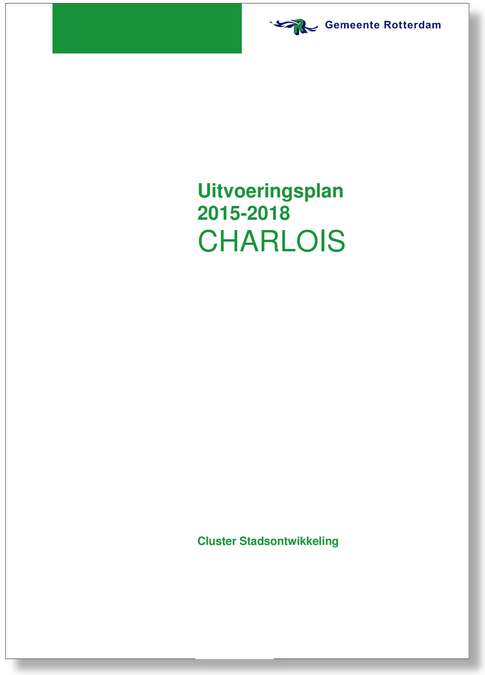
Source: Author



Source: Author

The following map shows how the neighbourhood is surrounded by large scale elements, such as harbour infrastructure, as well as main traffic roads.

The municipality has set out goals for the neighbourhood of Oud-Charlois. These tasks are an important driver for this thesis and are on social and spatial aspect the starting point for a new urban design for the neighbourhood. New typologies are introduced as well as functions added. On the other hand, subsitiute housing is created for inhabitants whose house is part of the restructuring of the neighbourhood.



Main task Charlois:

"Addressing vulnerable housing stock and adding of single family dwellings "

"The neighbourhoods [of Charlois] are perceived as unilateral, poor and sober in particular by social climbers and middle-incomes."

"More distinction between lively and quite areas and a certain critical mass of housing and service provision is needed for these target groups."

"In Oud-Charlois, there is a need to create spacious dwellings"

"Quite residential environments are alternated with functions at nodes and along main routes."

"Green and playgrounds in proximity of the housing is of importance for the liveability of these neighbourhoods where many children live."

"The focus for accessibility is put on public transportation, safe cycling routes, the connection with the inner city, stations, economical nodes and the neighbourhoods between themselves."

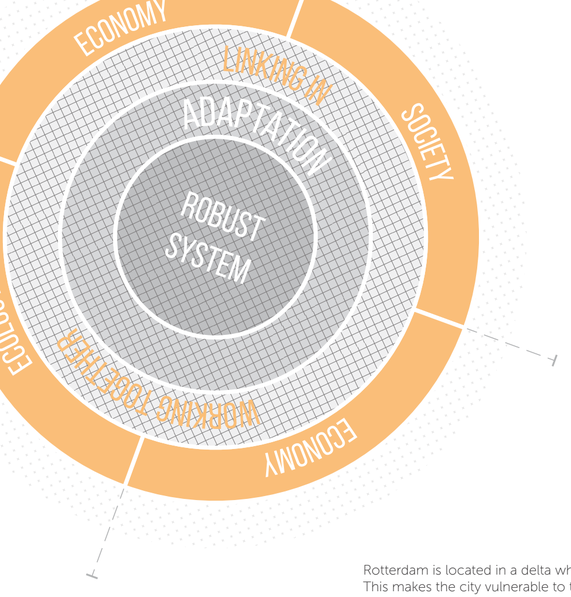
"Addressing the social, as well as the private owned housing stock and other elements contributing to an attractive living environment to break the negative spiral"

Source: Uitvoeringsplan 2015-2018 CHARLOIS,

The Rotterdam Climate Initiative, abbreviated RCI, is a collaboration between the Port of Rotterdam Authority, Deltalinqs, DCMR Environmental Protection Agency Rijnmond and the city of Rotterdam. This alliance works together to enhance the sustainability of the city, the port and the industrial complex. The objective of RCI is clean air, more green spaces, dry feet, cleaner energy at lower costs and job creation in the city as well as in the port and industrial complex. The aim is to set an inspiring example to other cities around the world, also in the area of innovation, sustainability and adaptation to climate change. The seven focal points are quoted on the next page. The aim to come up with large scale energy saving in the build environment and small to medium enterprise is most in line with the research done for this thesis. Besides this, when looking to the spatial implementation of the energy transition, it might be valuable to look into the possibilities of sustainable electrical mobility as well as the capturing and storage of CO_2 in the harbour industry and how this energy might be reused [illegible] heat.

_Deltaplan Energy-Infrastructure
_Centre of Expertise Energy Saving
_Large Scale Energy Saving in the Build Environment and SME
_Rotterdam Bioport
_Stimulation of use of LNG for Inland Shipping, Coastal Shipping & Freight Transport
_Sustainable, Electrical, Mobility
_Capture, Transport, Reuse & Storage of CO2

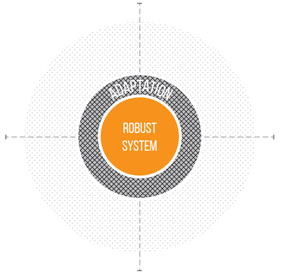
Source: RCI Actieplan Energie



Rotterdam is located in a delta which is dominated by great rivers and the sea in particular. This makes the city vulnerable to the effect of climate change. Furthermore, the area is densely populated and the harbour has a considerable economic value. These elements combined gives a clear insight in the fact that Rotterdam should come up with a strategy to be less vulnerable.

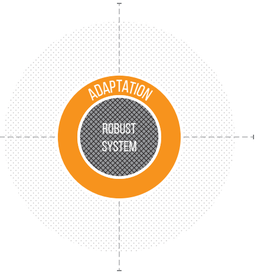
Climate change and economic growth give an urgency to come up with an adaptive approach. The adaptation strategy formulated by the municipality focusses mainly on climate, where the method might also be implacable for the shift towards energy from renewables.

Robust Sytem: maintain and strenghten



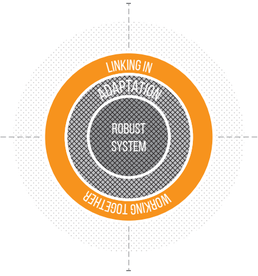
Maintaining and optimising Maeslantkering
Linking the strengthening of the flood defence to urban specifications at relevant locations
Working with the other responsible parties to maintain and optimise the current urban water system.

Adaptation: use of urban space



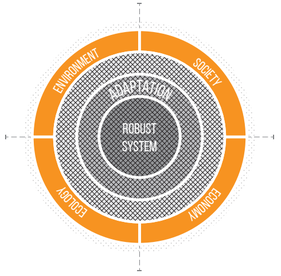
Build and furnish adaptively equipping in the outer-dike areas,
Harness the outdoor space and buildings for water storage and 'smart' water drainage, linked to the urban task at the specific locations
Actively encourage heat resistance as part of the design, renovation and maintenance of buildings, outdoor spaces and the road and public utility infrastructure.

Working together and linking in with other projects in the city



Actively gathering information and providing inhabitants and businesses with actions to take to protect against river water, excessive and insufficient rainfall and periods with extremely high temperatures.
Working towards a shared responsibility of public and private land owners for the collection of excess rainfall.

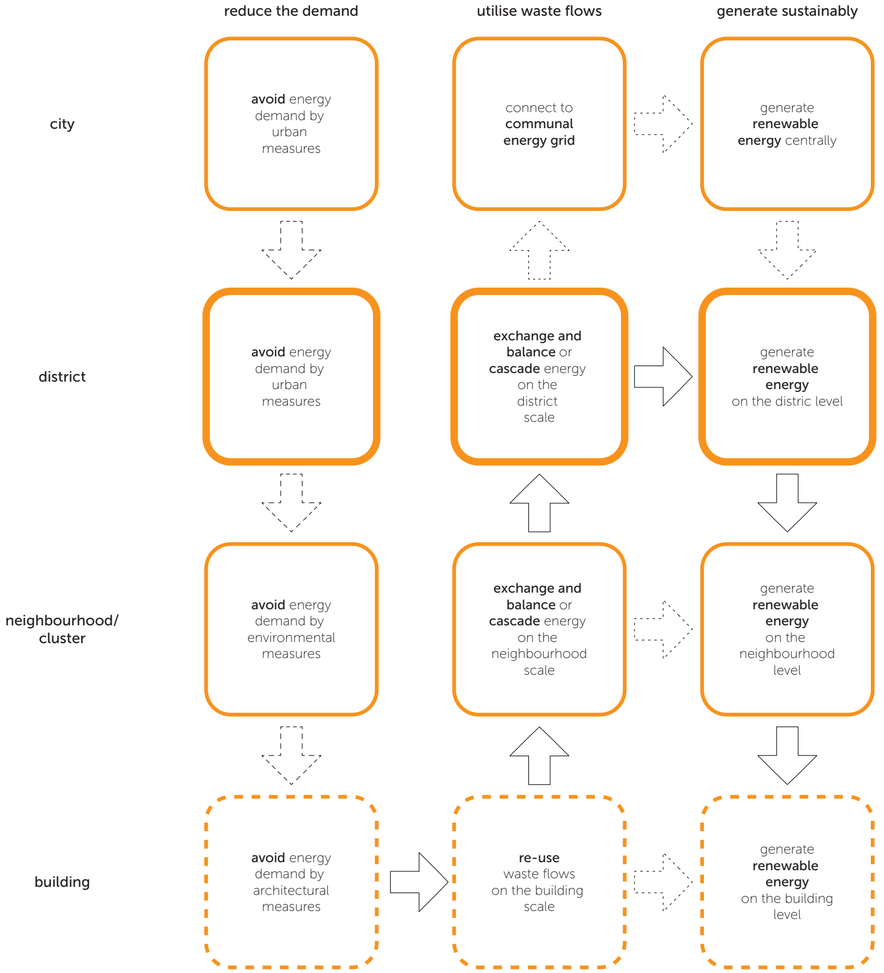
Added value for the environment, society, economy and ecology



Actively offering scope for pilot projects and innovations within climate adaptation measures (Rotterdam as a testing ground and portfolio for the business community).
Connecting Delta Cities as a strong international network of cities to be used as the connection with the international market.
Launching the further greening of the city as a 'no regrets measure' to create an attractive city environment.

Derived from: Rotterdam Climate Change Adaptation Stategy | Adjusted by Author

The REAP methodology is a framework designed Van den Dobbelsteen and others. "REAP supports initial demand for energy, propagates the use of waste streams and advocates use of renewable energy sources to satisfy the remaining demand. REAP can be applied at all levels: individual buildings, clusters of buildings and even whole neighbourhoods. Applying REAP to the Hart van Zuid has shown that this area can become CO2-neutral. Best of all: REAP can be applied everywhere" (Tillie et al., 2009). This methodology is used to design the patterns further on elaborated in this report.

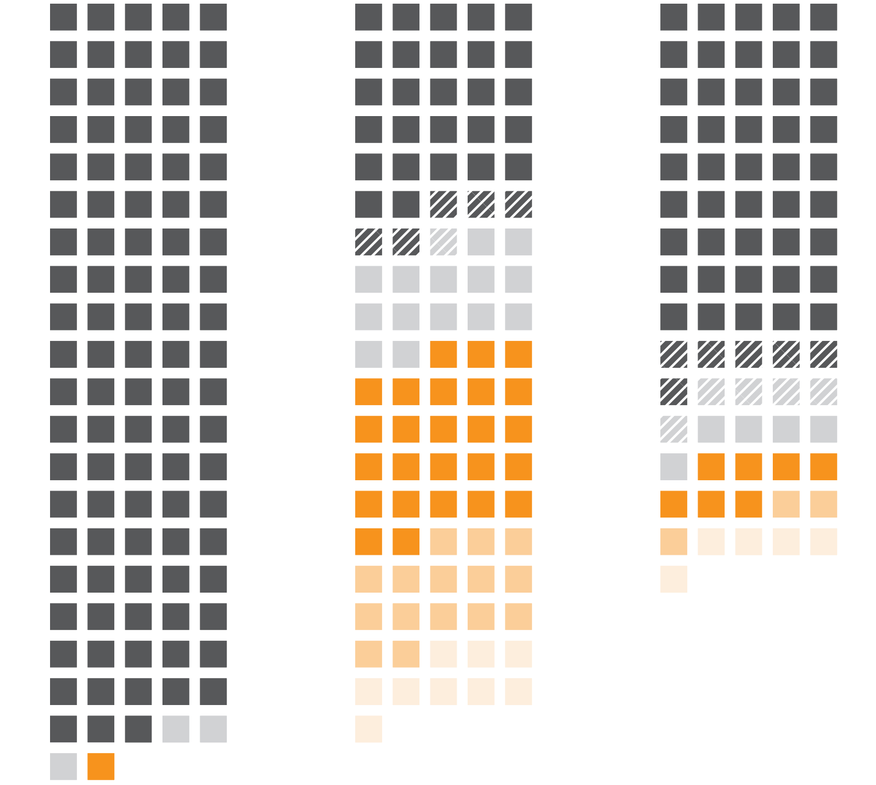


Derived from Tillie, et al. | Adjusted by author

Current energy usage Netherlands

2050 Outcome 1: Low CO_2 energysystem through renewables.

2050 Outcome 2: Low CO_2 energysystem through extensive savings and capturing and storage



20 PJ

Fossil

Fossil with CO_2 capture and storage

Biomass with CO_2 capture and storage

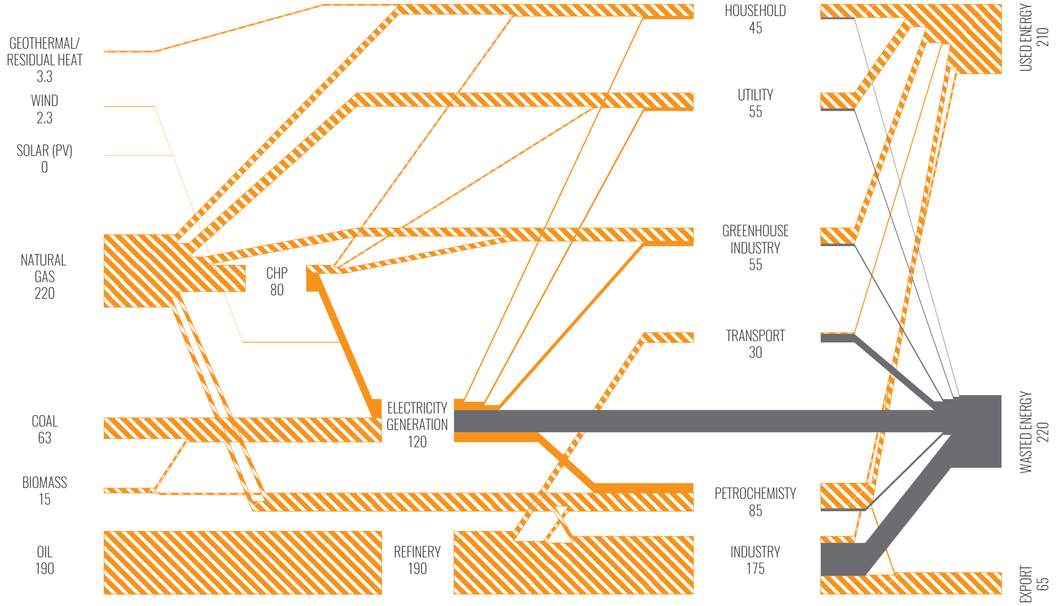
Biomass

Wind

Source: PBL, derived from Slimme Steden | Adjusted by author

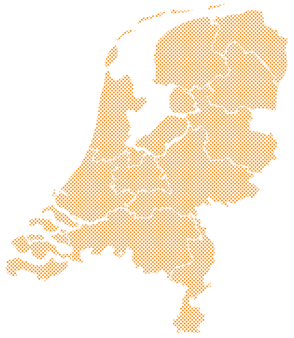
To reduce global warming, a reduction of CO2 emissions in inevitable. How the energy landscape will be by 2050 in uncertain, but major changes should be made. The diagram on the left shows two possible outcomes how the energy landscape might look like by 2050, based on prognoses by PBL.

Rotterdam can gain great benefits from the recycling of residual heat, which is primarily produced by the chemical and petrochemical industry and power stations in the harbour district of the city. This heated water is now being discharged in the harbour basins (sijmons, 2014). This heat could be used to meet the regional demand, for instance in the city. On neighbourhood scale this is already proposed in the 'Rotterdam Energy Approach and Planning, REAP(Tillie, 2009), but could have greater gains if implemented if applied on regional scale. As seen on the previous page, the region has good opportunities for geothermal energy. If the supply of heat from the harbour declines in the future, this network might be fuelled by geothermal sources.



Derived from: D. Sijmons | Adjusted by Author

The data shows some peculiar numbers. Because of the relatively substantial district heating network in Rotterdam, the amount of gas used in the municipality of Rotterdam is significantly lower than the rest of the Netherlands and even the province.



Average use of natural gas m^3

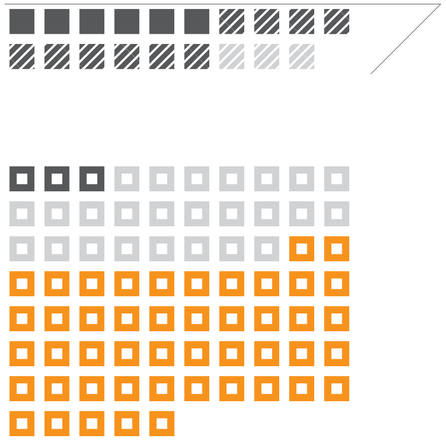
Average use of electricity kWh

Percentage Distict heating

	Netherlands			Rotterdam			Province		
2010	1850	3300	4,6	1600	3100	6,0	1250	2650	15,0
2015	1250	2980	5,5	1090	2810	6,6	840	2460	16,8

Source: CBS Statline | Adjusted by Author

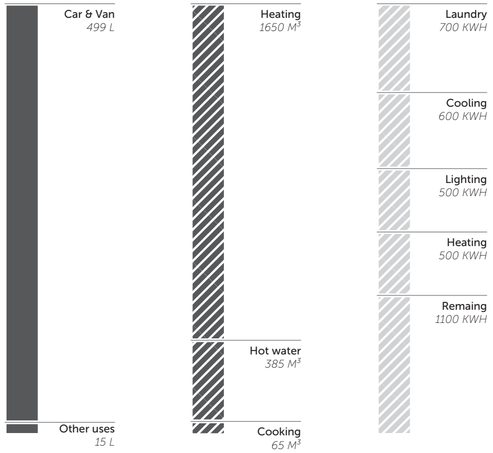
The data shows some peculiar numbers. Because of the relatively substantial district heating network in Rotterdam, the amount of gas used in the municipality of Rotterdam is significantly lower than the rest of the Netherlands and even the province.



Public Transportation
Public & Private consumption within the Netherlands
Foreign Production, Transportation & Servicesv

Fuel
Natural Gas
Electricity

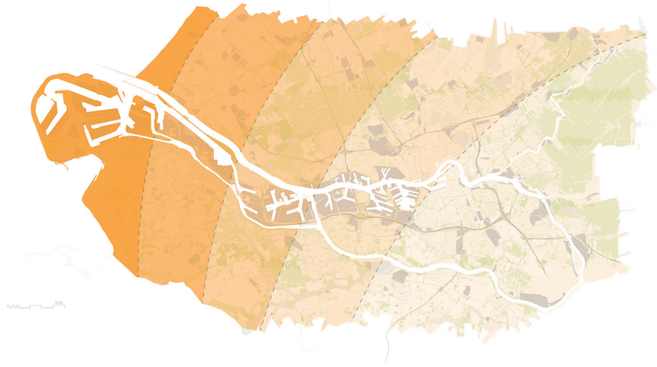
5 GJ



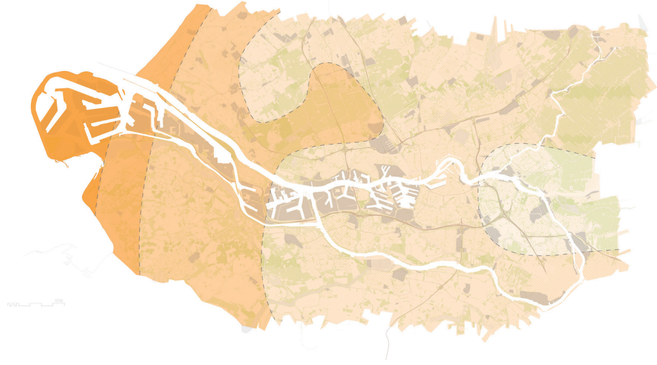
Source: PBL, derived from Slimme Steden | Adjusted by author

In the Rotterdam region it is important to put emphasis on the recycling and storage of CO2, since the harbour will in all likelihood continue to be in need of fossil energy in the nearby future. On the other hand there are ample opportunities for the sustainable generation of electricity in this region rich in wind and with, compared to the rest of the Netherlands, large number of hours of sunshine. On the other hand, space is crucial in this region. For Rotterdam there is a quest for smart combinations of renewable energy production with existing and new urban functions that can reinforce the image and competitiveness of Rotterdam's industries, including a potential shift in industrial uses of fossil fuel to vegetable raw materials. Rotterdam has the potential to exploit the scale of the port as source for the urban fabric (Sijmons, 2014).

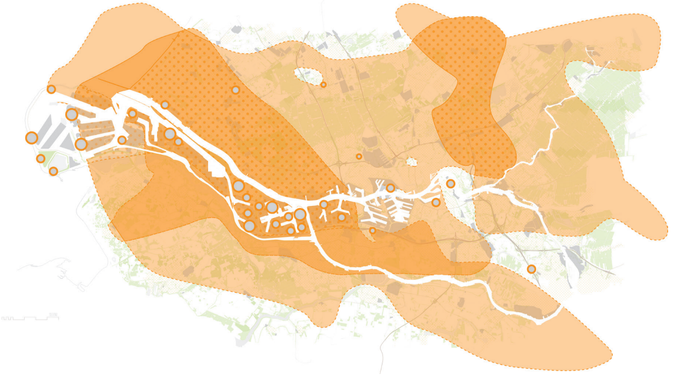
Wind



Solar

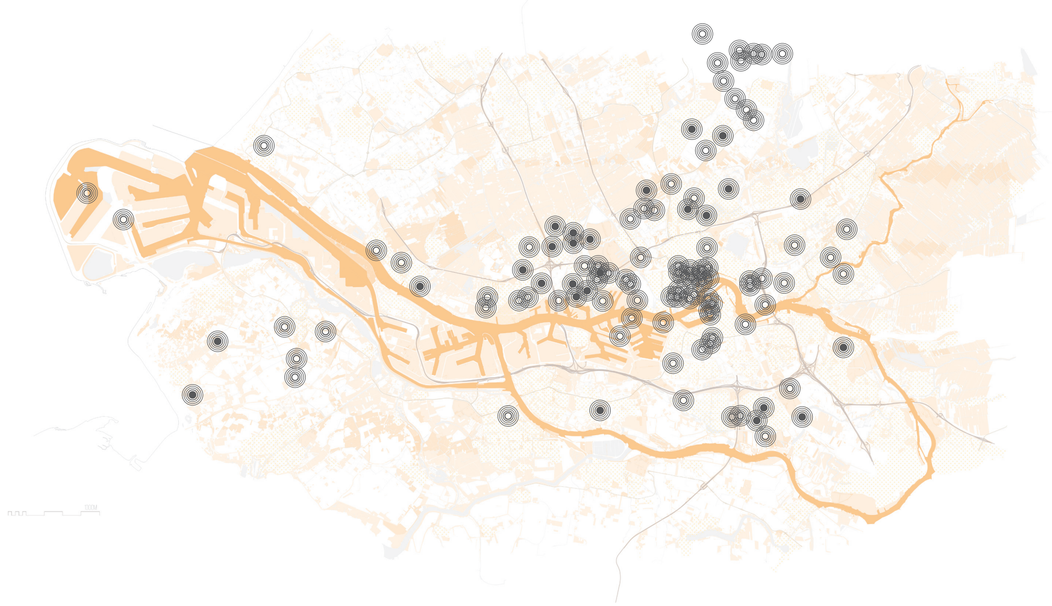


Geothermal



Derived from: D. Sijmons | Adjusted by Author

Shown are the cold-heat systems in the municipality. Specially in dense urban areas, these systems encounter different problems. Therefore, implementation of geo-thermal systems in combination with the already available district heating network will be more interesting. The spatial implementations of such a network are limited, although construction costs are large.



Closed Cold-Heat System

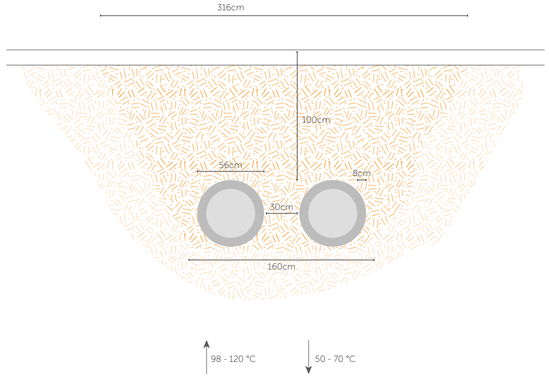
Open Cold-Heat System

Source: DCMR | Adjusted by author

Windturbines are one the most effective generators of electricity. However, still often resistance arises when turbines are planned in peoples living environment. Also their efficiency is limited in denser areas, such as Rotterdam, or Oud-Charlois in particular.

