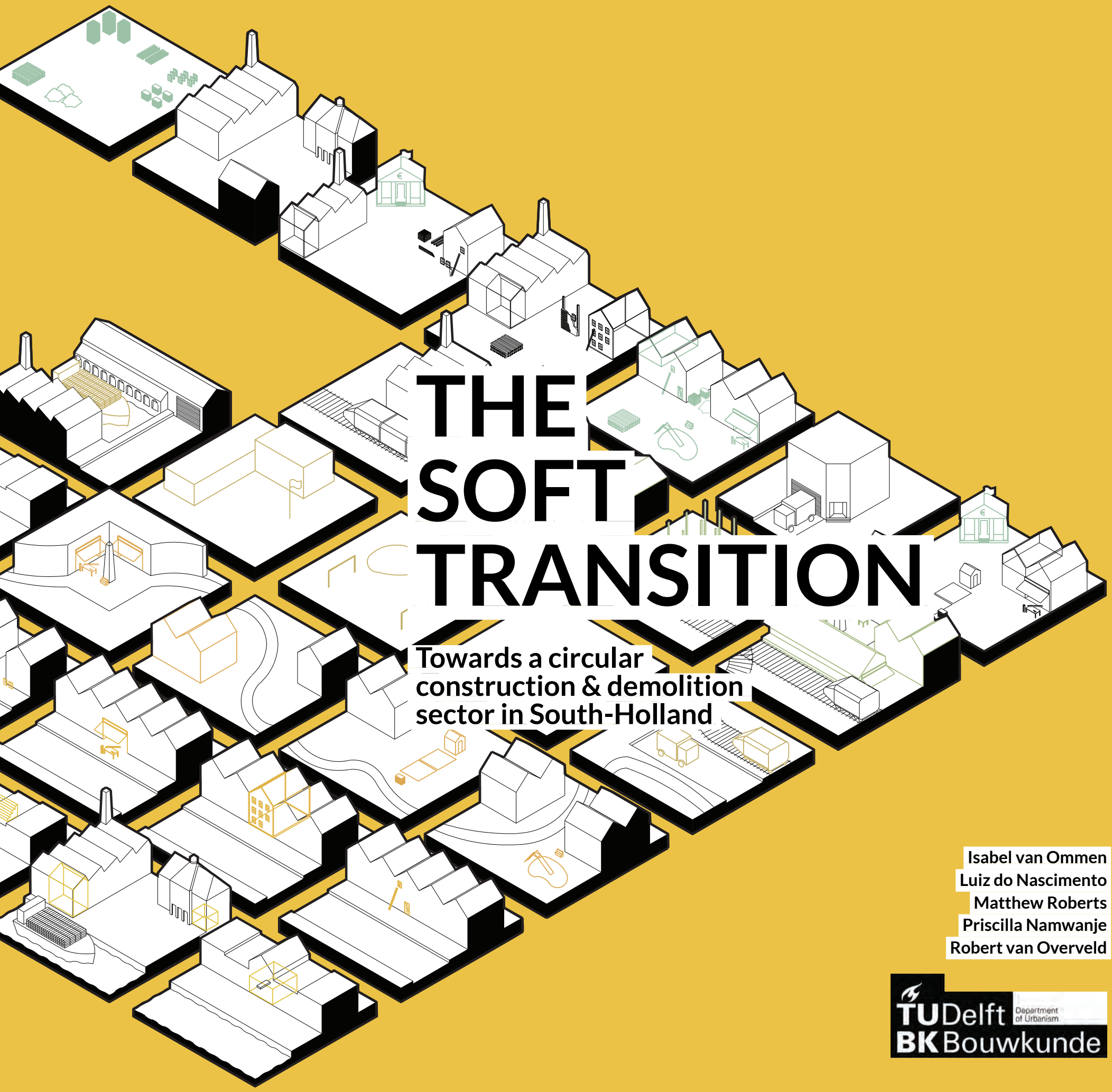

THE SOFT TRANSITION

Towards a circular construction & demolition sector in South-Holland

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