Realized
In (re)construction
Desired locations
Study locations

Source: DCMR | Adjusted by author



Warmtebedrijf Rotterdam

Warmtebedrijf Exploitatie N.V.

Shareholder

_Municipality

Warmtebedrijf Infra N.V.

Shareholders

_8% Province South Holland
_4% Housing corporation Woonbron
_88% Municipality Rotterdam

Nuon

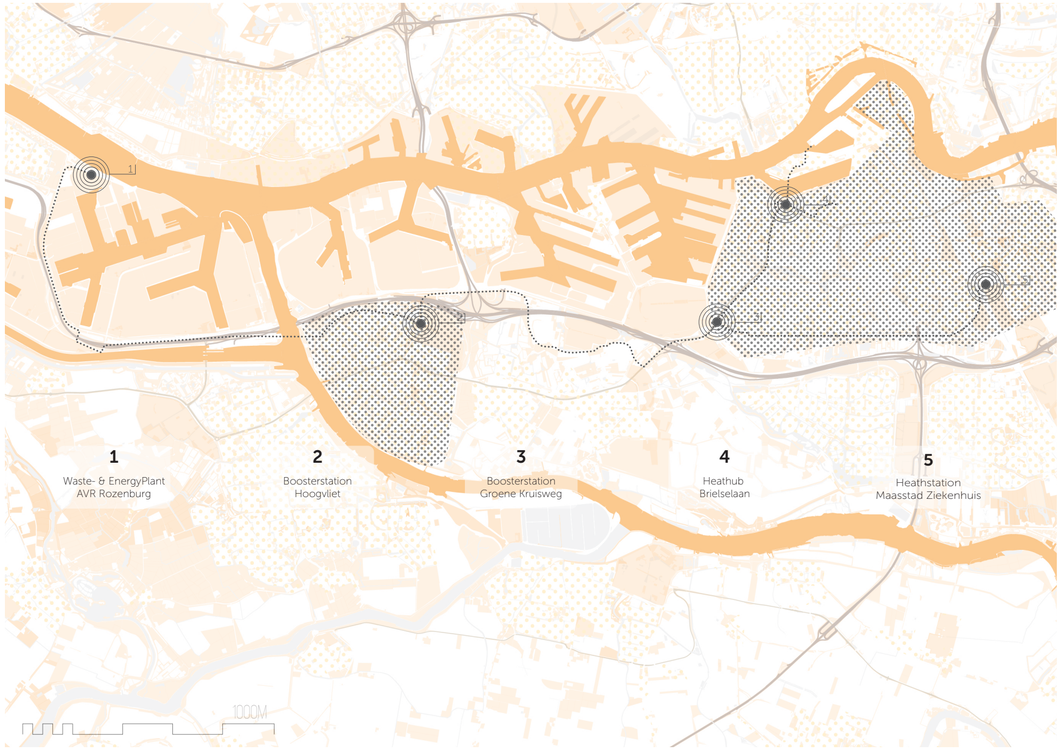
_Charlois
_Feijenoord
_Ijsselmonde
_Hoogvliet

7.123
Housing Equivalents

99,9
Availability

191.317 GJ
Delivered

9690t
Avoided emissions

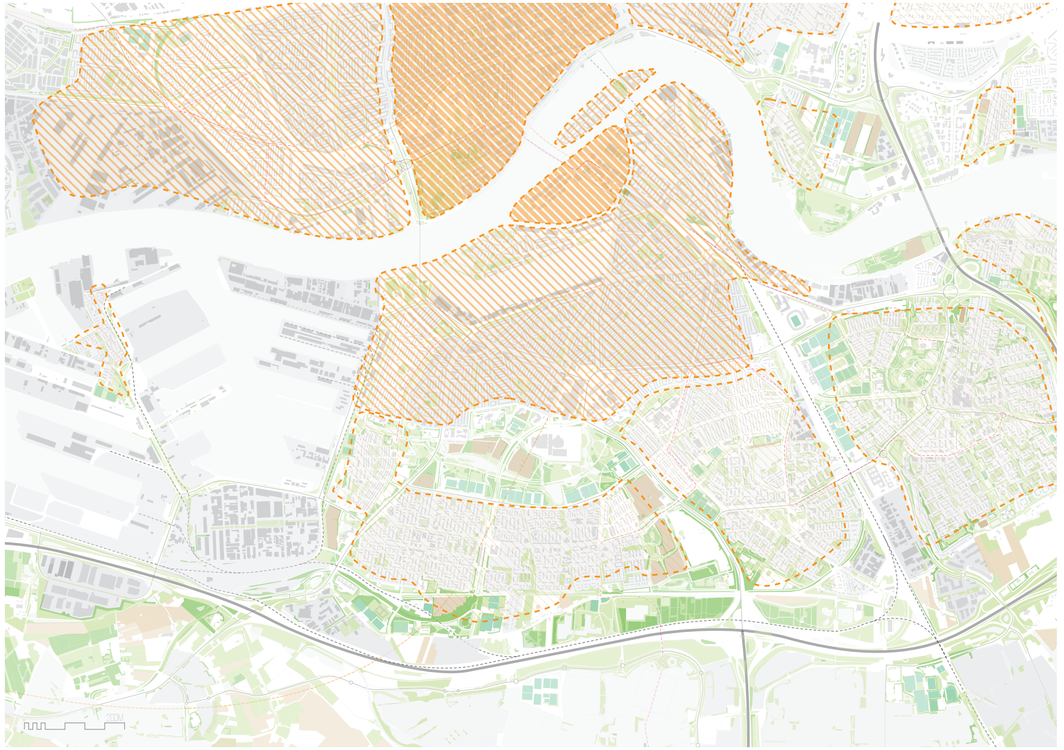


This map shows the development strategy by the municipality of Rotterdam in which the ambition is to achieve a well-balanced composition of the population. According to the municipality, the demand is concentrated around private-owned family houses in downtown and urban living environments. Most of the attractive neighbourhoods, according to the 'Grote Woontest' (Stand van het Wonen, 2008), are situated in the northern part of the city, in the neighbourhoods Kralingen, Hillegersberg and surrounding the Rotte River. The aim is to create comparible, 'green-urban –' and 'calm-urban living environments' around Zuiderpark, the 'Kop van Zuid' and 'Stadshavens.

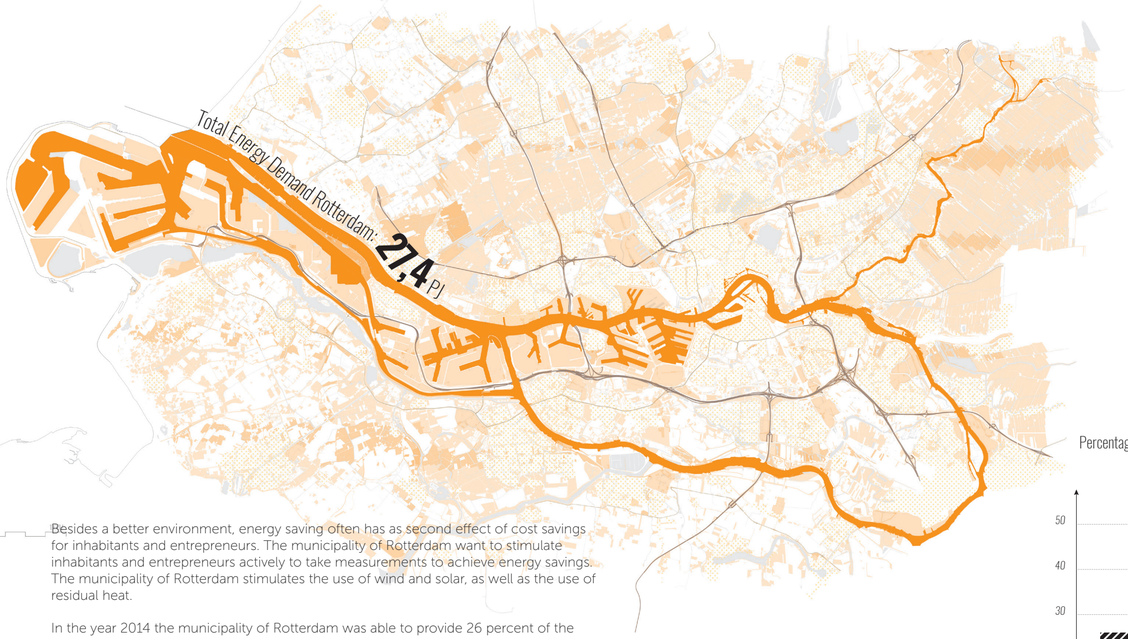
Urban Living Environment

Calm-Urban Living Environment

Green-Urban Living Environment



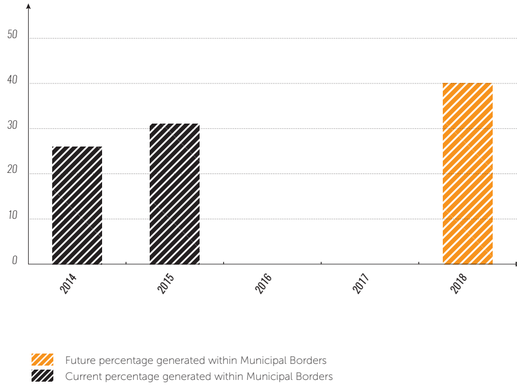
Derived from: Stadsvisie Rotterdam 2030 | adjusted by author



Besides a better environment, energy saving often has as second effect of cost savings for inhabitants and entrepreneurs. The municipality of Rotterdam want to stimulate inhabitants and entrepreneurs actively to take measurements to achieve energy savings. The municipality of Rotterdam stimulates the use of wind and solar, as well as the use of residual heat.

In the year 2014 the municipality of Rotterdam was able to provide 26 percent of the city with energy generated within the municipal borders and this percentage grew to 31 percent in the year 2015. The total energy use of the city of Rotterdam was 27,4 PJ, of which 8,5 PJ was generated with renewables. The goal is to let this number grow, mostly by focussing on wind energy, plants coincinerated with biomass and the use of solar power. Also the energy saving within the urban fabric contributes to the fact the municipality of Rotterdam is able to foresee better in its own energy demand (Monitor Duurzaam 2015 – 2018, 2016).

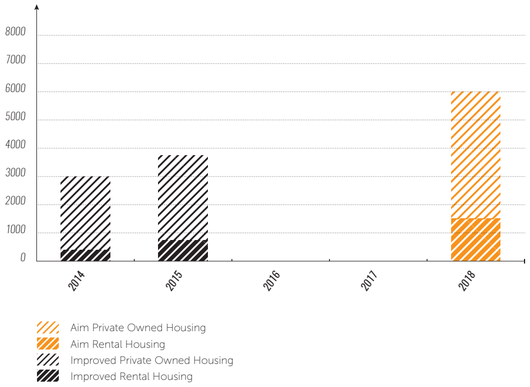
Percentage Energy from Renewables



Rotterdam has the aim to be able to generate enough energy so 40 percent of the energy used in the build environment will be from renewable sources by 2018. In the year 2030 this is supposed to be 100 percent.

If this numbers want to be achieved, this will have spatial implications within the urban fabric of the city of Rotterdam and more precise in Rotterdam South. How to give shape to this transition and where to place which forms of energy generators? How can residual heat from industries play a role in the process?

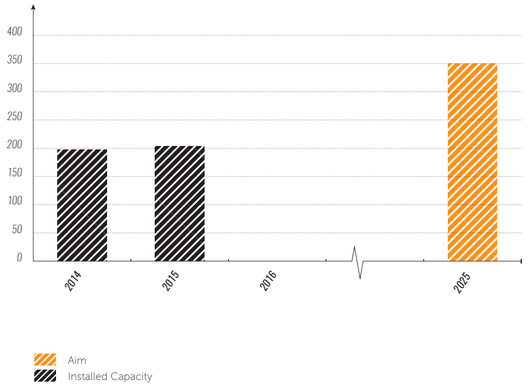
Energysaving Dwellings



The aim is to have made 3.000 private owned dwellings more energy sufficient by the year 2018. In the rental sector the aim is to improve 7.000 in their energy usage. The question arises how the urbanist can play a role in improving this amount of houses in the rental sector as well as the question how to get owners of houses to invest in energy saving measurments of their dwelling.

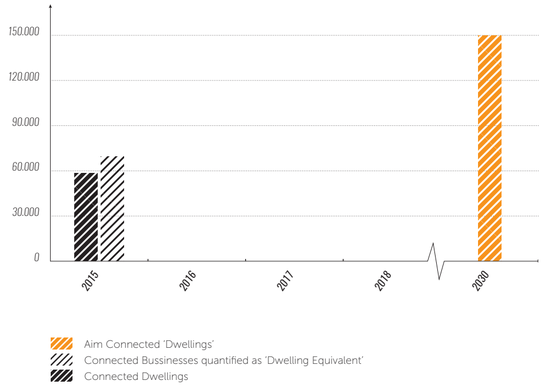
Derived from: Monitor Duurzaam 2015 - 2018 | Adjusted by Author

Wind Energy Production | MW



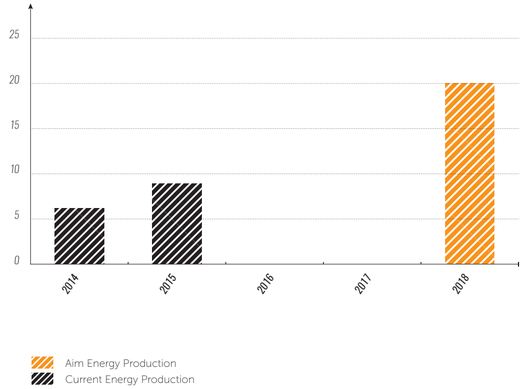
By 2018 Rotterdam wants to have enough wind turbines installed to have a combined capacity of 350 MW. In the year the amount of turbines was 86 with a capacity of 200,1 MW, by the year 2015 this number had grown to 88 with a combined capacity of 206,1 MW, which is only a marginal difference.

Sustainable Heat through District Heating



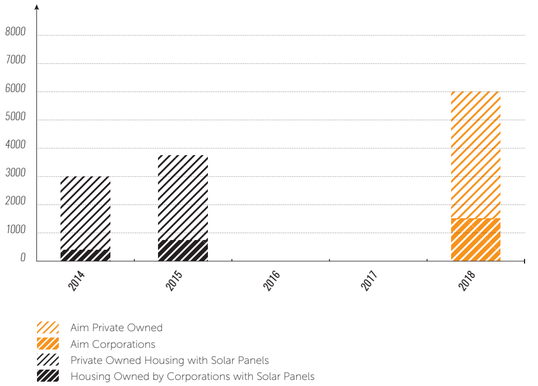
By 2030, the municipality wants to have 150.000 dwellings connected to district heating. In the year 2015 139.820 'dwelling equivalents' were connected to district heating. This number is built up from 56.245 dwellings and 800 business users, which equals 83.575 dwellings. In the implementation of this network and the spatial consequenses there is a role for the urbanist to play.

Solar Energy Production | GWh



By 2018 Rotterdam wants to produce 20 GWh of energy from solar. In the year 2014 there was a total production of 6,3 GWh, in the year 2015 this number increased to 8,3 GWh. When the aesthetics of solar panels change, as can be seen by the Solar Roof designed by Elon Musk's SolarCity, opposition against solar panels in the urban fabric may decrease.

Dwellings with Solar Panels

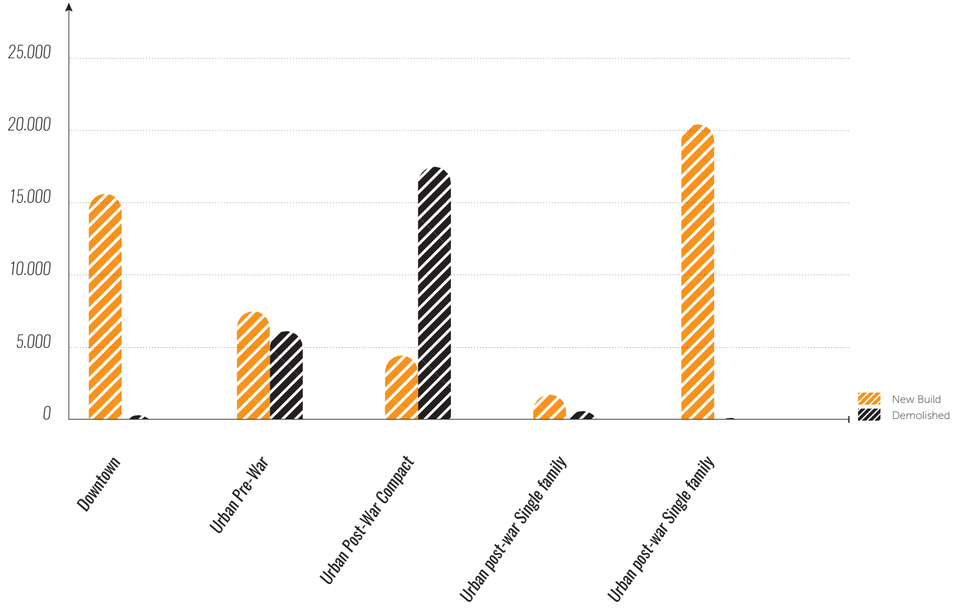


The aim is to provide 6.000 dwellings with solar panels by the year 2018. In this figure, 4.500 dwellings are private owned and 1.500 owned by corporations.

Here the question arises is why the majority of the dwellings is private owned. If it is possible to get the corporations triggered to invest in solar panels, the benefits might be higher over private investments in energy reduction through solar panels. Here lies a task for the urbanist to get the corporations more involved in the transition towards generating energy for solar panels.

Derived from: Monitor Duurzaam 2015 - 2018 | Adjusted by Author

Rotterdam has the goal, as many other municipalities in the Netherlands, to attract higher educated inhabitants as well as middle- and high incomes. In comparison to other cities, the municipality encounters competition on the level of living quality. To improve the living quality for its (future) inhabitants, the municipality decides to focus on developing new housing in the existing urban fabric and the creation of attractive living environments. By doing so, the number of inhabitants increases and at the same time the support for services already present. Furthermore , the green spaces surrounding the municipality are spared and the movements to live within the city stay limited as can be read in Stadvisie Rotterdam 2030 (2007). The municipality strives to build 56.000 new dwellings, of which 2400 dwellings in a village like living environment.



Source: Author

derived from: Stadsvisie Rotterdam 2030 | adjusted by author

"De stad waar je overhemden koopt met opgestroopte mouwen" - author unknown -

- Source: Flickr

Shown are the open and green spaces in Rotterdam South. It becomes clear that there are large areas of greenspace, but the green is fragmented and has designated functions. Therefore, the search for implementation of renewable energy generators becomes more difficult.

- Open Green Space
- Densely Vegetated Green
- Allotments
- Leisure
- Agricultur

Derived from Maperitive | Adjusted by Author

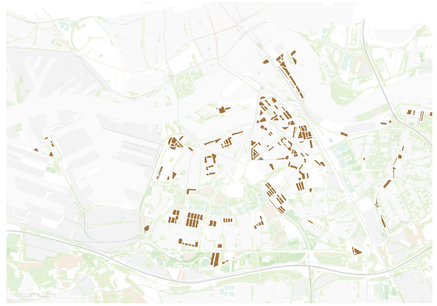
The main transportation network of Rotterdam South. The area is well connected by public transport as well as by roads. Present in the location is a tram network and metro line and in the eastern part runs a train line connecting Rotterdam South with the city centre and to Dordrecht.

- Train Station
- Metro Station
- Tram Station

Derived from Maperitive | Adjusted by Author

Built before 1959

Built before 1959 | Restructured

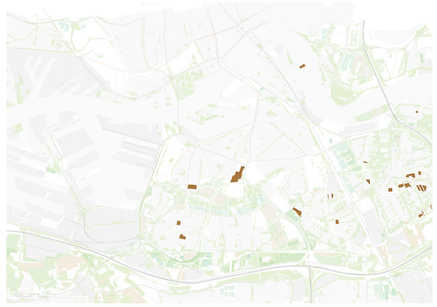


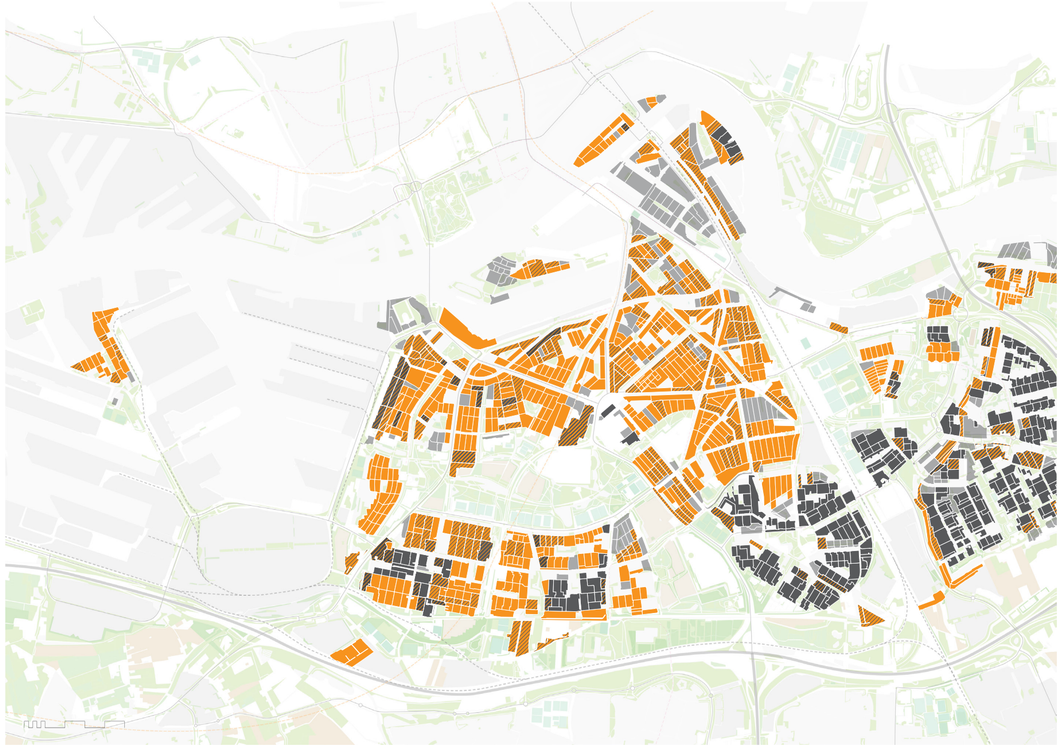
Built between 1960 & 1979

Built after 1979 | Restructured

Built after 1980

Mixed Buildingyear



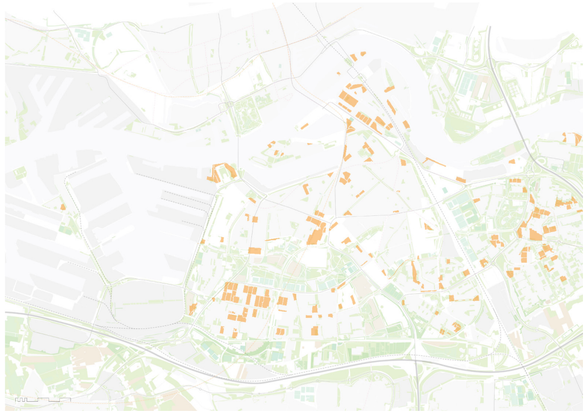


This series of maps shows the development of Rotterdam South. Clearly can be distinguished that in the northern parts of Rotterdam South major new developments have taken place because of transformation of former harbour area. Also clearly can be seen that although some areas that were built before 1959 have undergo restructuring, the majority of the housing stock realised before 1959 is in its original condition. Here lays a big task for the municipality as well as for urbanist to come up with solutions for more sustainable housing solutions.

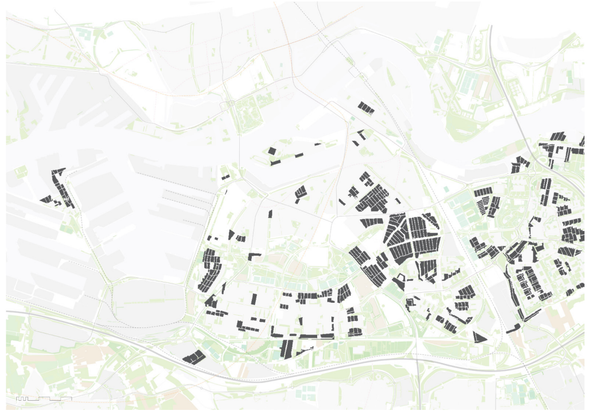
Derived from: Reader Trefzeker op Zuid | Adjusted by Author

Stacked without Elevator

Stacked with Elevator



Single Family Housing

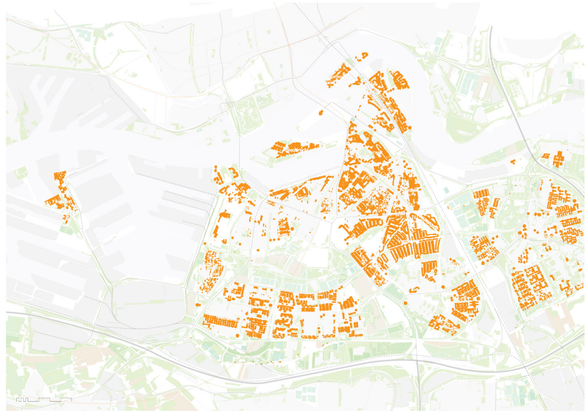


Upstairs-Downstairs Dwelling

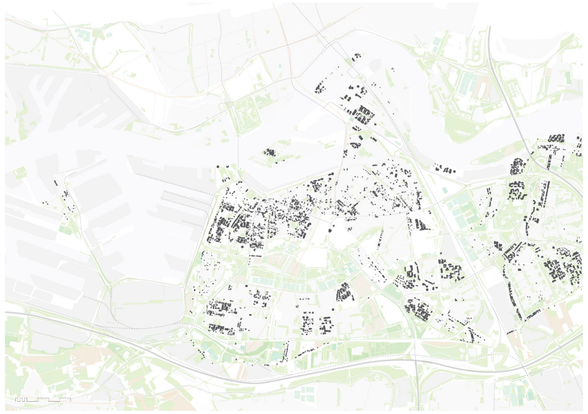
The series of maps shows the prevailing housing typologies of the different areas in Rotterdam South. Some conclusions that can be drawn is the substantial share of stacked housing without elevator, where in the eastern parts of Rotterdam south single family housing is predominant, although along the major infrastructural lines, the so called, 'beneden-bovenwoning' is dominant.

Derived from: Reader Trefzeker op Zuid | Adjusted by Author

Corporation or Municipality

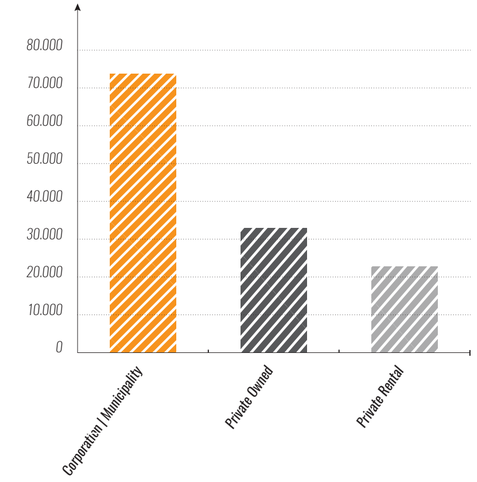


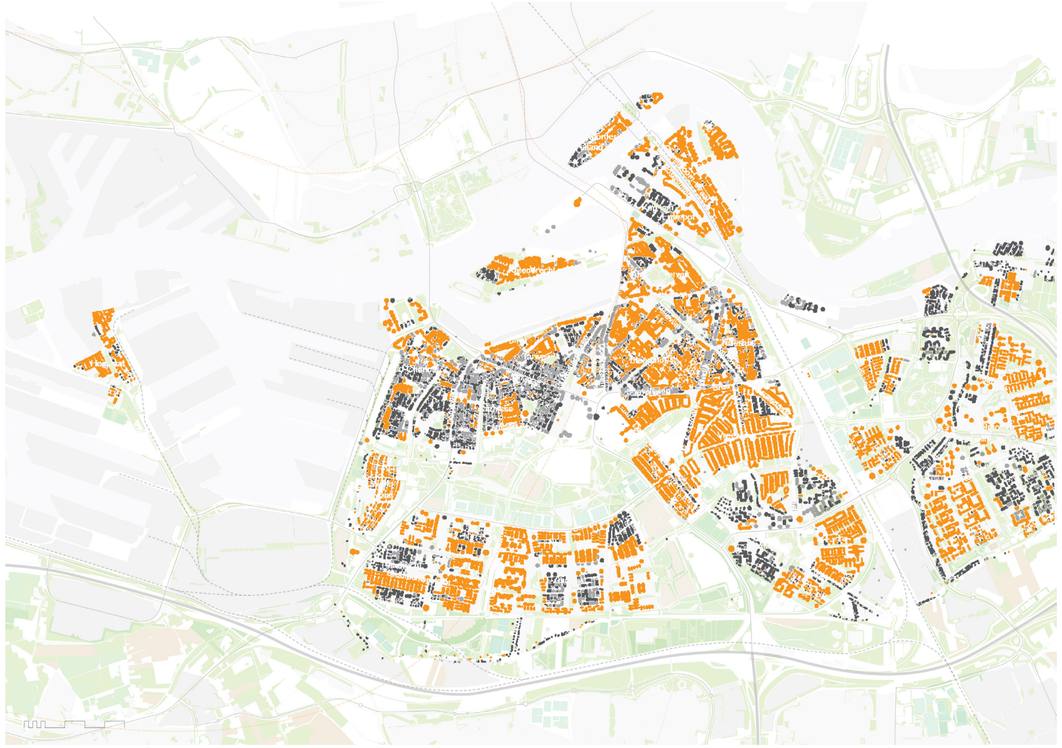
Private Owned



Private Rental

Dwellings



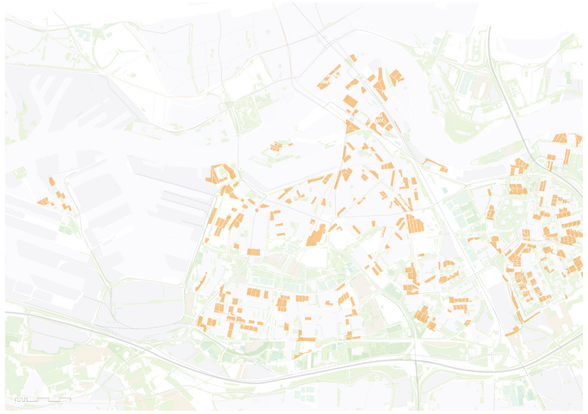


When looking to the situation of ownership in Rotterdam South, a distinction can be made between the western parts (Charlois) where the large majority is private housing stock, partly private owned, partly private rented, and the eastern part (Feijenoord) where most of the housing stock is owned by corporations. In this part, along the main streets most of the housing stock is private rent.

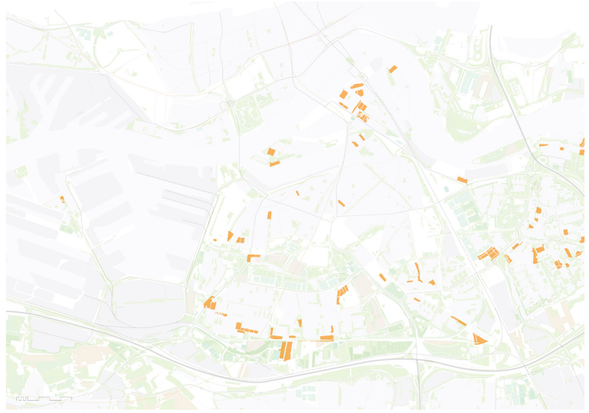
Derived from: Reader Trefzeker op Zuid | Adjusted by Author

Floor Surface < 75 m²

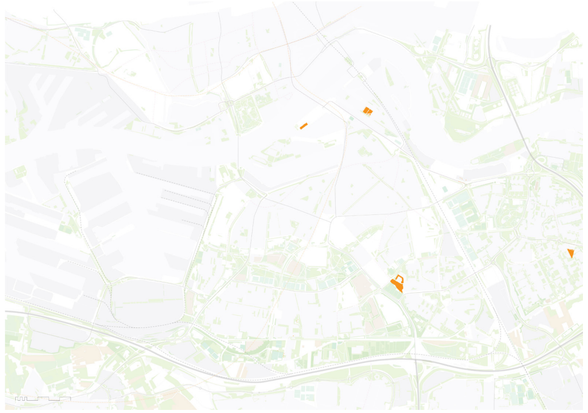
Floor Surface 76 - 100 m²



Floor Surface 101 - 120 m²



Floor Surface > 120 m²

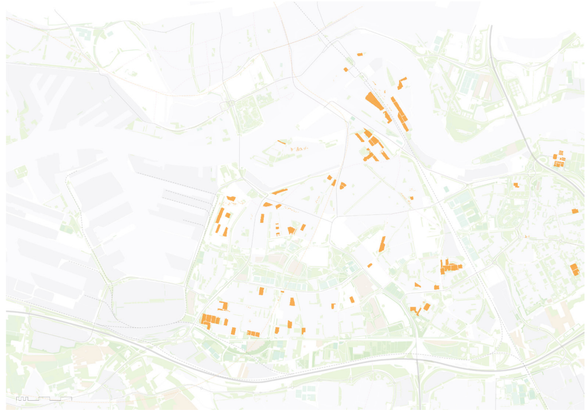


The maps show the large amount of small dwellings present in Rotterdam South, the majority of dwellings is less than 75m². In the eastern parts of Southern Rotterdam have some larger dwellings and properties with a surface more than 120m² are nearly not present in the area.

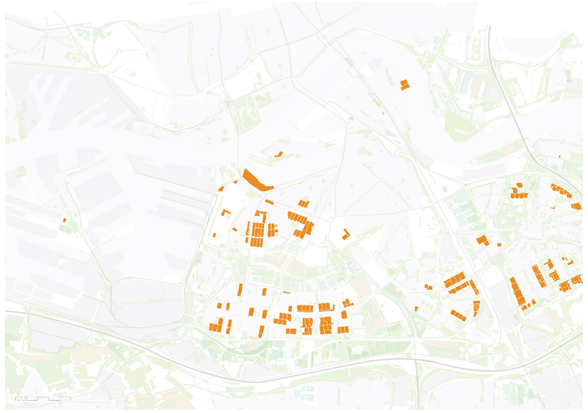
1 - 25 Percent

26 - 50 Percent

51 - 75 Percent



76 - 100 Percent



This series of map is a combination of the previous maps, combined with the property value of the housing stock. The municipality defines the vulnerable housing stock as the part of the dwellings which does not meet today's standard. For the municipality, vulnerable housing is defined as those dwellings which are situated in a stacked housing without elevator, smaller than 75 m2 and a property value less than €130.000. Looking at these maps, the high percentage of vulnerable housing is striking, here lies a major task for urbanists.

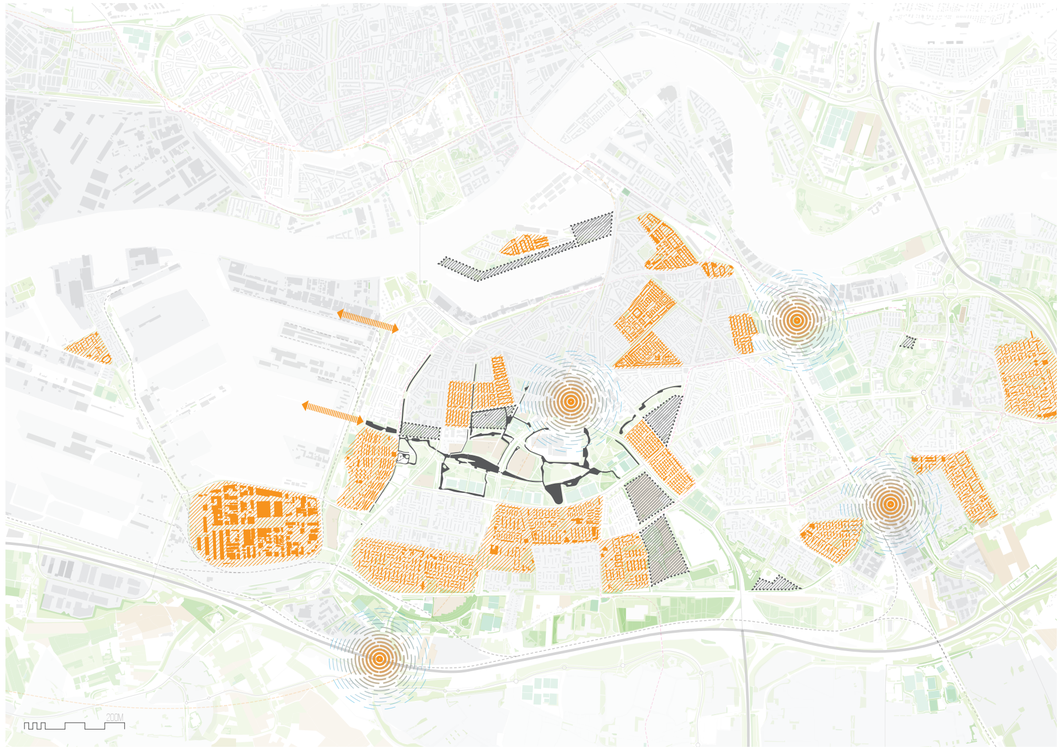
Derived from: Reader Trefzeker op Zuid | Adjusted by Author

Restructuring Locations

Development Locations

Improved Connection & Water Network

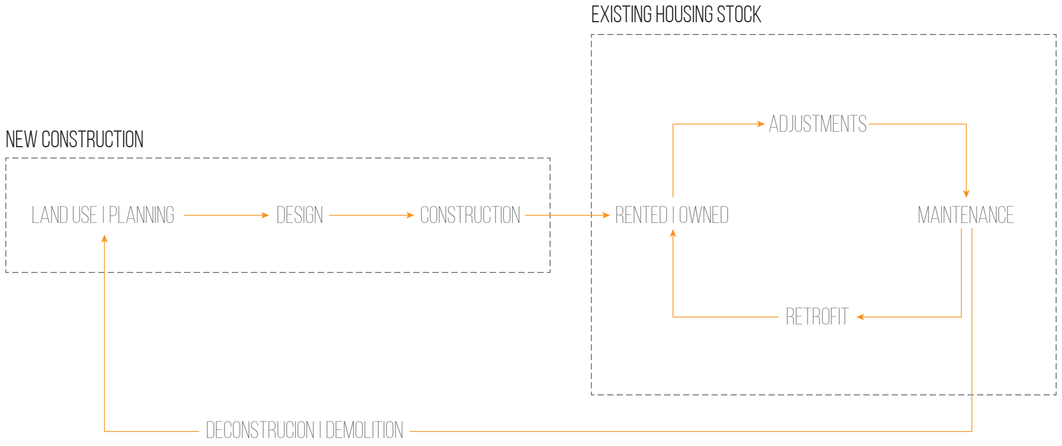
Opportunity Zones



The municipality appointed major restructuring locations and locations for new developments in Rotterdam South. Besides this the connection between Waalhaven and the neighbourhoods adjacent to the harbour should be improved, as well as an improved water network to deal with peak loads of increasing rainfall and rising water levels.

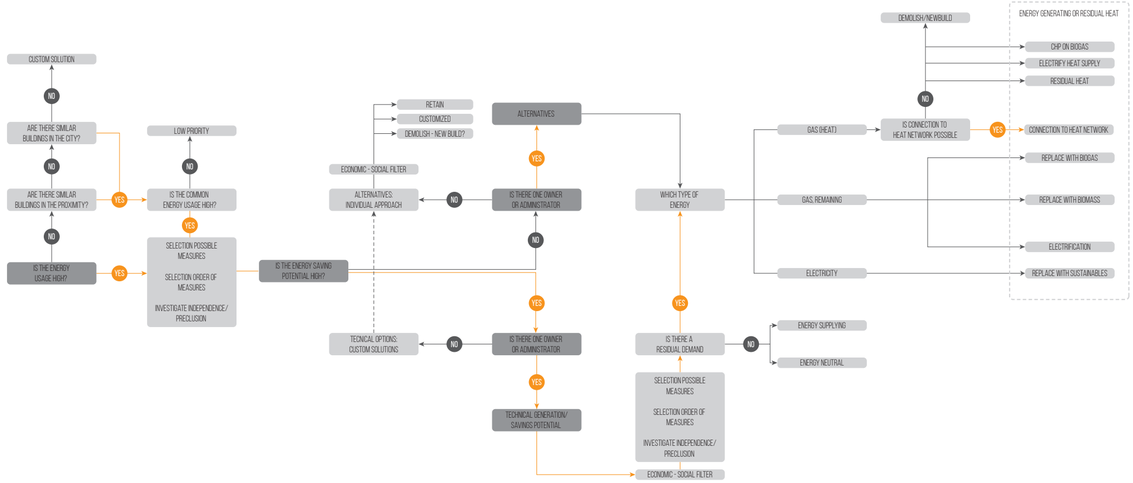
In Rotterdam South, several opportunity zones have been appointed, such as the area around Ahoy and Zuidplein, focussing on leisure and the area around the Feyenoord stadium, branded as a 'topsport location'. Besides these two, the area around hospital Maashaven is appointed as an area focussing on healthcare, where the area surrounding the A15 in proximity to the Waalhaven and Ridderster should be developed as an area focussing on knowledge and services.

Derived from: Stadsvisie Rotterdam 2030 | Adjusted by Author



The model shows how to approach the deprived housing stock in Rotterdam South. The focus in Oud-Charlois is on combining cramped apartments into double houses. To reach this goal, the municipality of Rotterdam appointed a 'coach' to give guidance in the process to combine two smaller apartments into a single family dwelling. Until the end of 2016, for this purpose even a subsidy was available with a maximum of €10.000,- (rotterdam.nl)

Source: Author



The flow chart shows an action plan to deal with the indigent housing stock in Oud-Charlois and in this way come up with suitable strategies for the housing stock. On basis of the chart, an effective savings strategy can be lined out for the neighbourhood.

Derived from Posad, Savings and Efficiency Tool | Adjusted by Author

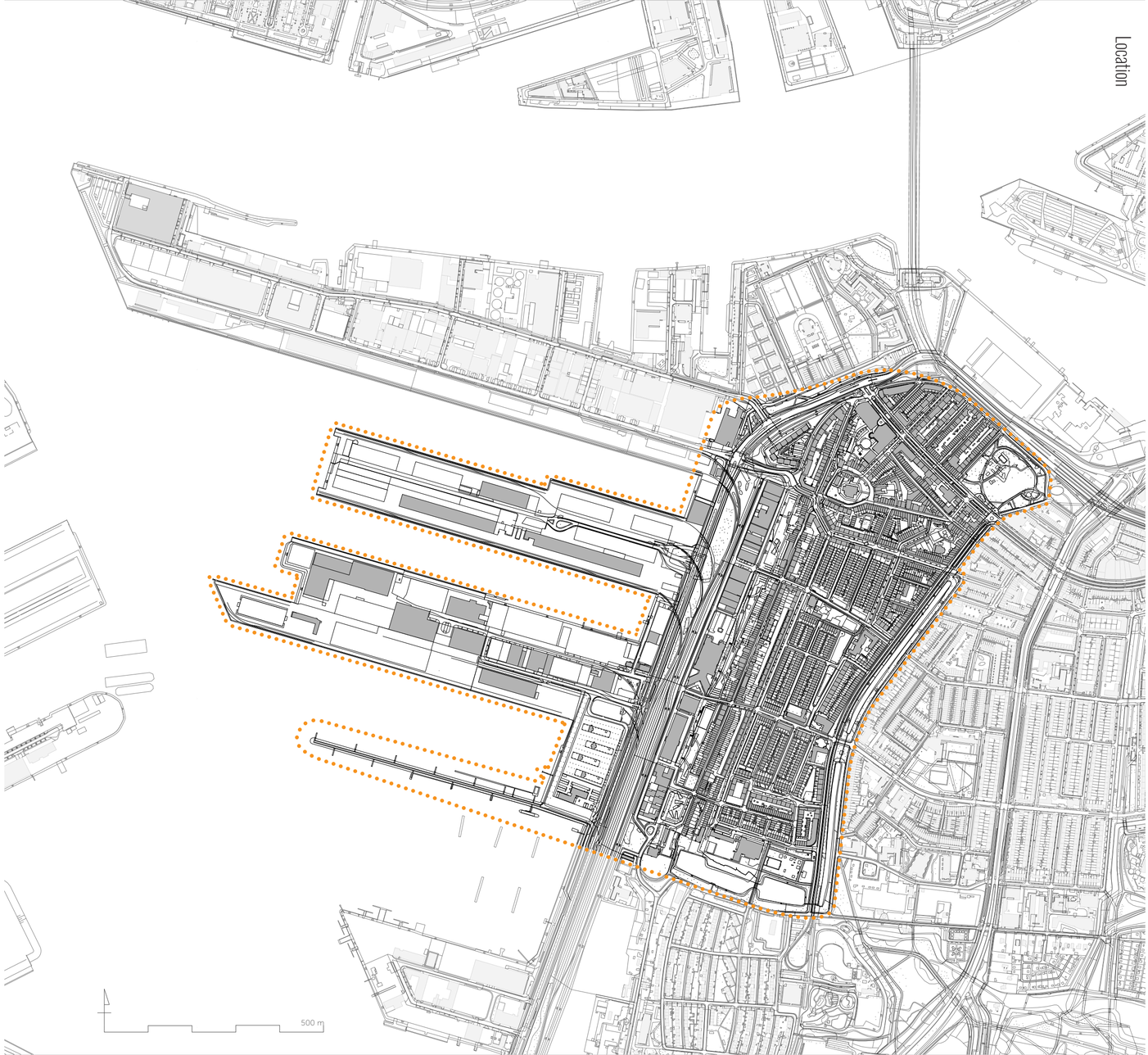
Source: Author

Oud-Charlois has in total roughly 13.000 inhabitants in nearly 6.500 dwellings. The project site has approximately 3400 dwellings, a large harbour area, partially ready for transformation, industrial area in destitute state and a large infrastructural area dividing the different areas. The majority of the dwellings is stacked housing, only nine percent is single family dwelling, even though often it appears different in the streetscape. The ownership of the dwellings is extremely scattered, with around a third private owned, a third owned by housing corporations and a third private owned by a considerable amount of proprietors.

The historical core of Oud-Charlois has a far-reaching history. The core is of great historical value, together with the historical ribbon, Grondherendijk and Zuidhoek. This contributes to the historical characteristic of the neighbourhood. The small scale, variation in premises, the amount of green present and the concentration of artist, mainly in the historical centre, make the neighbourhood to one with a lot of potential.

The neighbourhood has a young population structure but scores low in the field of health of its inhabitants. This can be seen in the statistics, which show fifteen percent of the inhabitants has problems mastering the Dutch language. This dissatisfactory numbers are translated into the income levels of its inhabitants: sixty percent of the households can be categorised under households with a low income (wijkprofiel).

On the next page the exact location for this graduation project is shown. In the coming pages the reason will become more clear, but in a nutshell the reason is this location gives the opportunity to come to a 'smart neighbourhood' through restructuring, new developments and transformation of the public domain and housing stock. The area includes harbour area ready for restructuring, as well as housing properties for which the same conditions. The historical core has to deal with its own problems and there is a wish from the municipality to connect the waterfront and the hinter laying neighbourhood. The coming pages give some insight in the characteristics of the neighbourhood.

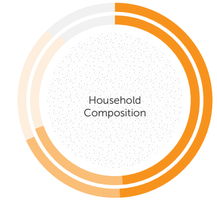


The statistics on the adjacent page give information on the demographics of the area in comparison to Rotterdam. Some numbers clearly stand out. Such as the fact that a substantial part of the households can be considered as low. This is in comparison to the rest of the Netherlands. Rotterdam as a whole scores below average, and Oud-Charlois clearly scores lower than the rest of the city.

Two other clear distinctions can be made when looking at the graphs. On the one hand, the high amount of inhabitants with a non-western background stand out. Second, percentage of inhabitants who are employed in comparison to inhabitants without a job is in comparison to Rotterdam notably lower.

low lowest 40%
middle middle 40%
high highest 20%

Oud-Charlois	*60 %*	
Rotterdam	*51 %*	
Oud-Charlois	*31 %*	
Rotterdam	*33 %*	
Oud-Charlois	*9 %*	
Rotterdam	*16 %*	



single person household
childless couple
couple with kids
single parent household

Oud-Charlois	*18 %*	
Rotterdam	*17 %*	
Oud-Charlois	*71 %*	
Rotterdam	*69 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	

< 15 years
15 - 65 years
> 65 years

Oud-Charlois	*18 %*	
Rotterdam	*17 %*	
Oud-Charlois	*71 %*	
Rotterdam	*69 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	

native dutch
western background
non-western backgroung

Oud-Charlois	*40 %*	
Rotterdam	*51 %*	
Oud-Charlois	*16 %*	
Rotterdam	*12 %*	
Oud-Charlois	*45 %*	
Rotterdam	*37 %*	

Working

Oud-Charlois	*13 %*	
Rotterdam	*33 %*	

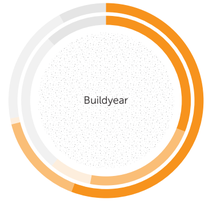
Sources: Gebiedsplan Oud-Charlois 2014-2018; CBS Statline; Wijkprofiel; GisWeb | Adjusted by Author

The diagrams on the next page display thought-provoking numbers. For example the high percentage of the housing typology ‘stacked without elevator’. The aim of the municipality is to get a more mixed housing stock in the area, with more single family dwellings. This ratio is also reflected in the property value of the housing stock in the area and is also reflected in the average surface of dwellings in the area.

To come up with strategies for the neighbourhood it is import to get the different stakeholders and owners involved. Since the ownership situation in Oud-Charlois is severely scattered with a high percentage of private rented dwellings with a number of different property owners, this is a challenge.

- *single family dwelling*
- *stacked with elevator*
- *stacked without elevator*

Oud-Charlois	*11 %*	
Rotterdam	*26 %*	
Oud-Charlois	*13 %*	
Rotterdam	*23 %*	
Oud-Charlois	*76 %*	
Rotterdam	*51 %*	

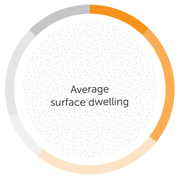


- *< 1945*
- *1945 - 1968*
- *1969 - 1979*
- *1980 - 1999*
- *> 2000*

Oud-Charlois	*18 %*	
Rotterdam	*17 %*	
Oud-Charlois	*71 %*	
Rotterdam	*69 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	
Oud-Charlois	*11 %*	
Rotterdam	*15 %*	

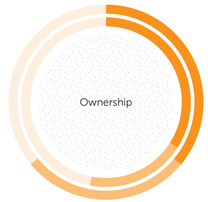
- *low* unto € 86.000
- *middle* € 86.000 till €1 80.000
- *high* from € 180.000

Oud-Charlois	*48 %*	
Rotterdam	*20 %*	
Oud-Charlois	*46 %*	
Rotterdam	*60 %*	
Oud-Charlois	*6 %*	
Rotterdam	*20 %*	
Rotterdam	€ 160.247	
Charlois	€ 112.769	
Oud-Charlois	€ 119.565	



< 55 m²	12,2 %
55 m² - 65 m²	23,4 %
65 m² - 75 m²	25,0 %
75 m² - 85 m²	9,3 %
85 m² - 95 m²	17,5 %
> 95 m²	12,6 %

Average surface: 74m²



- *owned*
- *private rented*
- *corporation*

Oud-Charlois	*35 %*	
Rotterdam	*34 %*	
Oud-Charlois	*27 %*	
Rotterdam	*19 %*	
Oud-Charlois	*35 %*	
Rotterdam	*47 %*	

- *residential function*
- *non-residential function*

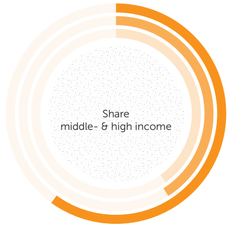
Oud-Charlois	*72 %*	
Rotterdam	*54 %*	
Oud-Charlois	*28 %*	
Rotterdam	*46 %*	

Sources: Gebiedsplan Oud-Charlois 2014-2018; CBS Statline; Wijkprofiel; GisWeb | Adjusted by Author

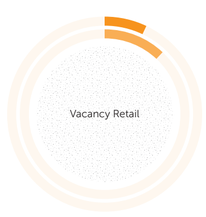
The municipality of Rotterdam has high ambitions with Oud-Charlois, since the neighbourhood is one of the seven, among Afrikaanderwijk, Bloemhof, Carnisse, Feijenoord, Hillesluis and Tarwewijk, focal neighbourhoods of the 'National Program Rotterdam South' (NPRZ). These goals stretch from a reduced share of vulnerable single family dwellings up until a reduced percentage of inhabitants living of financial support.

One of the major challenges is to attract more middle- and high incomes to the neighbourhood. To reach this goal, functions will have to added, as well as different housing typologies.

Share 2030	50 %
Share 2012	55 %



Oud-Charlois 2030 (aim)	60 %
Oud-Charlois 2014	41 %
Rotterdam 2014	40 %



Share 2030	7 %
Share 2012	12 %

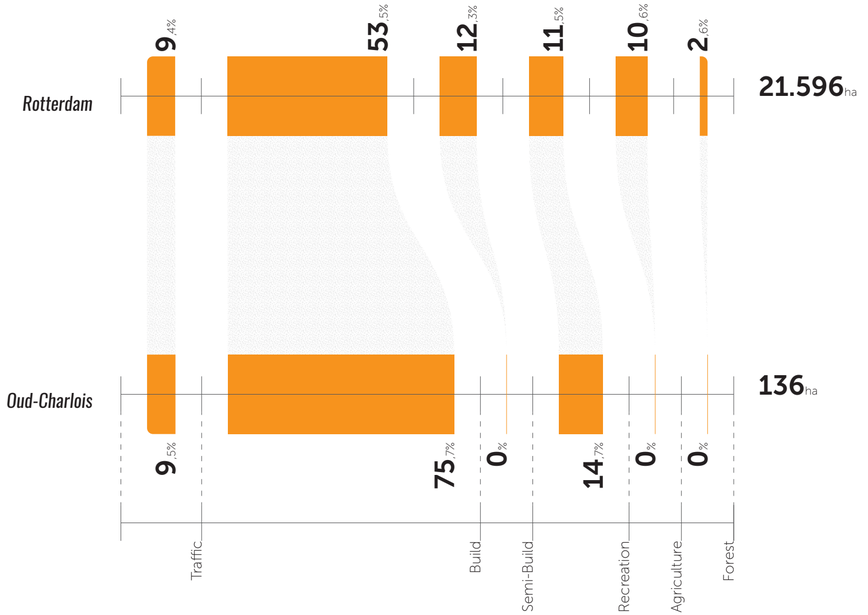
share 2030	50 %
share 2012	55 %

Oud-Charlois 2030 (aim)	100
Oud-Charlois 2014	90
Rotterdam 2014	100

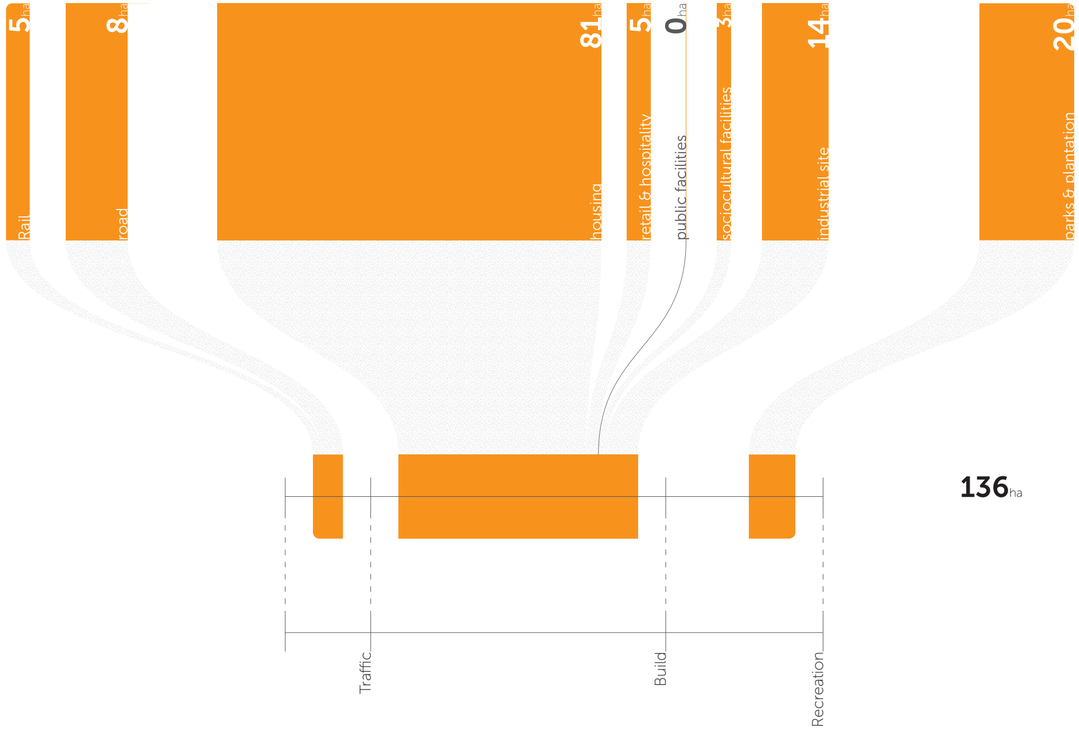
share 2030	12 %
share 2012	14,8 %

Sources: Gebiedsplan Oud-Charlois 2014-2018; CBS Statline; Wijkprofiel; GisWeb | Adjusted by Author

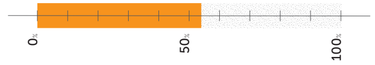
The scheme shows the land-use in Oud-Charlois in comparison to the municipality of Rotterdam. A conclusion is that the neighbourhood is relatively dense.



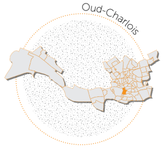
When zoomed in to Oud-Charlois, interesting facts are shown. In the neighbourhood, currently there are no public facilities present and also the amount of sociocultural facilities is low.



The figures show a lack of functions in the area. Where in the rest of the city, nearly half of the floorspace is used for functions, in Oud-Charlois, this is just over a quarter. This asked for the adding of functions in the neighbourhood.

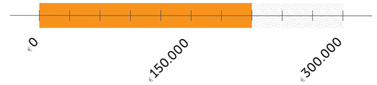


54% VS. **46**%



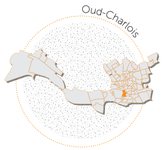
72% VS. **28**%

The figure on the adjacent page show some remarkable numbers. The housing price in Oud-Charlois is less than half of the rest of the Netherlands and also for below the average of Rotterdam.



€ **209**.000

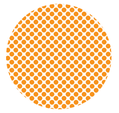
€ **148**.000



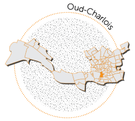
€ **101**.000

As the figures show, Rotterdam is in comparison to the Netherlands dense, but what is remarkable is the fact that Oud-Charlois is less dense than the rest of Rotterdam. There are opportunities for densification in the area.

1961



3968



3479

Non-Urban
< 500

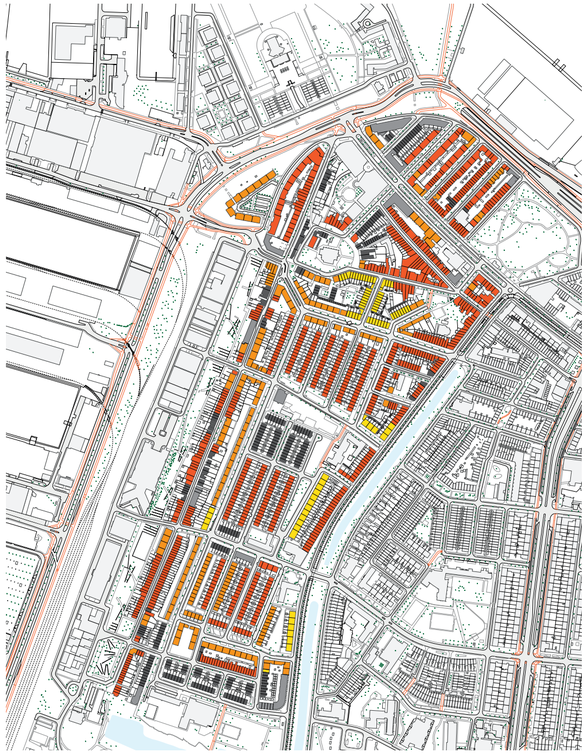
Low-Urban
500 - 1000

Moderate Urban
1000 - 1500

Strongly Urban
1500 - 2500

Very Strongly Urban
> 2500

The map shows the distribution of the different housing typologies throughout the neighbourhood. It becomes clear, the amount of single family dwellings is low. The ambition of the municipality is to double this amount through new development, as well as combining smaller apartments into single family houses (Woonvisie, 2016).



Eengezingswoning
Galerij
Haags Portiek
Portiek
Beneden Boven Woning

potential **276** single family dwellings

Shown are typical examples of the different typologies present in the neighbourhood. The map on the right page highlights the typical 'beneden-boven' dwellings that who lend themselves for the goals of the municipality to combine smaller dwellings into larger single family dwellings. In this manner 276 single family dwellings can be realised. On the other hand, this also leads to the loss of 552 dwellings. To meet the goals set for this thesis, substitute housing should be realised.

Voornsehof

Verboomstraat

Rietdijk

Voornsevliet

De Quackstraat

Gouwstraat

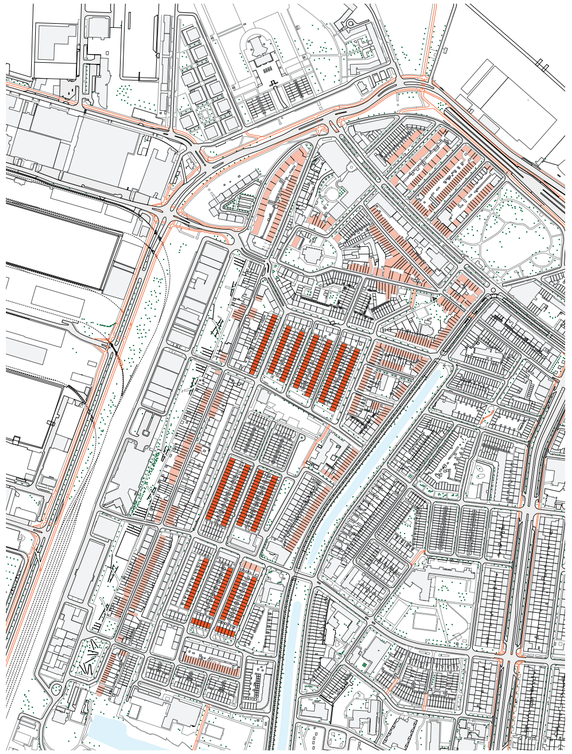
Frans Bekkerstraat

Struitenweg

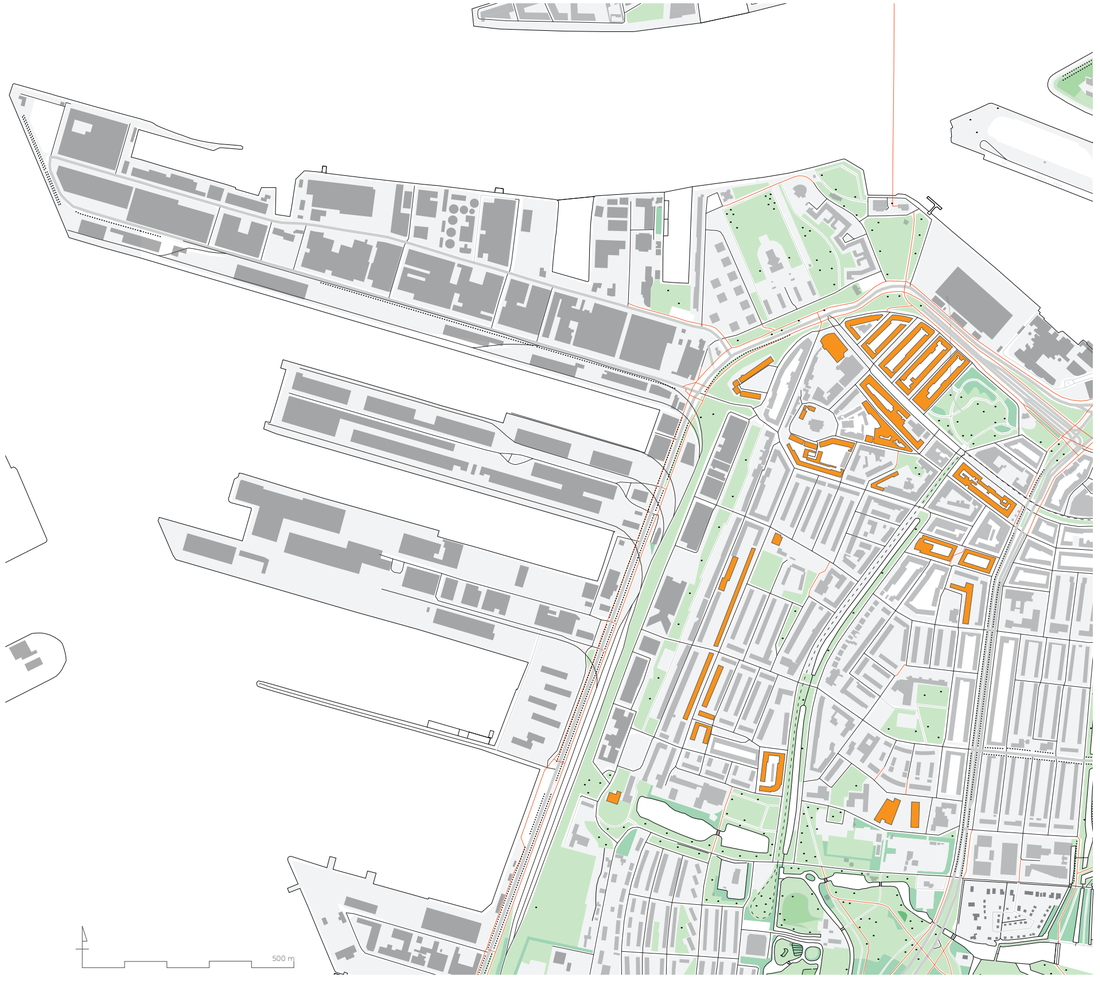
Van Dieststraat

Van Struitenweg

- *Eengezinswoning*
- *Galerij*
- *HaagsPortiek*
- *Portiek*
- *Beneden-Bovenwoning*



The map shows the blocks in which the majority of the dwellings is owned by corporations, However, in none of the cases, a corporation is responsible for a complete block. This scattered owning situation makes it a convoluted situation to come up with resolute measures. Different landlords, owners and corporations need to be gathered around the table and need to accept new implementations.



majority of block owned by corporation

majority of block private owned | private rented

Derived from Gisweb | Adjusted by Author

Doelgroepenbeleid

Engage in private rental sector

100

new developed 2015 -2018

Private owned

33

Private rental sector

21

Short term (inclusive 2017)

Demolish

150

Combine | "Fix-up homes"

300

Long term (till 2030)

Demolish

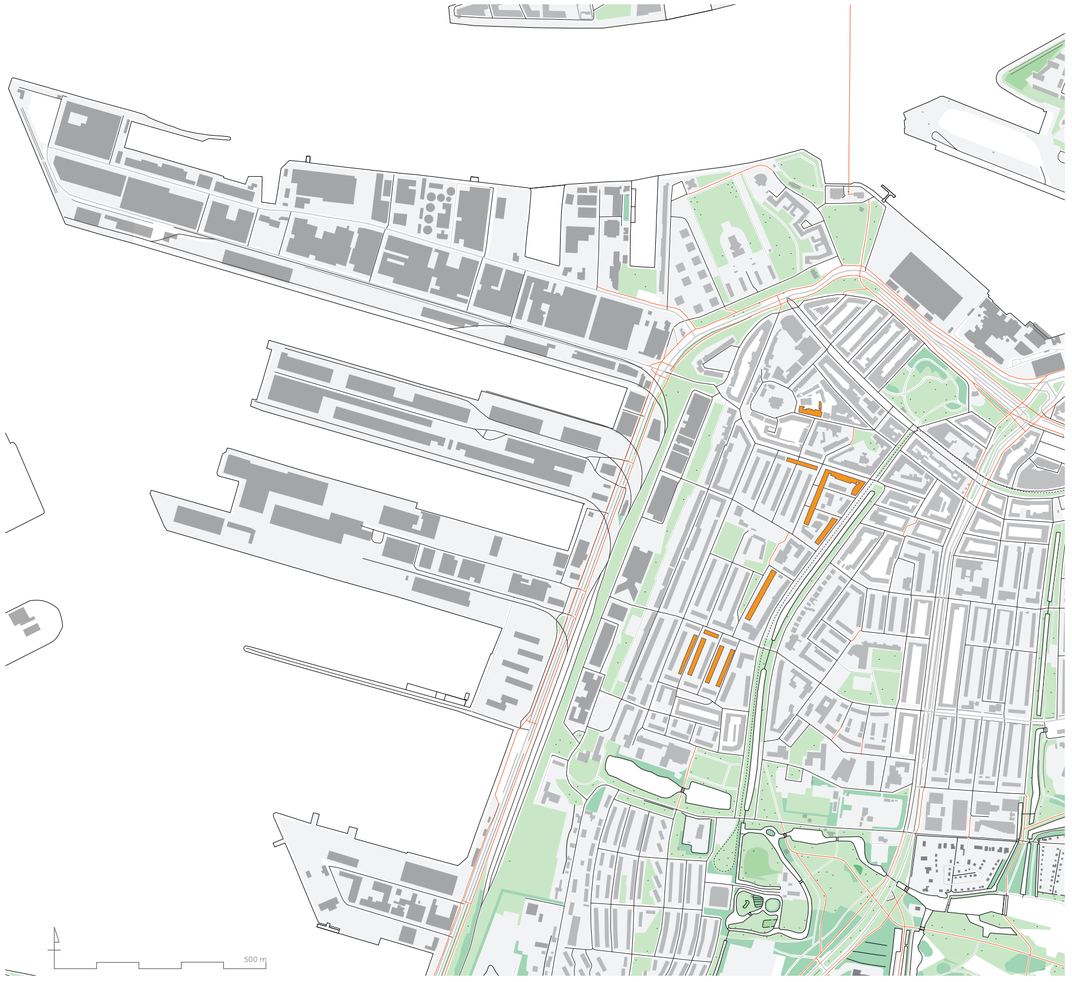
150

Combine | "Fix-up homes"

1.100

The data shows the development plans for Oud-Charlois determined in the execution policy of the National Program Rotterdam South. It becomes clear, the emphasis lays on combining properties and bring deteriorated properties in the market as "fix-up homes". This strategy will lead to a decreased total housing stock, but gives the opportunity to attract wealthier inhabitants.

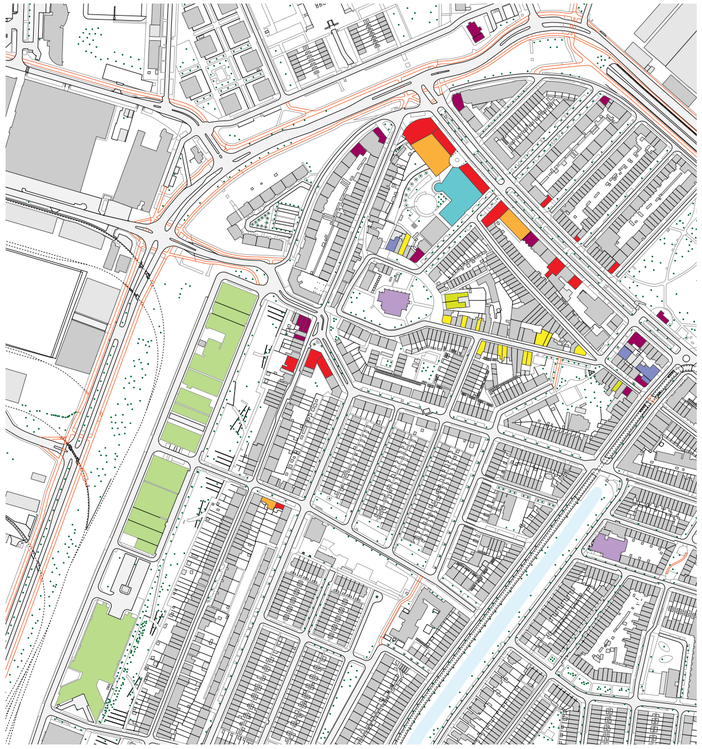
private owned property in impoverished condition



Source: NPRZ Uitvoeringsplan 2015 - 2018 | Adjusted by Author

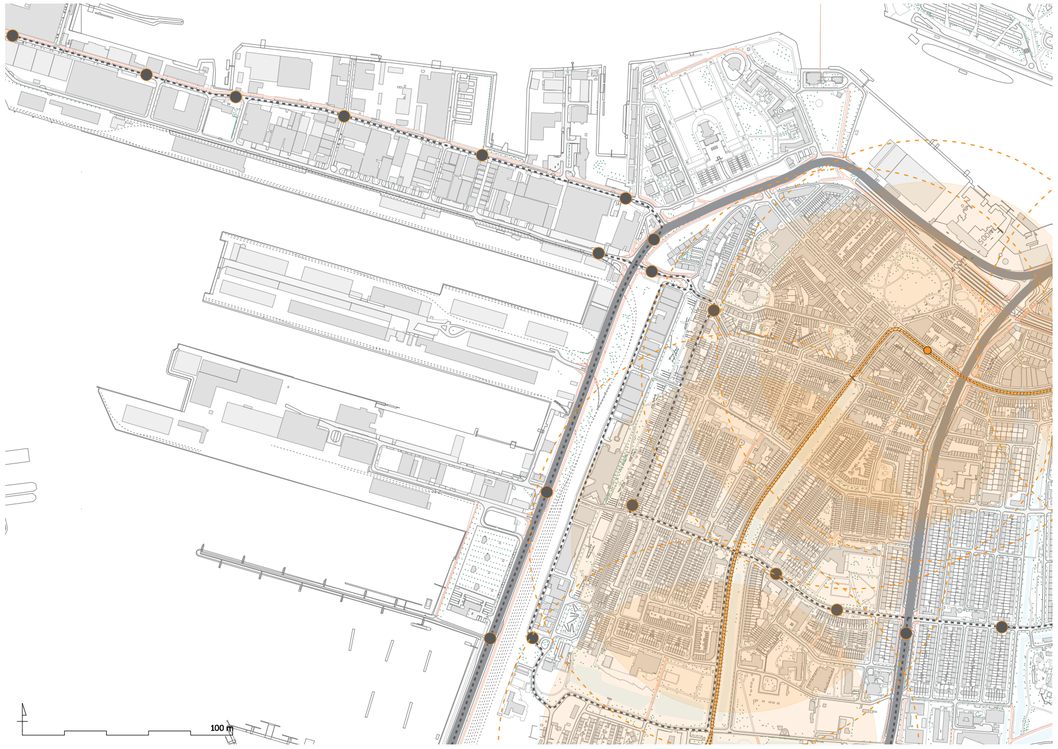
Derived from Kennisbank31 | Adjusted by Author

The map on the adjacent page shows the functions present in the area. It becomes clear that majority of the functions present are situated in the northern part of the neighbourhood.



supermarket
library
horeca
garage
industry
gallery | atelier
religion

With this map, showing the network of public transportation, it becomes clear the neighbourhood improvement in this field. Specially the area adjacent to the dike has poor reachability.



Tram stop
Tram line
Bus stop
Bus line
Road city Network

Housing stock
_double the share of single family dwellings in the area, mainly through combining apartments and secondary by means of demolishing/new developments
_stimulate combination of dwellings in the Charloise Tuinen area
_develop and operate with instruments to stimulate combining, improve appearance, intervene in misconducts and give the opportunity to owners to structurally manage through ownership associations
_make clear where and how to sell properties, social property and business units owned by municipality and corporations

Public domain and accessibility
_improve 'long lines' and connections with adjacent neighbourhoods
_refurbishment of Boergoensevliet (partially finished) and extend this to Boergoensestraat
_improve relation and connections to Zuiderpark
_improve public transport connections, mainly in east-west direction
_improve connection Rietdijk and Waalhaven Oostzijde
_deal with appearance courtyard and property boundaries

Employments
_Spui area: chances for restructuring as well as small scale engineering companies and apprenticeships
_chances for small scale enterprises and creative entrepreneurs at historical core Oud-Charlois
_facilitate initiatives such as Speelstad Rotterdam

Services
_economic revitalisation of 'Kunstenzone' through changed functions of former retail properties
_added functions in Oud-Charlois to attract young families

People
_focus on young families
_grasp social climbers
_attract creatives to neighbourhood

Derived from NPRZ | Adjusted by Author

Living Environment Oud-Charlois *goals till 2020*

- Share midde- & higher incomes increases from 42% till 60%
- Share of multiple person households increases from 29% till 33%
- "Veiligheidsindex" increases from 6,4 to 8

Housing stock

- Improve private owned housing stock
- Increase housing differentiation
- minor new developments

Private Owned housing stock

- Improving"Boergoensehof"
- Get owners associations involved
- Combine dwellings
- Improve Boergoensevliet

Developments

- Realization of 73 dwellings, of which 55 for middle- & higher incomes
- Zuidhoek
- Oostvoornestraat

OBR owned housing

- Tackle all 196 dwellings ("Kluswoning", combine, renovation or demolish)

Corporations

- Doklaanbuurt: maintenance 339 dwellings (Woonstad)
- Grondherendijk: maintenance 28 dwellings (Vestia)

Improvements Public Domain

- Portlandstraat, Pendrechtstraat, Zegenstraat

Vacancy

- Schilpoortstraat, Frans Bekkerstraat

Inhabitant participation Public Domain

- Wolphaertshof
- Gouwplein
- Boergoensevliet

Derived from: Gebiedsplan Oud-Charlois 2014 - 2018 | Adjusted by Author

From the four 'Stadshaven areas, the Waalhaven will retain the most typical 'harbour characteristics'. The Stadshaven city ambition sees the long infrastructural patterns next to the eastern area of the Waalhaven transformed to 'maritime boulevard'. The scattered appearance will be transformed and the harbour will provide employment for inhabitants of the adjacent neighbourhoods, such as Oud-Charlois and connections to the waterfront are planned to be improved. These plans fit in the ambitions for this thesis. In between pier three and four, a study location is appointed for floating constructions.

improved connection waterfront

improved green structure

existing green structure

green-urban living environment

maritime service

transshipment cargo

public services & retail

improved slow traffic connection

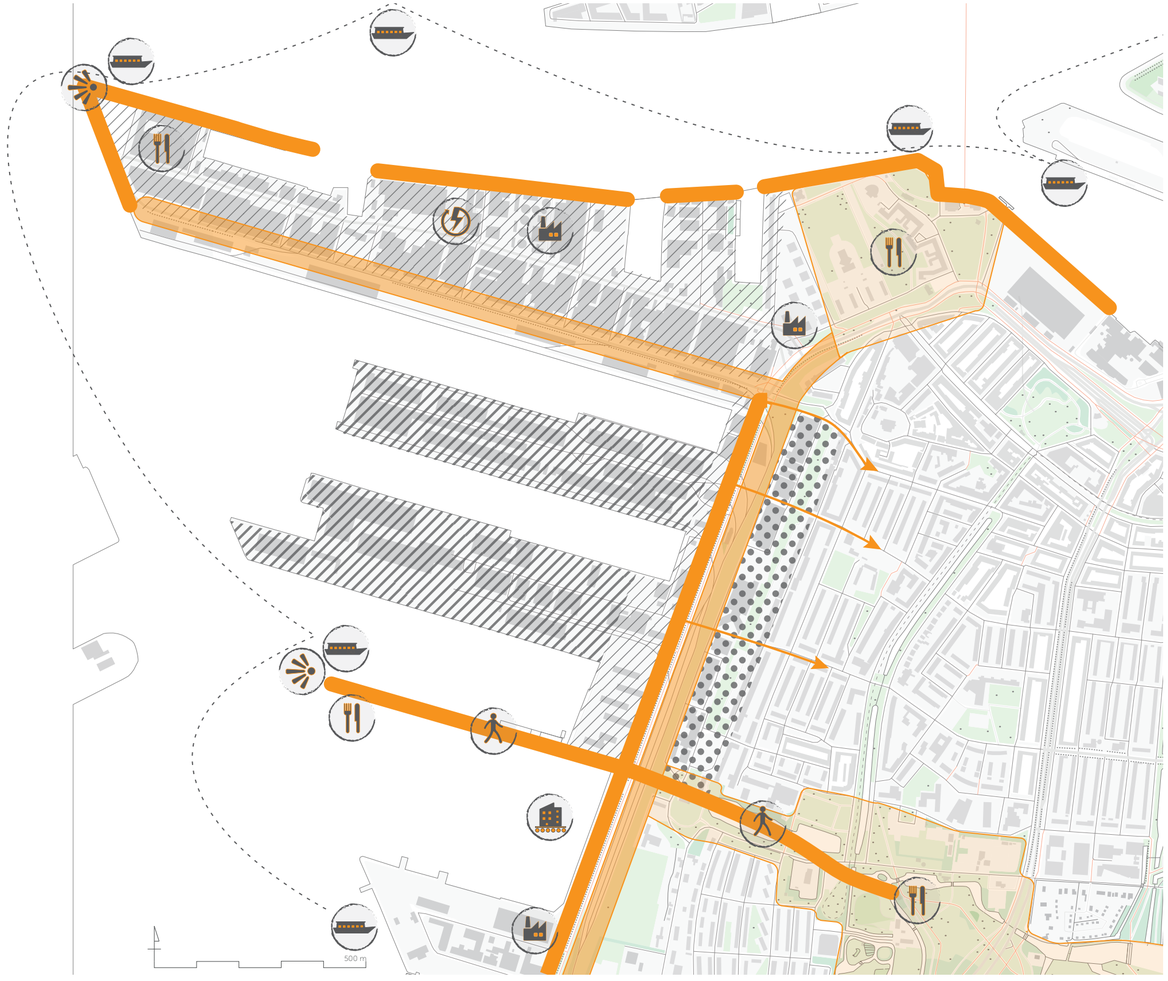
study location energy generation

viewpoint

redevelopment cultural heritage

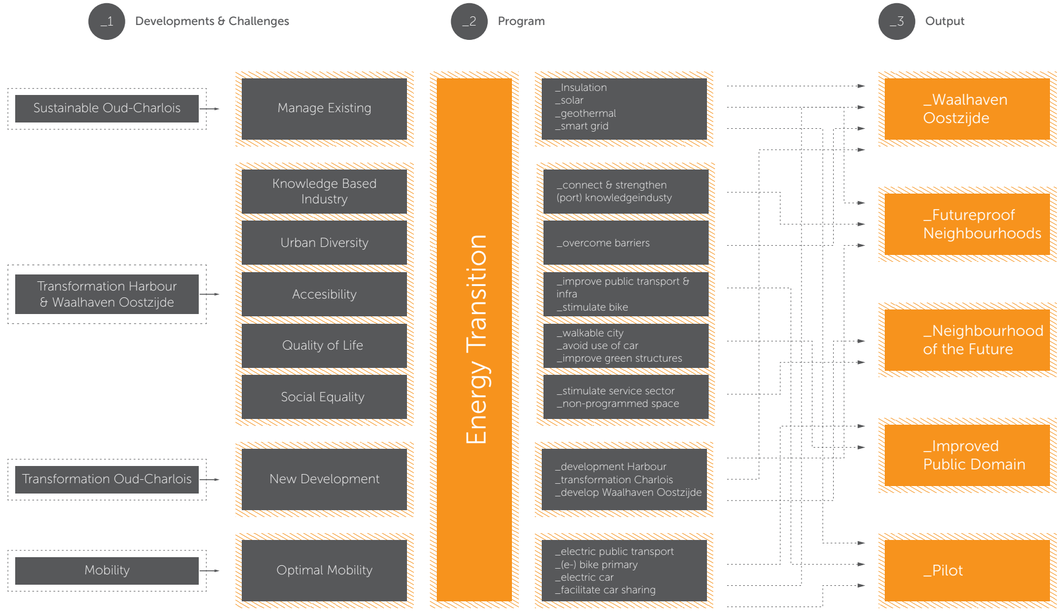
aquanet

floating construction



Derived from Gebiedsplan Waalhaven-Eemshaven | Adjusted by Author

The scheme on the adjacent page shows the strategic scheme for the development of Oud-Charlois. The program will be translated to patterns for the regeneration and revaluation of the neighbourhood.



"Dull, inert cities, it is true, do contain the seeds of their own destruction and little else. But lively, diverse, intense cities contain the seeds of their own regeneration, with energy enough to carry over for problems and needs outside themselves."

- Jane Jacobs, The Death and Life of Great American Cities -

Source: Authour

Energy has a variety of meanings. For this thesis there a distinction is made between three types of energy to categorise different design patterns, namely 'social energy', 'spatial energy' and 'sustainable energy'.

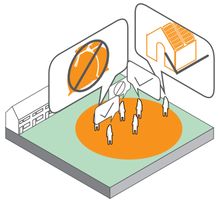
Social energy refers to the kind of energy flowing between the inhabitants of the neighbourhood. In Oud-Charlois, there already are a number of groups of inhabitants, artists and institutions active, such as the 'Historisch Charlois' foundation. On the other hand is the area characterised by a majority of inhabitants with low income and weak social bonds. Goal of this research is to find patterns or strategies to enhance the capabilities of the inhabitants.

Spatial Energy is the energy in the neighbourhood generated by the interplay of the public domain, infrastructure and green spaces in the area. A consistent design of the area invites for more inhabitant participation and increases the sense of belonging of its inhabitants. Spatial energy includes the appearance of the neighbourhood as well. Think about character of the housing stock and the physical state of this housing stock but also the embedding of (new forms) of public transportation in the area and its connection to the rest of the city.

Sustainable energy is the more classical form of energy in the form of electricity but also new implementations such as the use of smart grids connecting solar panels with car batteries, the use of geothermal energy and its spatial implications.

These different forms of energy and its patterns result in a strategy which will contribute to the regeneration and revaluation of Oud-Charlois, the Waalhaven area and the dividing infrastructural elements.

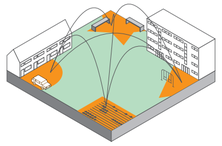
Social



"Social energy implies something measurable, yet a convenient and reliable formula cannot be provided for isolating a single, stable quantum for examination. Energia is only identified indirectly, by its effect: it is manifested in the capacity of certain verbal, aural, and visual traces to produce, shape, and organize collective physical and mental experiences"

- Greenblatt, Shakespearean negotiations -

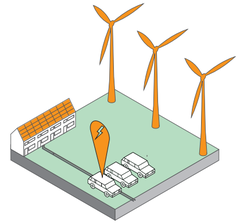
Spatial



"The building art is man's spatial dialogue with his environment and demonstrates how he asserts himself therein and how he masters it"

- Ludwig Mies van der Rohe -

Sustainable

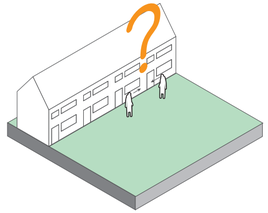


"The secret of change is to focus all of your energy, not on fighting the old, but on building the new"

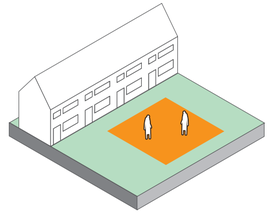
- Socrates -

The outcome of the earlier analysis shows us some characteristic threats and weaknesses in the researched area Oud-Charlois and the adjacent harbour area. The next page summarises these weaknesses. Some of these observations account for whole of the city, such as a lack of social connections and practically the whole of Rotterdam South has a unilateral housing stock, while others are specific for the area of Oud-Charlois, such as the missing connections with the waterfront and outdated harbour area.

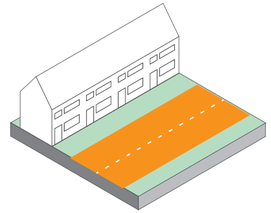
Weak Social Bonds



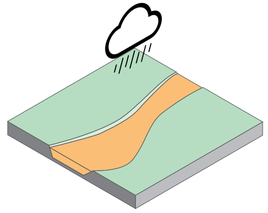
Lack of Social Space



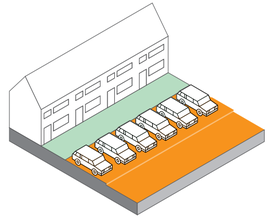
Lack of Local Characteristics



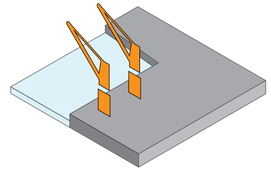
Watermanagment



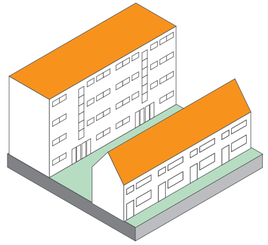
Paving



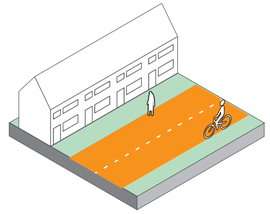
Outdated Harbour Area



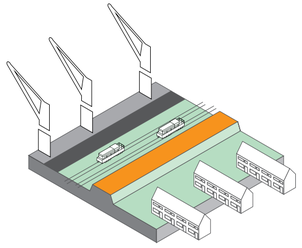
Unilatteral Housing Stock



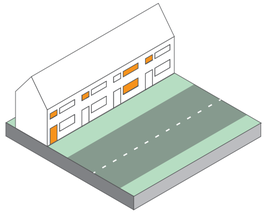
Lack of Pedestrian and Bicycle Routes



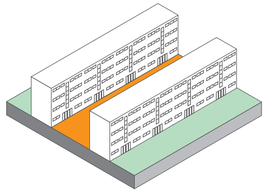
Missing Connections



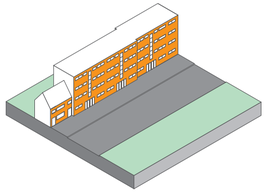
Poor Maintenance



Grubby Courtyards & Backsides

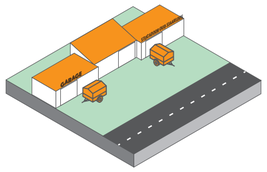


Fragmented Streetscape

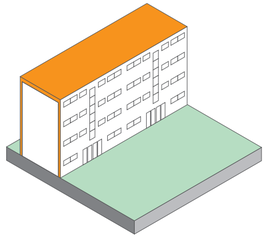


The neighbourhood has a typical appearance with returning problems throughout the neighbourhood. The image on the left page shows an average street in Oud-Charlois, a lot of parked cars, lack of green, poor maintained and a fragmented facade.

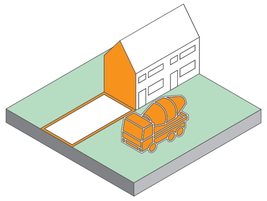
Transform



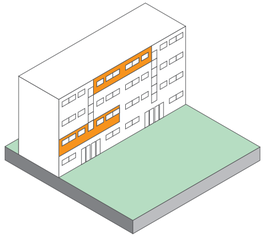
Restructure



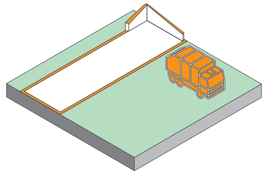
Develop



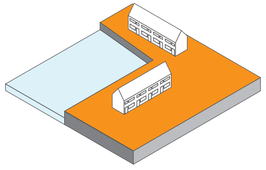
Combine



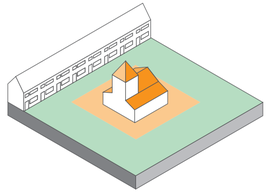
Demolish



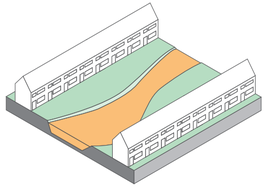
Harbour



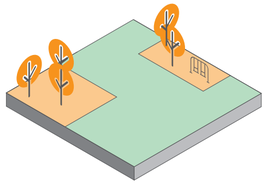
Historical Core



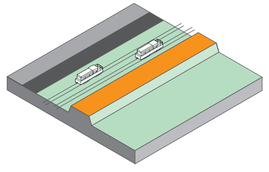
Watermanagment



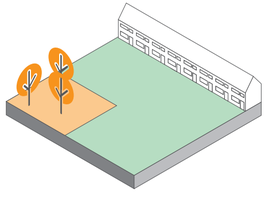
Green Structures



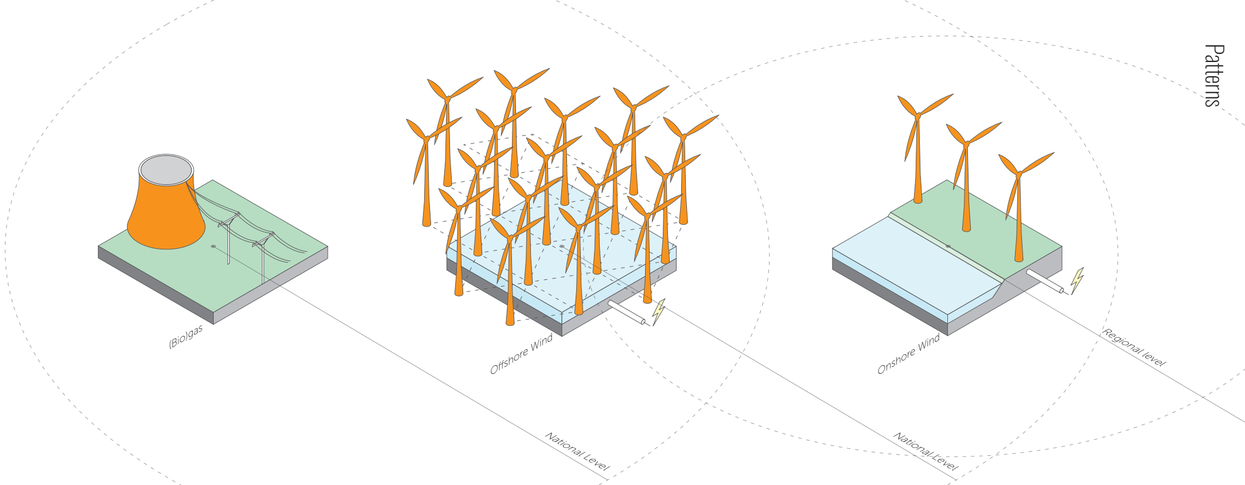
Missing Connection

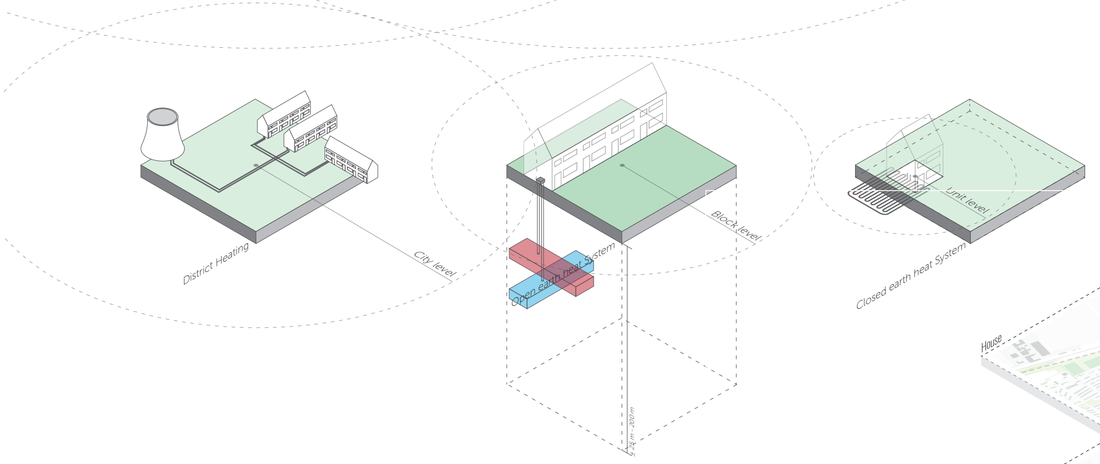


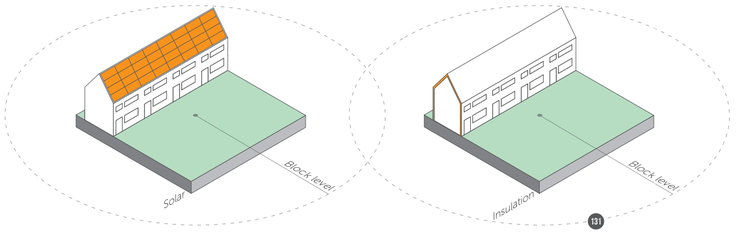
Missing Connection



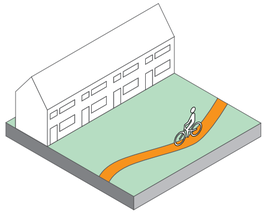
The patterns for the generating energy from renewables often are not visible in the urban fabric and work throughout different scales, varying from the unit up until the national level. Therefore strategies should be implemented to create awareness and visibility for these generators. In the following pages, patterns will be introduced to get inhabitants of Oud-Charlois involved in their neighbourhood and therewith create a stronger sense of belonging. The implementations can be used to create pilot projects which in the future can be spread throughout the city and rest of the Netherlands.





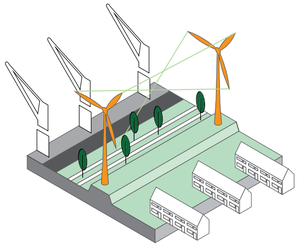


Energy Generating Pavement



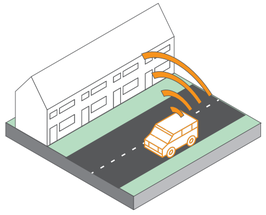
Energy generating pavements makes use of solar power. It is a clearly visible way of generating energy in the urban fabric.

Energy Landmarks



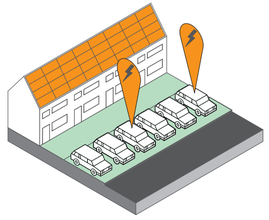
Energy landmarks can be used to change the general perception about renewable energy generators. Examples are the artworks by Daan Roosegaarde.

'Smart' Public Transportation



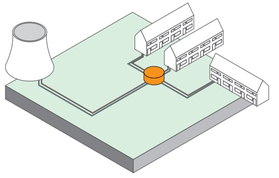
New forms of public transportation improve the reachability of the neighbourhood and overcome the isolated location of the neighbourhood. Less infrastructure is needed so roads can be transformed public domain.

Household on Battery



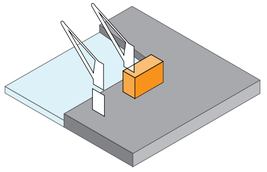
Storing electrical energy is currently one of the major flaws of renewables. Constructing a 'smart grid' in which batteries of electrical vehicles are linked to renewable energy generators can overcome this.

Neighbourhood Saving Centre



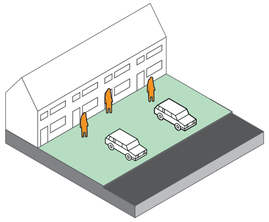
Currently there already is a heat hub present in the area (see picture page 14 - 15). This building takes in a relatively large site, but is not notable. Giving a public function creates awareness.

Energy Awareness Centre

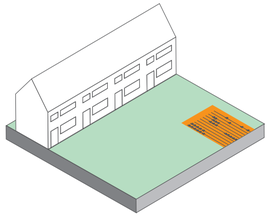


When a stronger connection between the harbour and neighbourhood is established, this harbour area is suitable to house a centre to create awareness about energy use. Within the area there are numerous building suitable for this purpose.

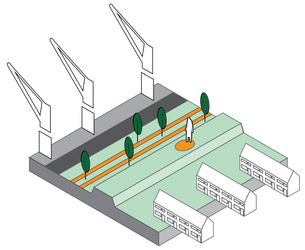
Car Sharing



Urban Farming

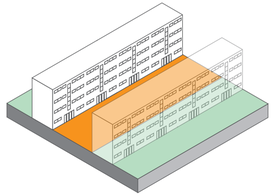


Buffer

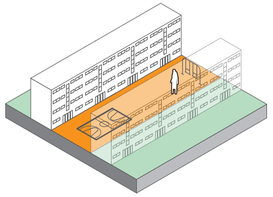


To increase the social energy in the neighbourhood, patterns are distinguished to reinforce social connections within the neighbourhood. These patterns have different scale levels. Some work on the level of the unit or portico, others on the level of the block and others affect the whole neighbourhood.

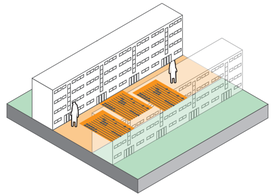
Use of Green



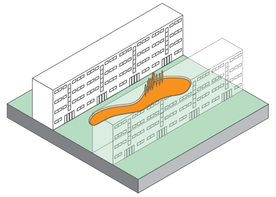
Social Space



Allotments

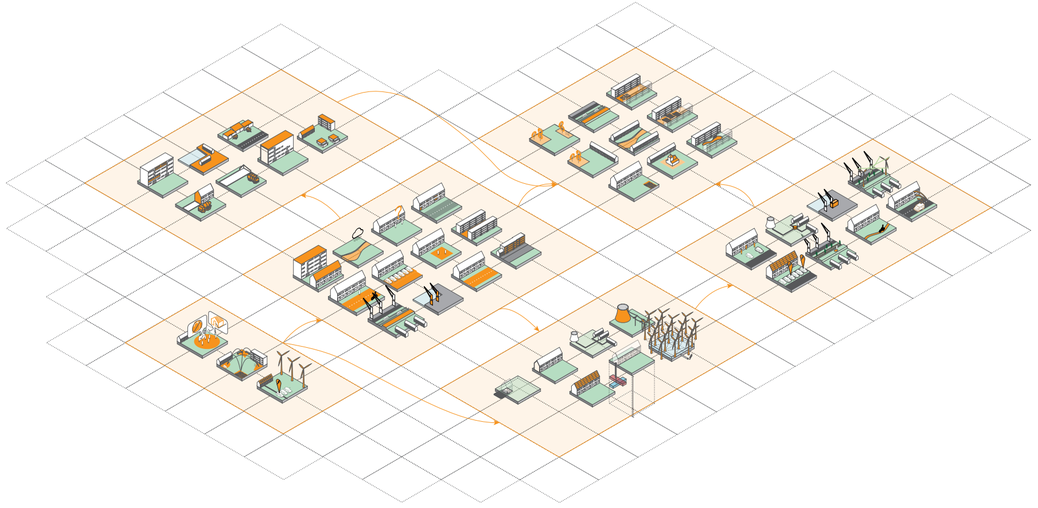


Water Storage



Currently the courtyards of many building blocks are in poor condition. These courtyards form a source for social energy. Different pattern can give better meaning to these courtyards. Urban farming improves social connections as well as lowering the living costs of the often poor inhabitants, where other transformations can improve the water bearing capacities of the neighbourhood.

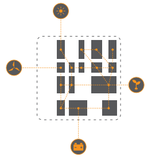
The patterns described in the previous pages are strongly connected. In the design process this connectivity should be taken into account. Patterns can be grouped by theme, but they influence each other. Guiding are the different distinguished energies, social, spatial and sustainable energy and how these energies can be connected through urban design.



Source: Author

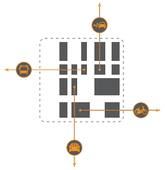
The three pillars for the design are energy, densification and mobility. Energy in terms of generating in the neighbourhood itself, as well as connecting the neighbourhood to other sources of sustainable energy in the city and region. Densification in terms of reaching a high density in new realisations in the area, since the original structure of the neighbourhood functions relatively well. Mobility in terms of new public transportation as well as reduced use of cars through clever design of the neighbourhood and connections with the rest of the city and region.

Energy

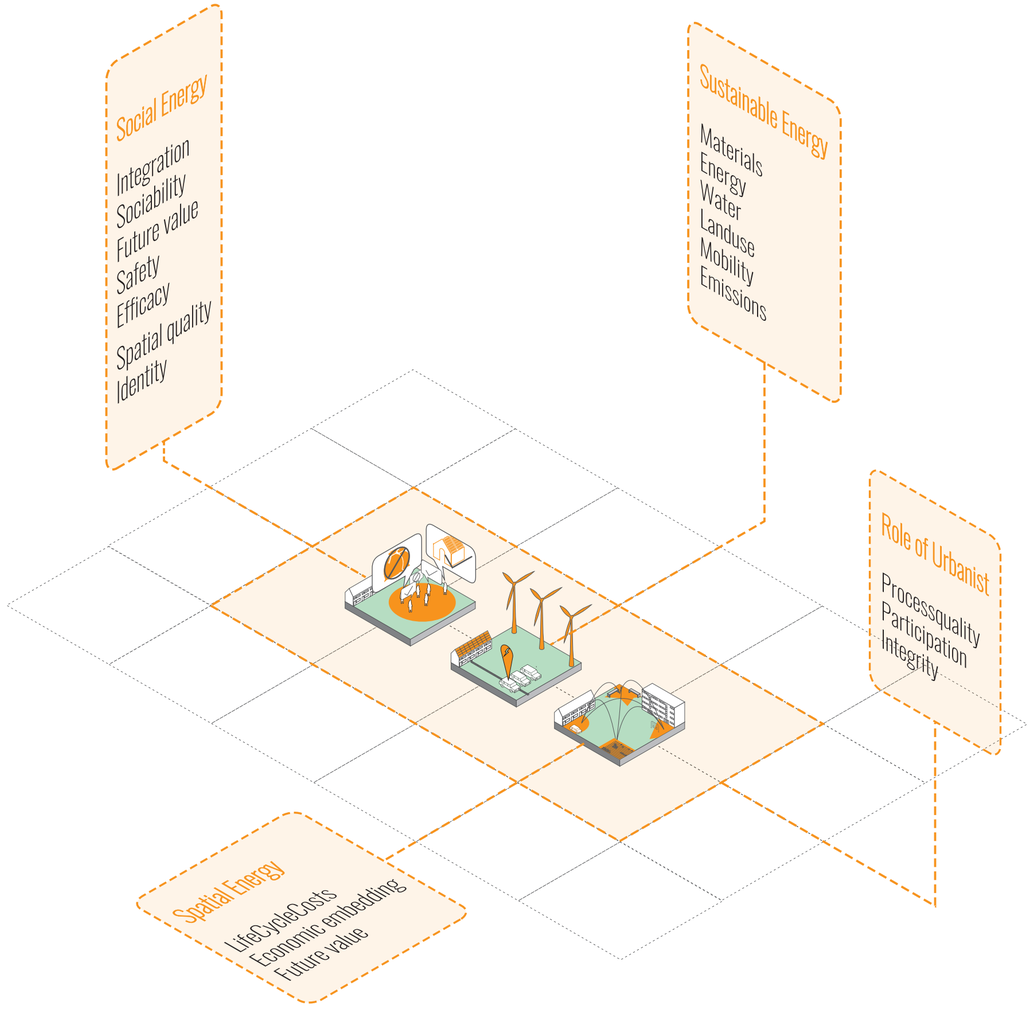


Densification

Mobility

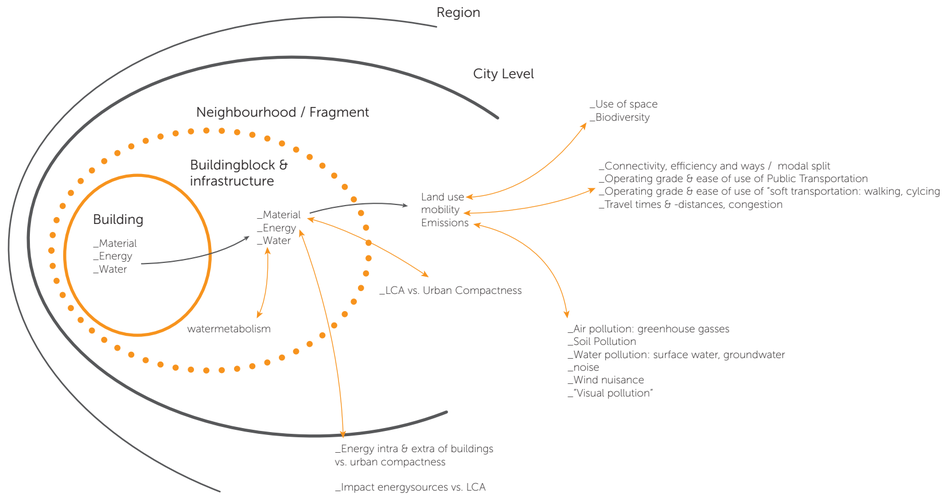


The different kinds of energy defined in this thesis have different implications but are strongly connected. All the facets should be taken into account when designing a connected Oud-Charlois.



Derived from: Strategieen voor een verhoogde implementatie van duurzaam bouwen in Vlaanderen | Adjusted by Author

The framework gives insight in the different scales how a sustainable Oud-Charlois can be realised. This framework gives handles for the eventual design of the neighbourhood. The three main pillars are clearly part of this framework.

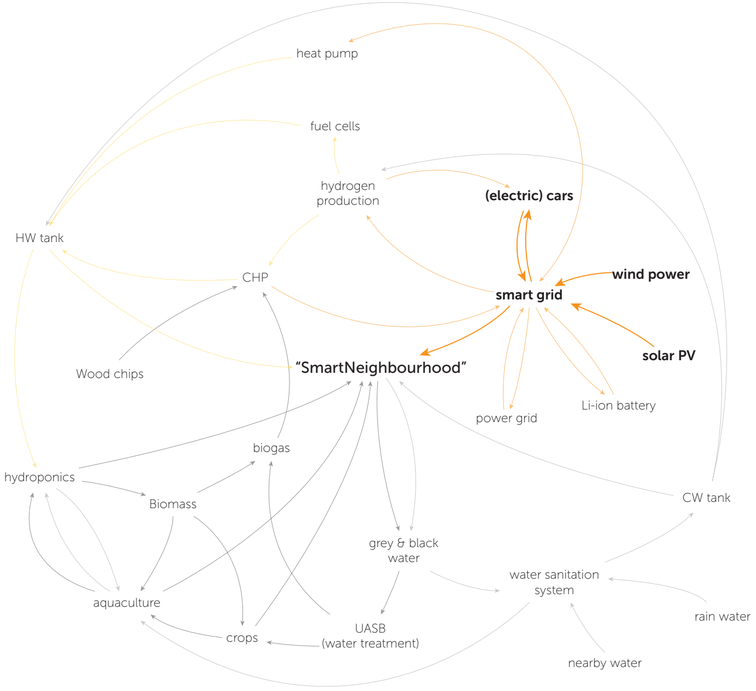


Derived from: Strategieen voor een verhoogde implementatie van duurzaam bouwen in Vlaanderen | Adjusted by Author

The design principles formulated on the previous page can be translated to the interventions described in the scheme with design guidelines. Highlighted measurements have of more interest for the area.

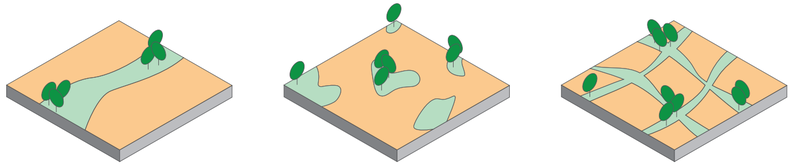
Land use and built form	Environmental -Energy conservation	Environmental -Re-use & recycling	Communication & Transport
• **intensive use of urban land**	• **Combined heat and power (CHP) - local power generation**	• 'grey' water systems	• **light transit routes, eco-friendly buses and bikeways**
• **networks of green corridors**	• micro power generation	• reuse water and filter	• car clubs and cycle facilities
• community building	• renewable energy	• waste recycling, use for production of biogas	• **pedestrian friendly infrastructure**
• **mixture of land uses at relatively high density**	• reduced energy consumption	• reduced domestic and construction waste	• **restricted car parking**
• affordable homes	• high levels of insulation	• carbon-neutral lifestyle	• energy and water monitoring
• **local identity**	• eco-rating (e.g. BREEAM 'excellent)		
• sustainable building materials			
• flexible design and good space standards			

The scheme shows how the design guidelines are connected to come to a sustainable Oud-Charlois. These guidelines should be taken into account when giving shape to a connected neighbourhood.



Energy
Heat
Water
Food

How the green structure in the area is organised has great implications on the characteristics of this green spaces, as shown in the scheme on the adjacent page. How green areas are arranged brings different advantages. Ideally, in a design, the different structures are incorporated.

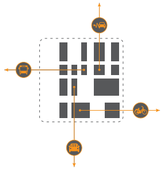


	Corridor	Patch	Matrix
flood storage	+++	++	+
infiltration capacity	++	++	+++
evaporitive cooling	+	+++	++
shading	+	++	+++

Different models of governance can be distinguished. For the site in this thesis, a combination of different models of governance is recommended. In more urban areas, a more top-down model, such as the second is advised, where on the other hand, at certain places the user is able to determine the program and demands.

Derived from: Module Duurzame Gebiedsontwikkeling | Adjusted by Autho

The research done for this thesis, together with the guidelines has lead to the program which is the base for the design explained in the following pages. To prevent repetition, only the relevant guidelines are included in the program.



- Energy label A when renovated

- 276 potential single family dwellings

- slow traffic bridge to Katendrecht
- sociocultural-, public and retail facilities

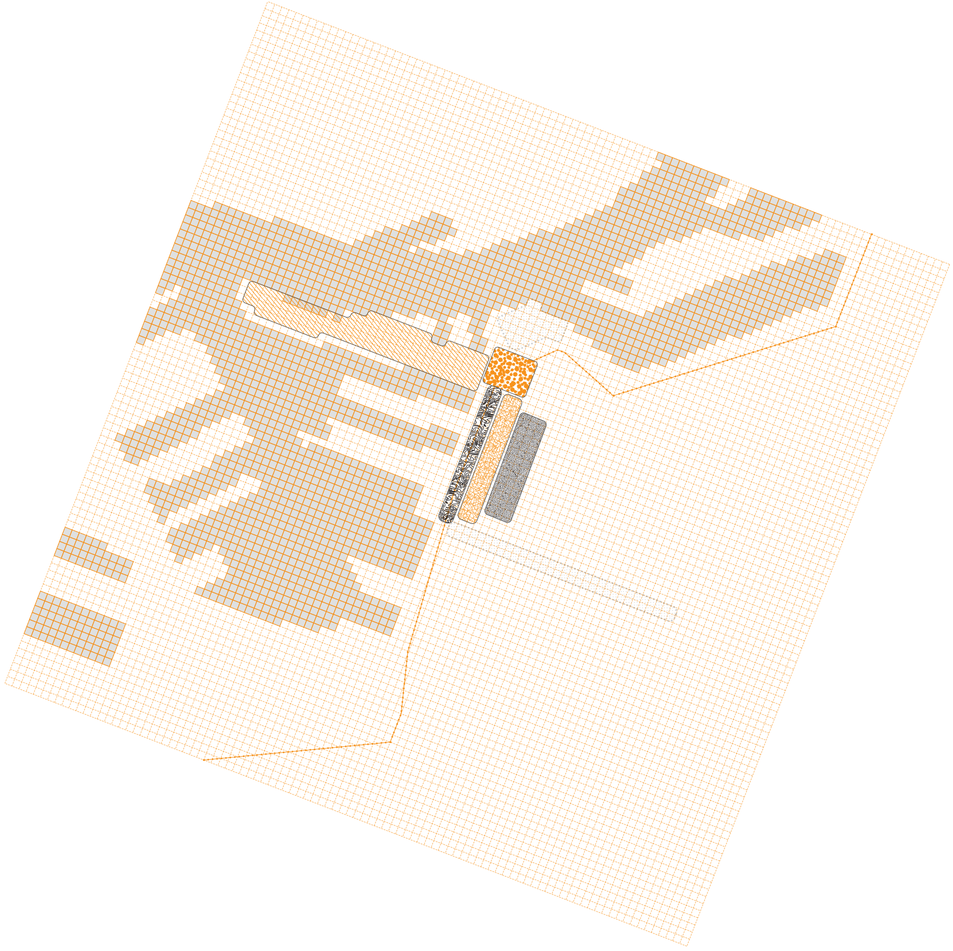
- 100 dwellings per hectare
- 9,4 hectare
- substitute 552 dwelligs from neighbourhood
- 390 middle to high class dwellings

- parking norm: 0,25 per house
- autoshare platform

- large scale solar energy generating

- employment- and education opportunities

The following pages show the design guidelines that steered the design process. The first diagrammatic grid map shows the different locations in the site. In the existing neighbourhood, renovation and combining of dwellings will take place. Besides in, on the the stripe next to the dike, new developments will be realised to meet the goals of densification and to substitute the lost dwelling in the neighbourhood. The dike will function as connection element and functions will be realised mostly in the northern part of the district. According to the 'Urban Traffic Plan' (2017) the 'Sluisjesdijk' will be transformed to 'next economy'. This area will be connected with the high urban area in the north part of the plan.



densification
new development
green
renovation | combining
next economy

The group of grid maps show the different models of governance, how the density decreases and the morphology of the site.

To meet the goals of the municipality different models of governance are needed. Especially the dwellings that need to be substituted from the existing neighbourhood, governmental influence is needed, since this stock mostly exists of social housing. On the other hand, in the arrangement of the public domain, as well as in self-build objects in the area, the user has a big influence.

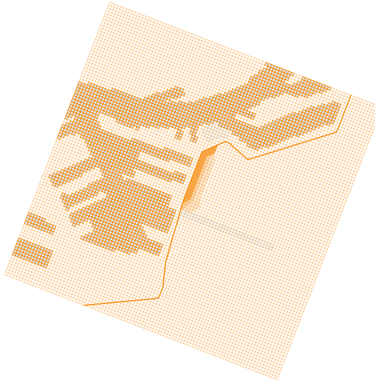
Towards Zuiderpark, density of the neighbourhood decreases, where close to the historical part high densities are realised, to the south a more parklike atmosphere is created.

The height differences in the area are a design guideline in that sense that it can be used to connect different typologies, as well as the fact that it gives aesthetic quality to the neighbourhood, if used properly.

model of governance

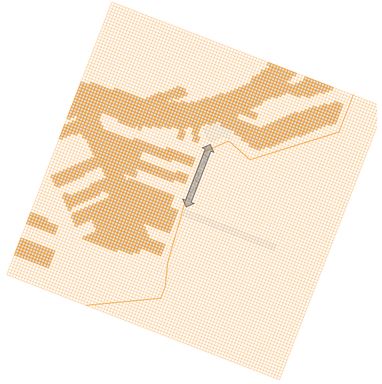
density

morphology

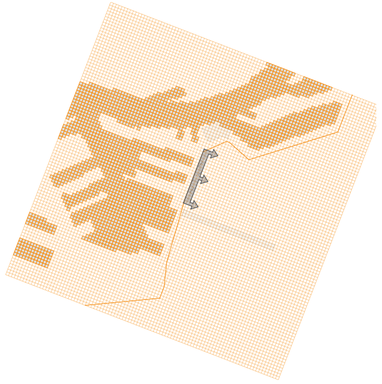


The green structure along the dike has multiple roles to play. On one hand, as design principle it connects existing green structures already present in the area. On the second hand, the green structure can be used to infiltrate into the new developments. Lastly it functions as buffer and bridge between the harbour area and the existing neighbourhood at the same time.

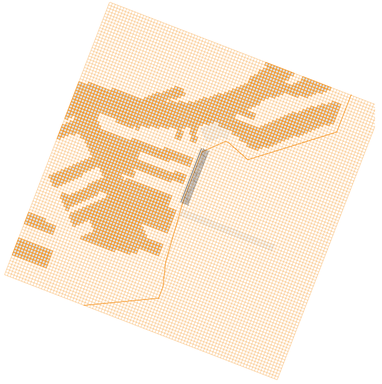
connecting



intruding



buffering

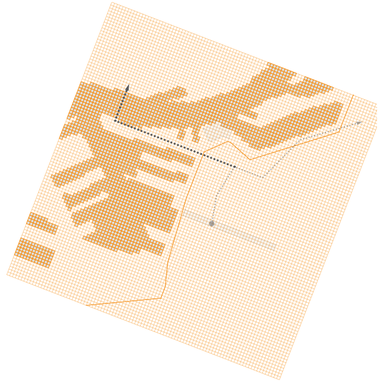


In terms of mobility, different facets are taking into account. The 'Urban Traffic Plan' foresees in a new bridge, connecting 'Sluisjesdijk' with the northern river bank. With this bridge, the connection for public transportation by tram will increase significantly, so movement patterns and connectivity for inhabitants of the neighbourhood as well.

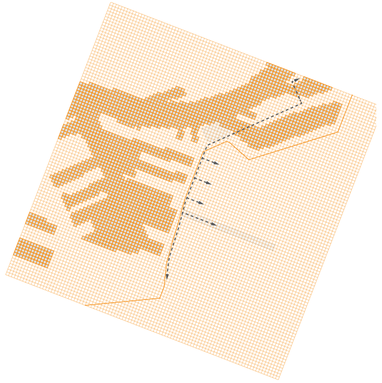
The proposal foresees in a slow traffic connection with Katendrecht, connecting with the already existing Rijnhavenbridge. The main route for cyclist will be on the dike, connecting adjacent neighbourhoods, as well as Oud-Charlois itself with the city centre.

To create a green, pedestrian friendly neighbourhood, a single one-way road for cars is taken into the new design. Since 'Zuidhoek', is a one-way road stretching the other direction, despite having only one road, the neighbourhood will be reachable by car.

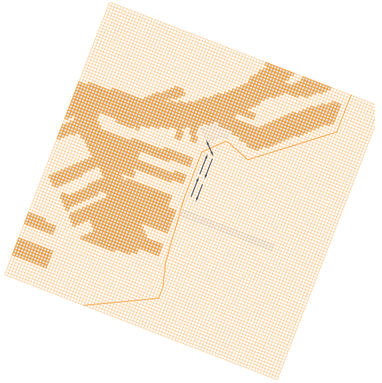
purblic transportation



slow traffic

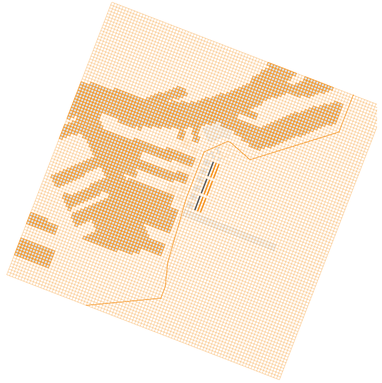


routing cars

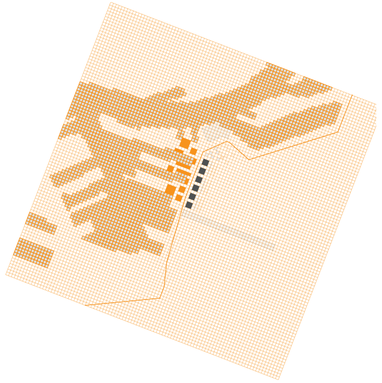


Different scales and placing of functions should be taken into account. The harbour and its infrastructure is of a different scale in comparison with the existing neighbourhood. This should be taken into account in the design for the neighbourhood. Secondly, placing of functions should be connected with the existing functions, so these areas do not compete with each other.

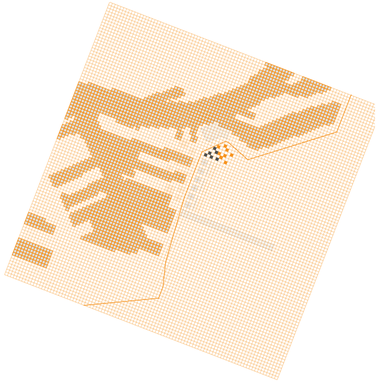
neighbourhood scale



harbour



functions



Source: Author


50
100
200

The dike operates as connecting element throughout the neighbourhood and is interwoven with the urban fabric. The public domain along the dike functions as social space to improve connections between inhabitants and passers of the neighbourhood.

Along the dike, a energy hub is situated. It serves to make the parameters of energy transition, decentralisation, networking, flexibility and adaptability visible. In the hub, visitors and inhabitants of the neighbourhood will be able to receive information throughout the three-dimensional
energy park, from the challenges of energy transition in the city of Rotterdam, and Oud-Charlois in particular, to renewable energy sources on site.

The design for the neighbourhood foresees in a large variety of typologies. The plan foresees in the desired single family dwellings for middle and higher incomes as well as in substitute social housing. Included is 18000 square meters for mixed functions. One can think of facilities such as supermarkets, retail, hospitality functions as well as community services such as community centers.

Included in the public domain are allotments, not necessarily for food production, but largely to improve social connections between inhabitants. To keep the area as green as possible, suitable solutions are included to remove parking from the public domain. Here the significant height differences present in the area are a solution. Underneath the urban villas and ParkHouses half deepened parking is situated, the DikeHouses have a bystreet with parking, for the other typologies underground parking is fairly easy to realise because of the height differences.

The overall urban plan is designed in such a way, different atmospheres are created, but always situated in a green environment with the dike as main and forming element.

The map on the adjacent page shows Oud-Charlois and how the new neighbourhood is incorporated in the existing urban fabric. Plans of the municipality are to foresee in a new bridge, connecting the Sluisjesdijk with the north banks of the Maas, although the precise location is not known yet. Besides this, since recent a ferryboat for cyclist and pedestrians connects Dokhavenpark with Katendrecht and the north banks, but a new slow traffic bridge is proposed between Charloise Hoofd and Katendrecht, so a direct connection is established with the Rijnhavenbridge, Wilhelminapier and Erasmusbridge.

The added program in Oud-Charlois. There is a variety of typologies, so the goals for the municipality to attract higher incomes, as well as the goals set in this thesis to foresee in the possibility for the current inhabitants to stay in the neighbourhood.

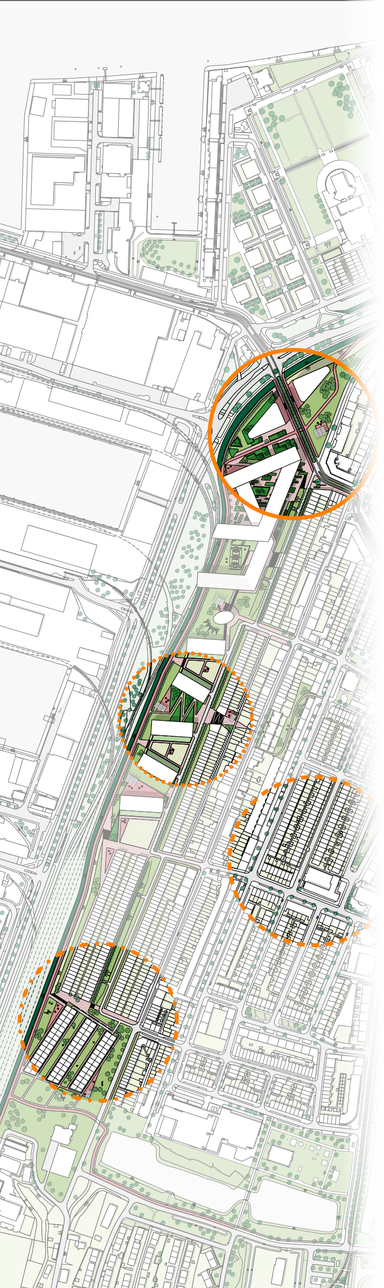
The square meters of functions are not strictly appointed, but a strive is to attract vocational education to bridge the gap between the lack of technically educated employers in the harbour and the poor educated inhabitants of Oud-Charlois.

In the current design, nearly a hundred dwellings per hectare is realised, although the plan is not a blueprint and other densities, lower as well as higher, might eventually be an outcome in the future.

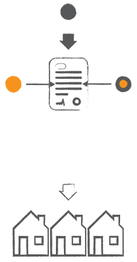
18.000 m^2 *Functions*

Urban Block	**100** m^2	**290**
Gate Towers	**90** m^2	**220**
Self-construction	**260** m^2	**37**
DikeHouse	**190** m^2	**70**
UrbanVilla	**90** m^2	**265**
RowHouse	**120** m^2	**110**
ParkHouse	**140** m^2	**84**

1.076 *New dwellings* *or 114,46 per hectare*



Participation Model



In the most northern part, the area to be developed as first, the proposed model of governance is a participation model. In this model, the municipality gives room for stake- and shareholders. They have a role in the decision making process and the municipality connects public and private interests and tries to overcome differences and conflicting interests, though the municipality stays in charge in the development.

government

private / market developer

private / other

user

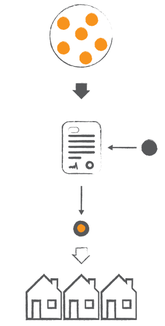
Frontrunner Model

As the name already mentions, in this area there is room for frontrunners to develop their ideas. Innovators are matched with changers in this particular part of the neighbourhood. The role for the municipality is to facilitate in determine a shared perspective among the different stakeholders.

Public-Private Partnership

This part of Oud-Charlois has the potential to foresee in the creation of 276 single family dwellings. In this way, the goals to create more single family dwellings of the municipality are catered. But the ownership in this area, as well as in the rest of Oud-Charlois, is complicated. Therefore a public-private model of governance is proposed. In this manner, homeowners, landlords, corporations and the municipality can work together to achieve the realisation of single family dwellings in houses which are now still small upstairs-downstairs apartments.

User Determines



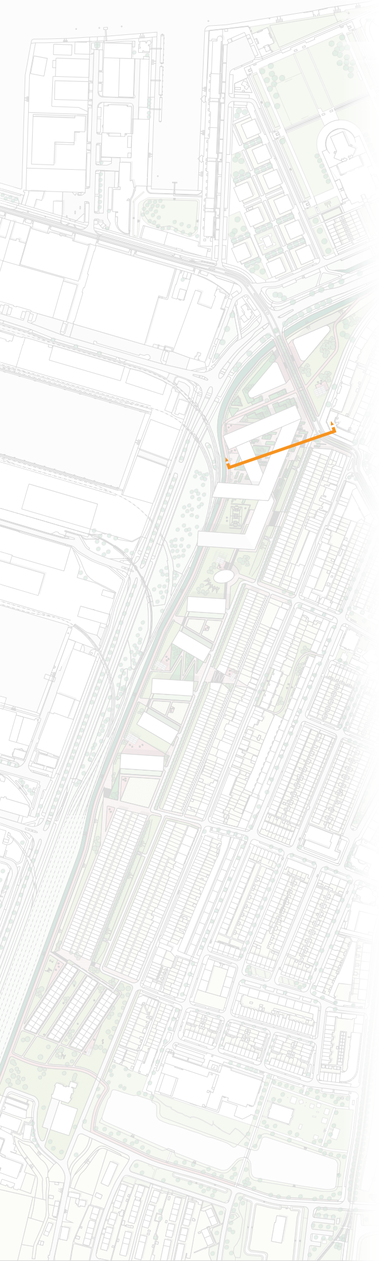
This is the last area to be developed. In this area, future inhabitants have a lot of freedom in the creation of their dwellings. The initiative comes from the enduser, therefore this area possibly has a longer time of developments. Because the initiative lies by the endusers, the municipality has possibly an auditing and stimulating role.

Shown is the densest, most northern part of the new design. The plint is opened up as much as possible to foresee in visual connections from the historic village core of Oud-Charlois, onto the operating harbour.

At places where the plint is still present, functions are included in the design in addition to the already existing functions in Oud-Charlois. The replaced opening into the neighbourhood is accompanied by two high rise towers, functioning as landmarks for the neighbourhood.

The design of the public domain increases the connection with the dike and the historical core. A pavilion is present in this area as well, where artist already living in the neighbourhood have the possibility to exhibit their works.

The rowhouses are self-build houses. These houses are the largest of the whole design and again parking is situated underground, making use the present height differences.



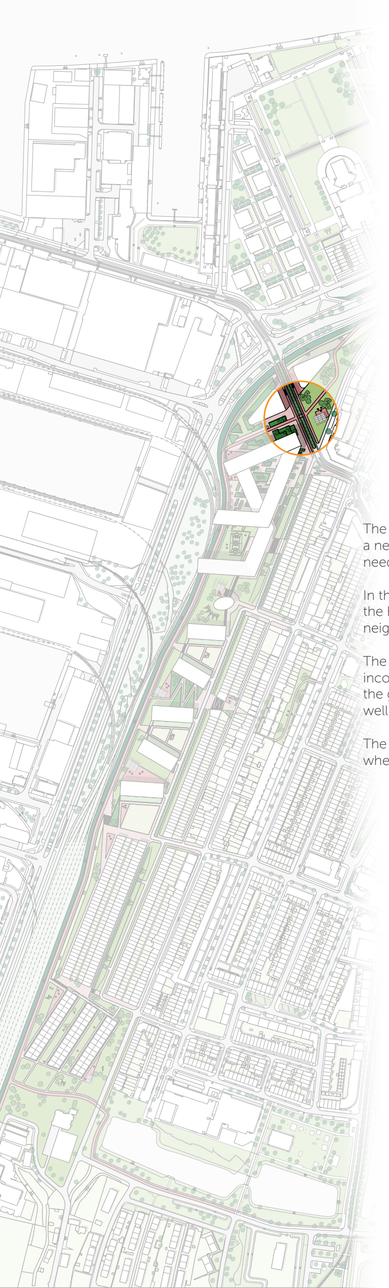
This sections shows the densest area in the neighbourhood. By opening up the plint of the urban block, the dike still finds it's way into the area. In the remaining plint there, space is created for functions, such as retail, hospitality functions, as well as social facilities.

Along the road, the only two way road in the design, a new tramline is implemented to improve connections of the area with the rest of the city and reducing the need to use cars.

The road cuts through the dike, but is closable with a coupure, and is characterised by the two "high-rise" landmarks, to indicate the entrance of the neighbourhood.

0 25 50

The impression shows how by opening up the plint of the urban block, strong connections with the historical core of Oud-Charlois and the harbour are established. The dike is as close as possible moved towards the rail-lines which are still in use by the harbour industry. In this way, the total surface of the narrow strip between the harbour and existing neighbourhood is maximised.

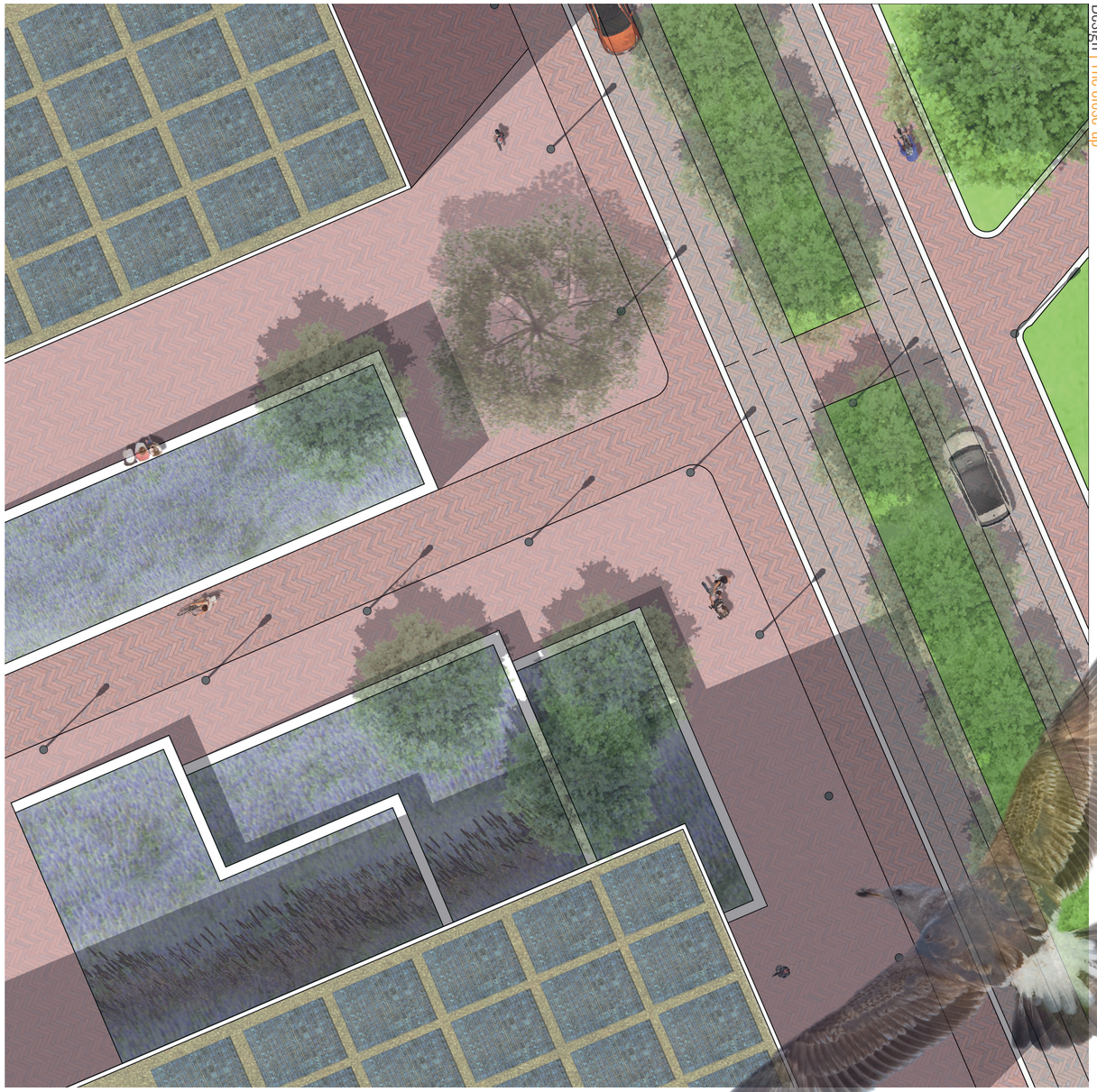


The detail shows the only two way road in the new designed area. Along this road, also a new tramline is incorporated to for an improved connectivity of the area and reduced need for cars for inhabitants of the neighbourhood.

In the plint of the urban block, functions are situated and the planters function to highlight the height difference present in the area and put an emphasis on the dike sloping into the neighbourhood.

The northern part is the most paved part of the area, but still planters and flowerbeds are incorporated to improve the water bearing capacity of the neighbourhood, together with the green roofs with solar panels. The planters give opportunity for social interaction as well.

The pavement used is the same throughout the area, the create so-called 'shared space' where the car is guest and pedestrians and cyclist are at home.



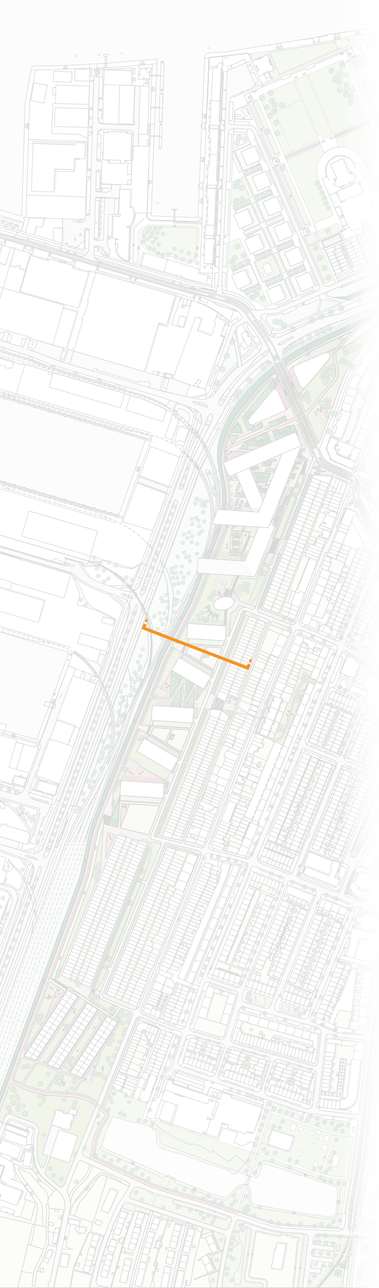
0 5 10

The zoom-in shows the middle part of the design. Strong sightliness are included in the design so a strong connection with the harbour is established.

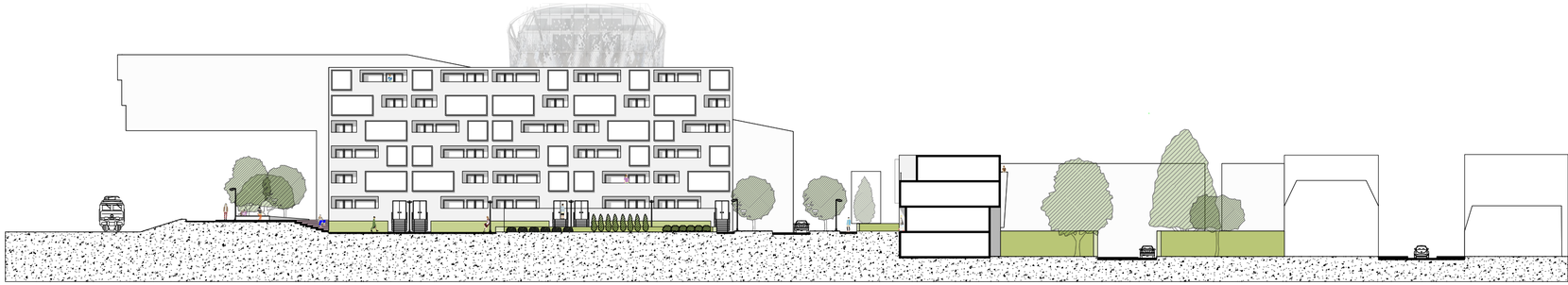
Halfway the row of dikehouses is broken open to achieve a connection with the public spaces in the existing neighbourhood along a route of small pocket parks to achieve more social connections and social energy. These pocket parks can be realised because a back-street is incorporated in the design to foresee in the need for parking space. The urban blocks have half deepened parking, making use of the one-and-a-half meter of height difference.

The urban blocks are used to foresee in substitute housing for the social housing which is lost in the neighbourhood. The open courtyards are used to let the dike intrude into the area and on the other and to foresee in allotments to create stronger social connections.

Pavilions are included at the collective spaces and at the energy hub and energy awareness centre. Here, also a pavilion is placed to facilitate in gaining knowledge about sustainability and the energy transition.

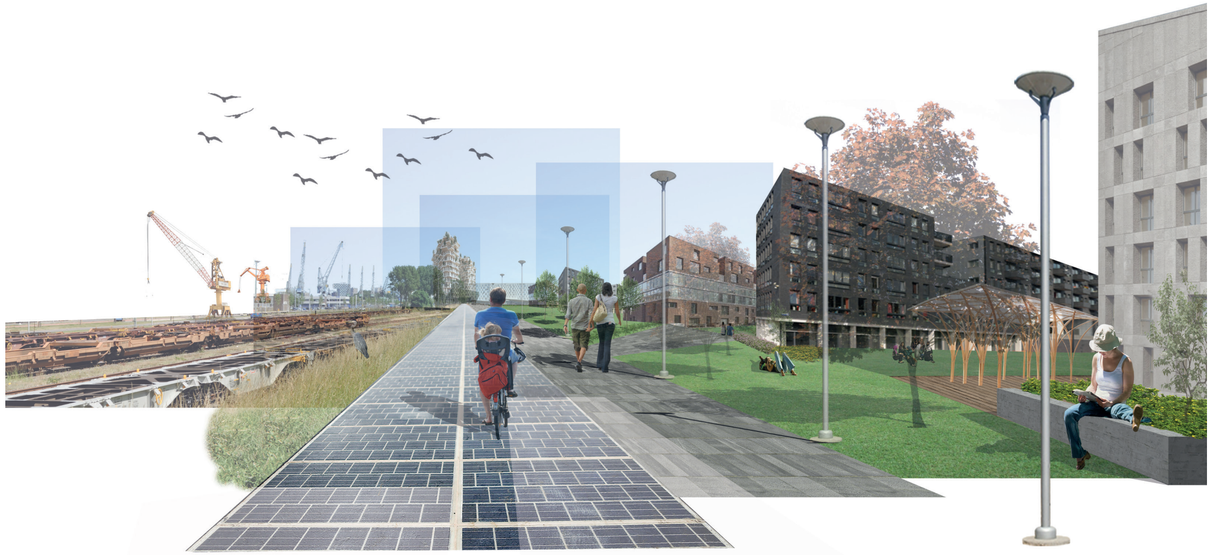


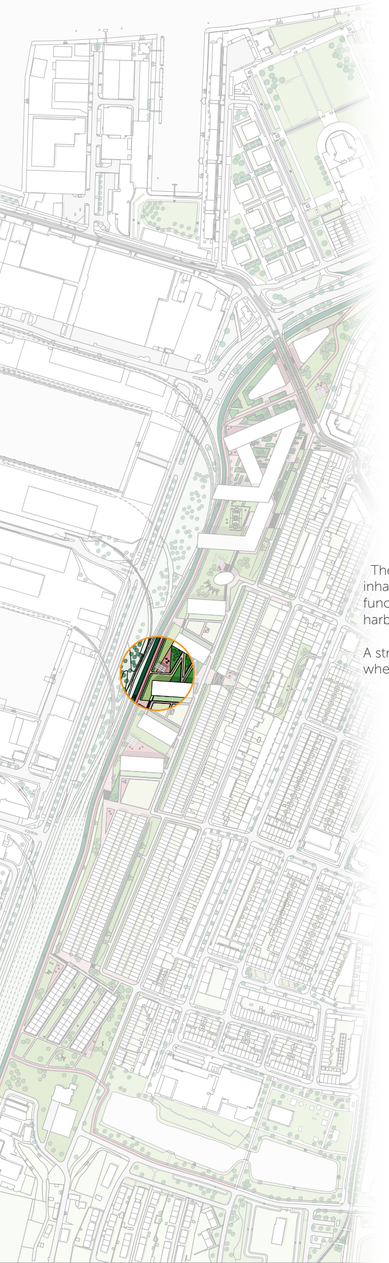
This section clearly shows how the new developments overcome the scale differences between the harbour and the neighbourhood. The dike houses match the scale and alignment of the existing neighbourhood, while the freestanding blocks mirror the scale of the harbour. In the urban villas, the substitute dwellings from the neighbourhood are housed. The apartments are approximately hundred square meter, a major improvement compared with the current size in the neighbourhood, which is approximately seventy square meters. In the public domain between the row houses and urban villas, allotments are situated, to improve social connections in the neighbourhood. Parking is situated half deep underneath the urban villas and along a back street for the dike houses. Behind the urban villa, the energy hub is visible, functioning as energy landmark, to create awareness and to connect energy flows from adjacent areas.



The impression shows how the scale of the urban villas reflect the scale of the harbour and establish a strong connection, physical as well as visual along sight lines. The dike gradually penetrates the neighbourhood, transforming it into a park-like environment. In the courtyards closing up unto the dike, allotments are situated, in the courtyards opening up to the harbour, collective spaces are included.

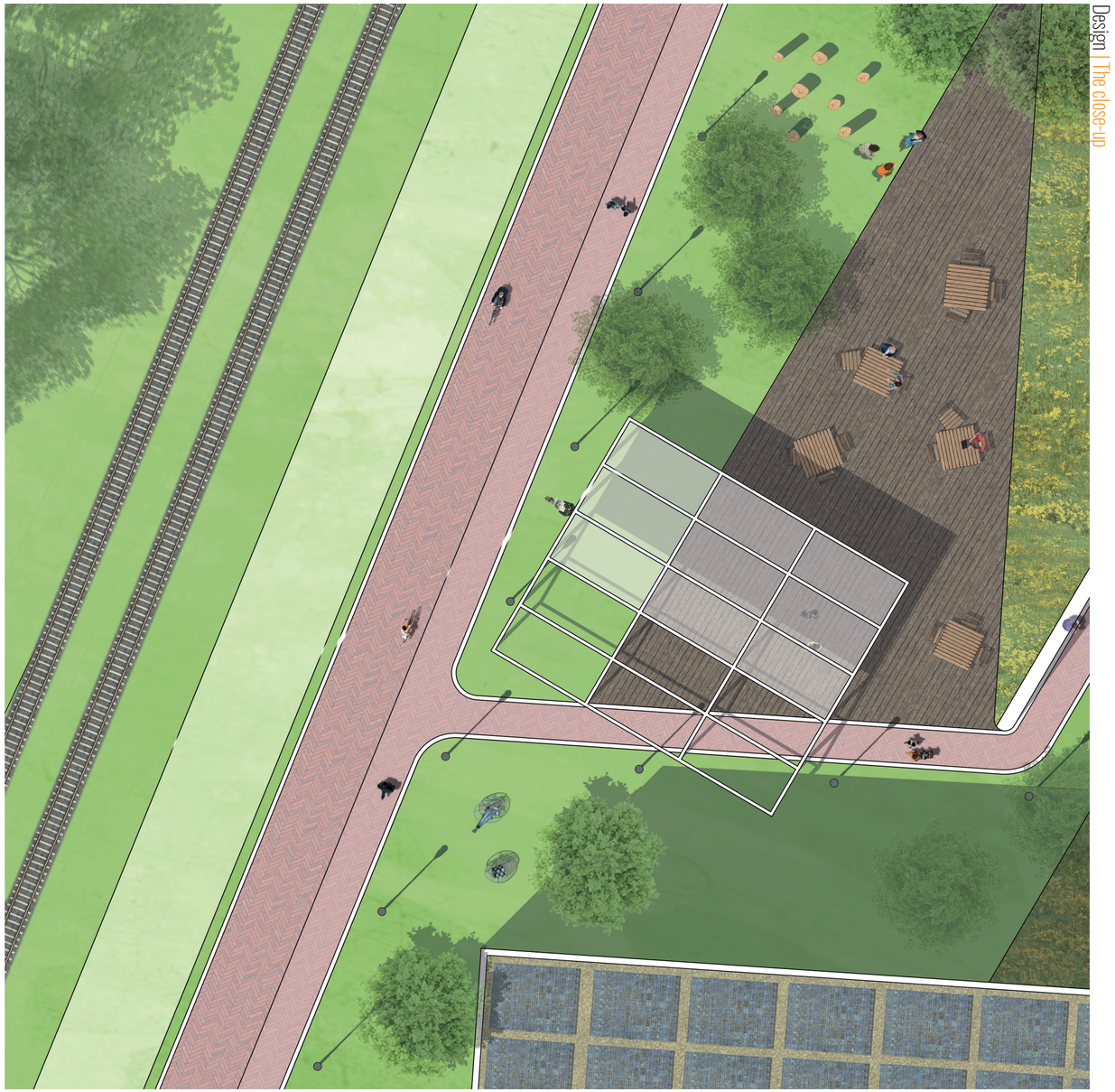
On the horizon, the two "highrise" towers marking the new entrance of Oud-Charlois. Solar-roads are included in the design to foresee in the energy use for public services, such as lightning.





The close-up shows how the dike functions as a park with collective spaces for inhabitants and users of the park. Pavilions are included in the design with several functions. This specific pavilion has the goal to show the connection of Rotterdam with it's harbour, since this is a location with strong sight-lines onto the harbour.

A strong contrast is created between the industrial harbour and the green public domain, where at the same time the urban villas correspond in scale to the harbour facilities.



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Shown is the most southern part of the design. The dike gradually slopes into the Zuiderpark, combining the dike and the Zuiderpark into a single entity and create spatial energy.

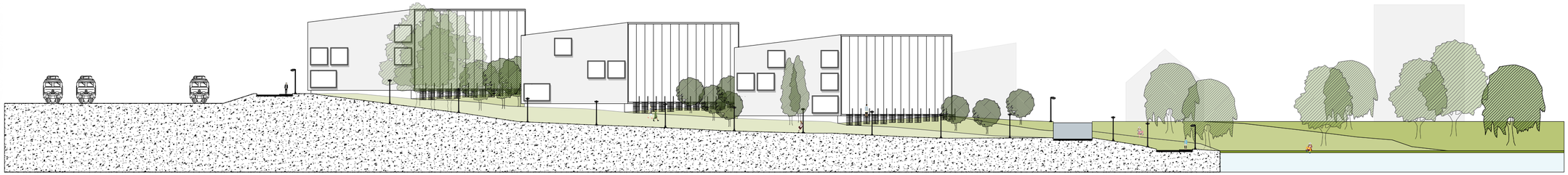
The orientation of the blocks and roofing is in such a way solar energy can be used to power the households and vehicle to grid is installed to store generated energy and create sustainable energy for the inhabitants.

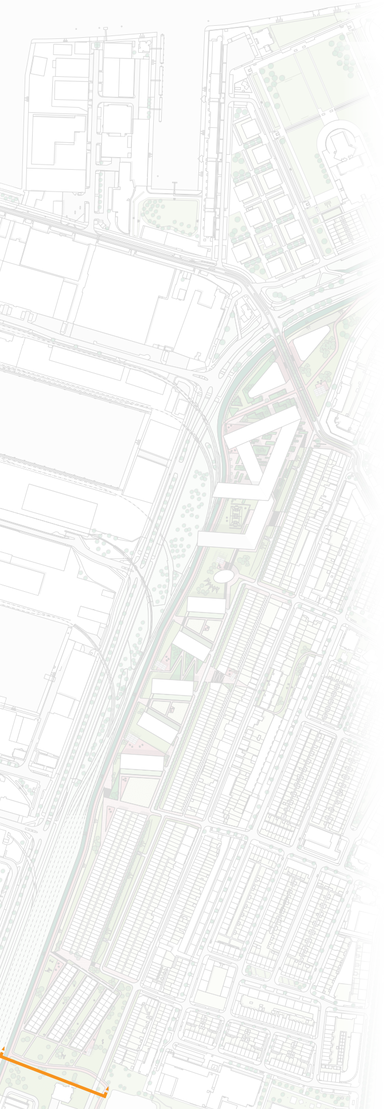
The dwellings in the park have direct acces into this park with half deepened parking situated underneath the building blocks.

The height difference in the area is used to situate parking underneath the dwellings in the northern part.

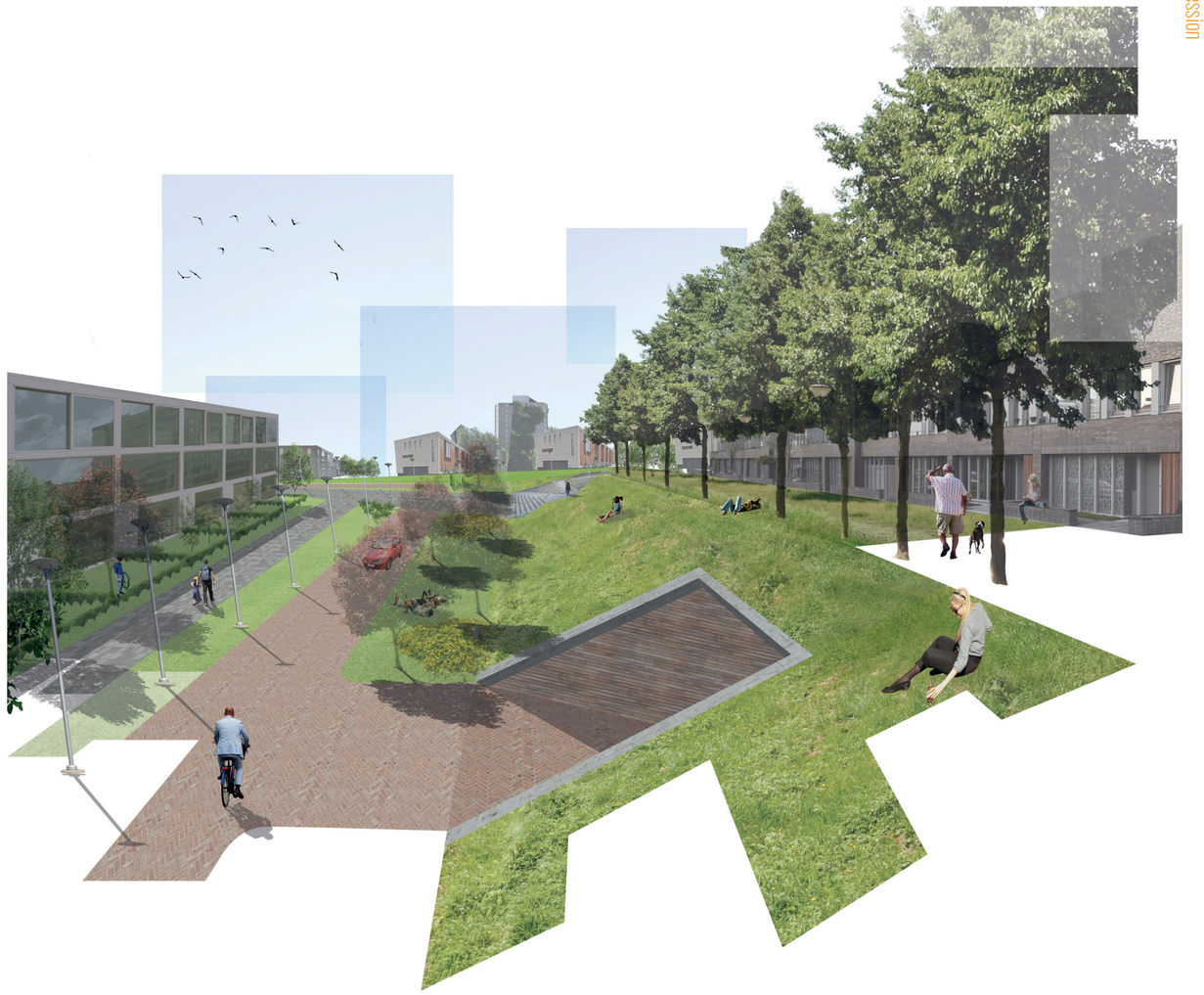
Collective spaces on horizontal level are created to facilitate social meetings and contribute to the social energy of the neighbourhood.

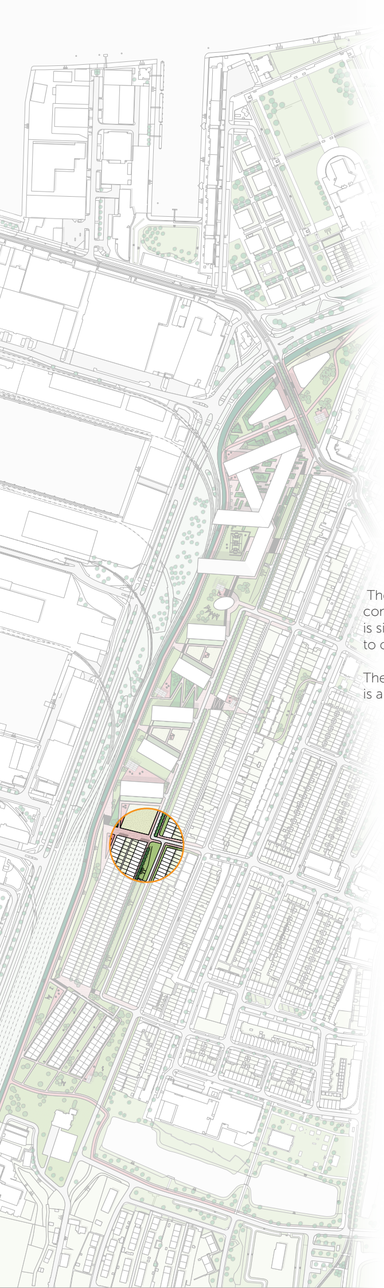
This section shows how the park and the dike fluently merge into one another, making it into one. The dike becomes part of Zuiderpark therewith connecting the different green structures prese nt in the area. This part of the site has the lowest density with intertwined dwellings with direct acces into the park. Or onto the dike. The plan breathes the atmosphere of a park. The slow traffic route over the dike, traversing the neighbourhood, has a branch into Zuiderpark and the adjacent neighbourhoods.





The impression shows how the characteristic long lines present in existing Oud-Charlois return in the design. On the horizon the parkdwellings can be seen situated in the park. The height difference, one of the strong spatial elements in the area, is used the house parking. The green environment and the fact there is only a one way street for cars contributes to the fact the housing is situated in a green environment.

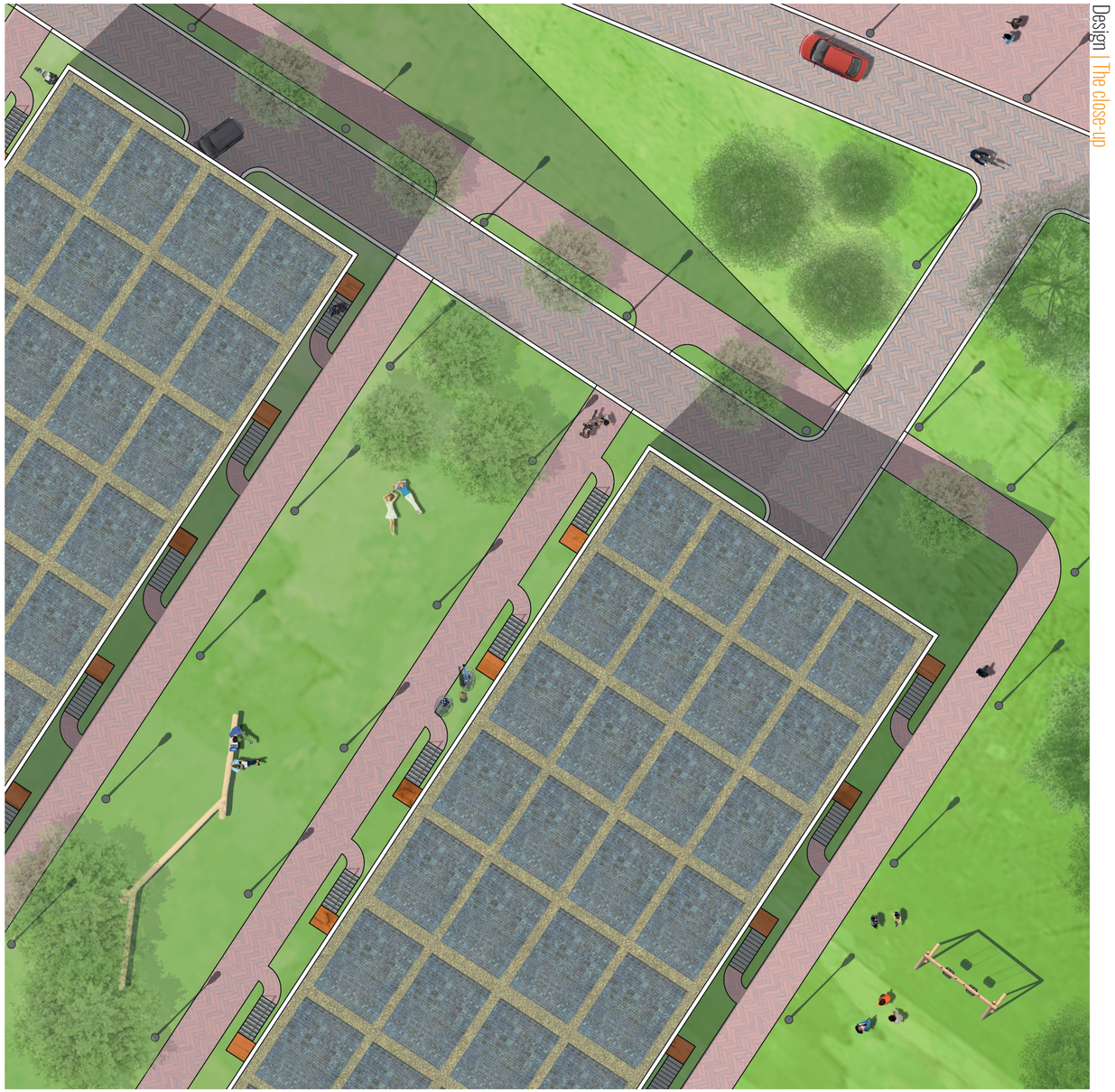




The close-up shows how the park dwellings are directly connected to the park, contributing to more social interaction among inhabitants and visitors of the park. Parking is situated half deepened underneath the building blocks and the height difference is used to create intimate places in between the building blocks.

The main road is a one way street, reducing the amount of cars in the neighbourhood, but is a two way street for cyclists, to have a good routing through the neighbourhood.

0 5 10

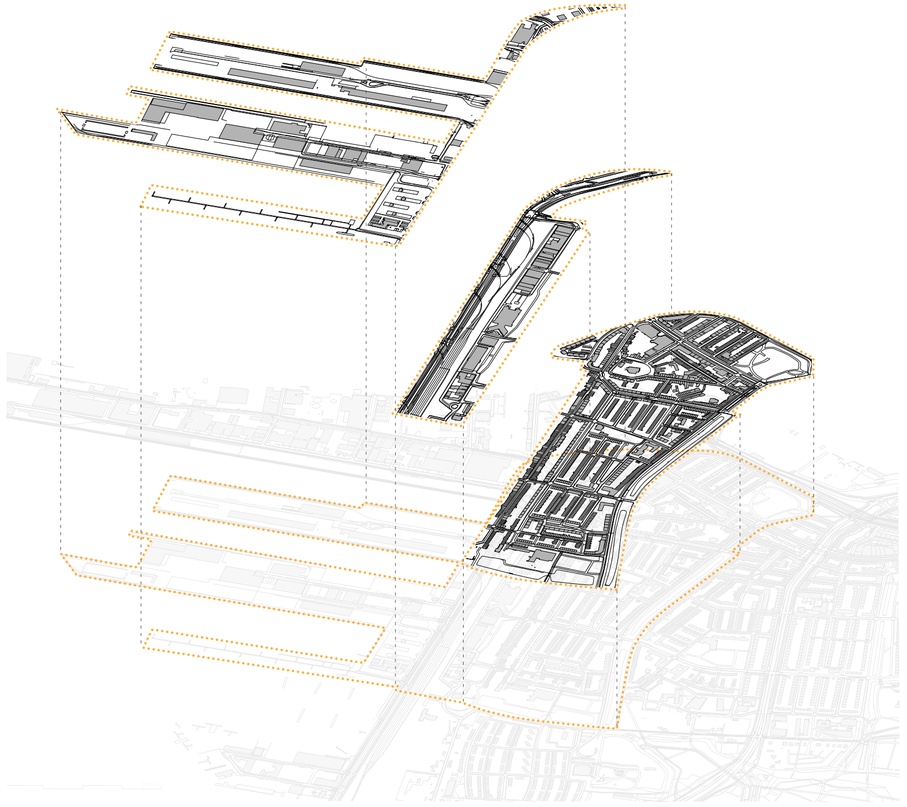



rotterdams

During the process of this thesis, several locations in Rotterdam-South have been investigated. Eventually, this location was most interesting for the purpose of this research. There are already several ongoing plans in the area, such as a new bridge and the transformation of the Waalhaven. Besides this, this is an area where there is room for new developments on the border between a working class neighbourhood and the harbour. It is one of the last neighbourhoods in Rotterdam adjacent to an operating harbour. This harbour also provides employment opportunities for the inhabitants. The current harbour, as well as the foreseen 'next economy' the municipality has planned at Sluisjesdijk.

The site has the right size for pilot project focussing on the energy transition and the forming of an independent cluster as part of the bigger city. Most important is the fact this area has the potential to connect different atmospheres: the typical working class neighbourhood, large scale infrastructure in the form of the harbour and an historical core. This design brings out best of this different atmospheres and grasps them in the new neighbourhood.

The development will attract new inhabitant groups therewith meeting the goals set by the municipality while it prevents gentrification. Involvement of stakeholders in the decision-making process will encourage participatory processes among them. Including a strong network for cyclists and pedestrians, improved public transportation and ameliorated connections with the city centre will discourage the use of cars. Public amenities in a green environment will enhance social connections in the neighbourhood, while collective energy production and bettered insight in energy saving will generate a stronger sense of belonging.

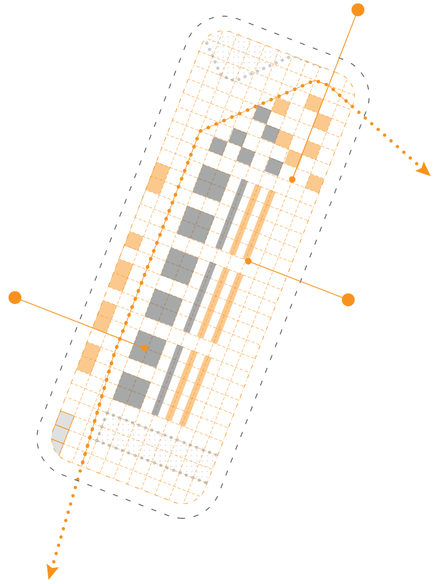


An important question during the research for this thesis was whether the neighbourhood should function as an open system or as a closed cluster. Both have positive and negative aspects.

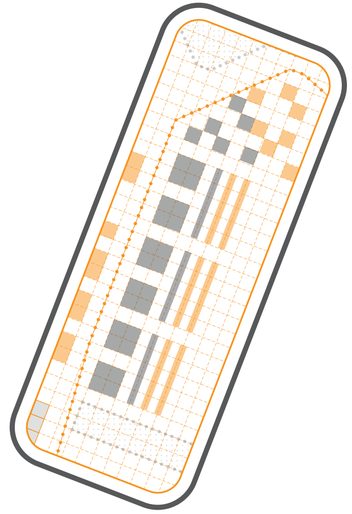
The advantage of creating an open cluster is the fact that you have the possibility to make use of existing mobility patterns and connect to them. This is done for example by including a new tramline, connecting the neighbourhood through public transportation with the rest of Rotterdam. In this way, inhabitants have less need for cars and therewith the need for parking spaces in the neighbourhood can be reduced.

Forming and operating as a closed cluster has his own advantages. By creating a closed entity, the possibility is present to create new conditions for the inhabitants and pilot project are an important ingredient of the design. The closed cluster shapes conditions for a stronger sense of belonging, something currently is not present in Oud-Charlois and with the new design is giving shape through urban design. In a closed cluster, the inhabitants profit from collective lowered living expenses and the energy transition is used to facilitate social structures

In the end, a closed cluster is created, shaping several social, spatial and sustainable conditions for the inhabitants of the neighbourhood to come to a connected Oud-Charlois, using advantages of an open cluster, such as attaching to and expanding of public transportation networks and slow traffic routes.



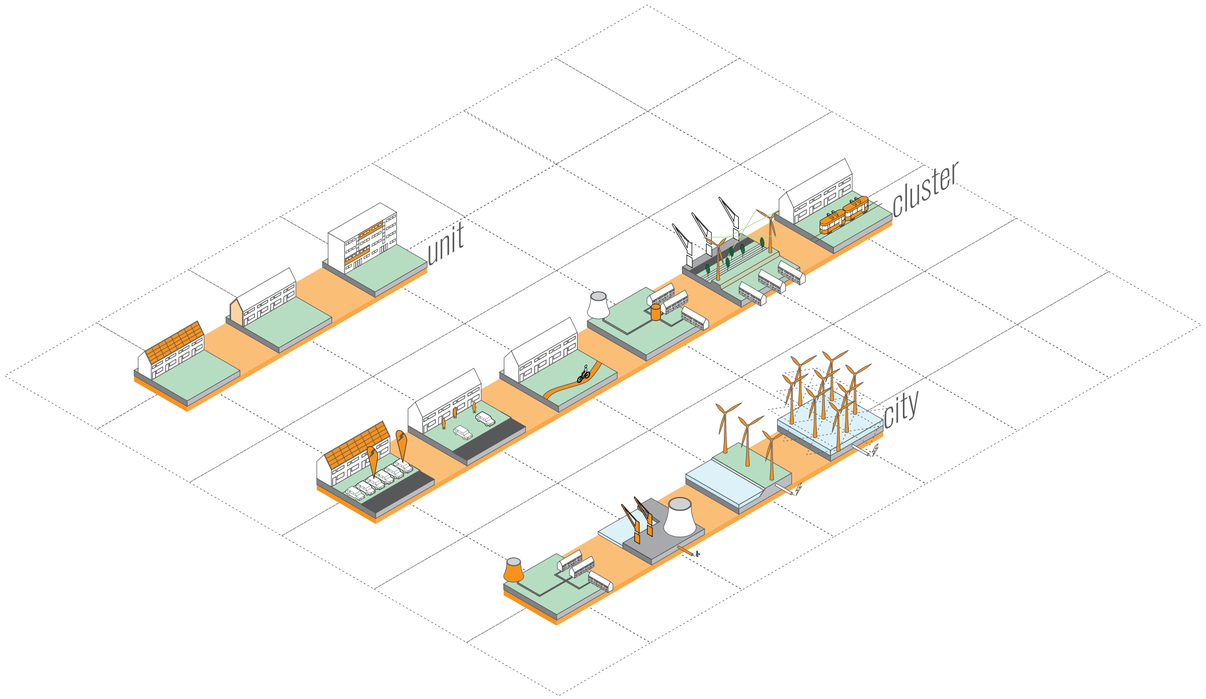
Versus



The energy transition and how the urban fabric can be used to generate energy was the starting point of this thesis. Soon in the process it became clear, spatial implications are hard to incorporate in an urban design. The scale of the cluster was the premise for the design and how this can operate in the larger urban fabric of the city.

Since the site is situated in one of the poorest neighbourhoods of the Netherlands, the energy transition in this specific research is used to lower the living expenses of the inhabitants of the neighbourhood by clustering their energy flows in the design. Spatially, energy generators and pilot projects have been incorporated in the design to create awareness among inhabitants of the area and visitors of the neighbourhood. Energy landmarks, such as an energy hub and solar pavement are designed to make an energy transition visible.

Besides the visible aspects, residual heat is used to heathen and cool the households, vehicle-to-grid systems are part of the design and new public transportation networks are incorporated to reduce car use in the area. All and all, the outcome is, that in the future, most energy won't be generated within the urban fabric, but there is a task for urban designers and urban planners to generate awareness about the energy transition.



The outcome of this thesis is a strong urban plan to connect Oud-Charlois through transition. A transition to new forms of energy, new mobility patterns as well as the potential to create new social structures. However, to make the design a succes, some further steps and recommendations for the municipality should be taken into account.

To establish the goals set in this research, there should be put emphasis on getting the users and stakeholders involved in the process of establishing this new area in Oud-Charlois. Since the future is unpredictable, a gradual development is advised and new developments in the field of the transition to new forms of energy should be incorporated in the design when possible.

Currently, there is a strong trend towards living in the city, which asks for higher densities. In the proposed design, a high density is established, but trends can change. Therefore, flexible densities are used. The plan is not a blueprint, it gives guidelines for a possible transition for Oud-Charlois.

To bring the design, which is a frontrunner design which incorporates pilot projects and new developments such as vehicle-to-grid systems, the municipality should offer subsidies for entrepreneurs and frontrunners willing to invest in the establisment of this neighbourhood

Looking solely into the transition from energy from fossil sources to the use of energy from renewables is hard to translate to specific spatial interventions. Therefore this thesis distinguishes tree types of energy; social, spatial and sustainable energy.

Subsequent steps are further research on how to increase the social energy in the neighbourhood, among other things through inhabitant participation. Also more elaborate investigation needs to be done on how to transform and connect the public domain and streetscape to come to improved spatial energy. Spatial implementations for energy generators into the urban fabric, pilot sites and projects to increase the social acceptance for these generators need to established.

The developed patterns are handles for the steps described above. Further exploration into the application of the patterns and connectivity is needed to come up with a concluding strategy to meet the goals of the municipality, meet the ambitions set and establish a revaluation of the area.

Connectivity though transition is the key component for this thesis. More in depth clarifications to come to strongly connected energies in the whole area, harbour, dike and existing neighbourhood are recommended future steps.

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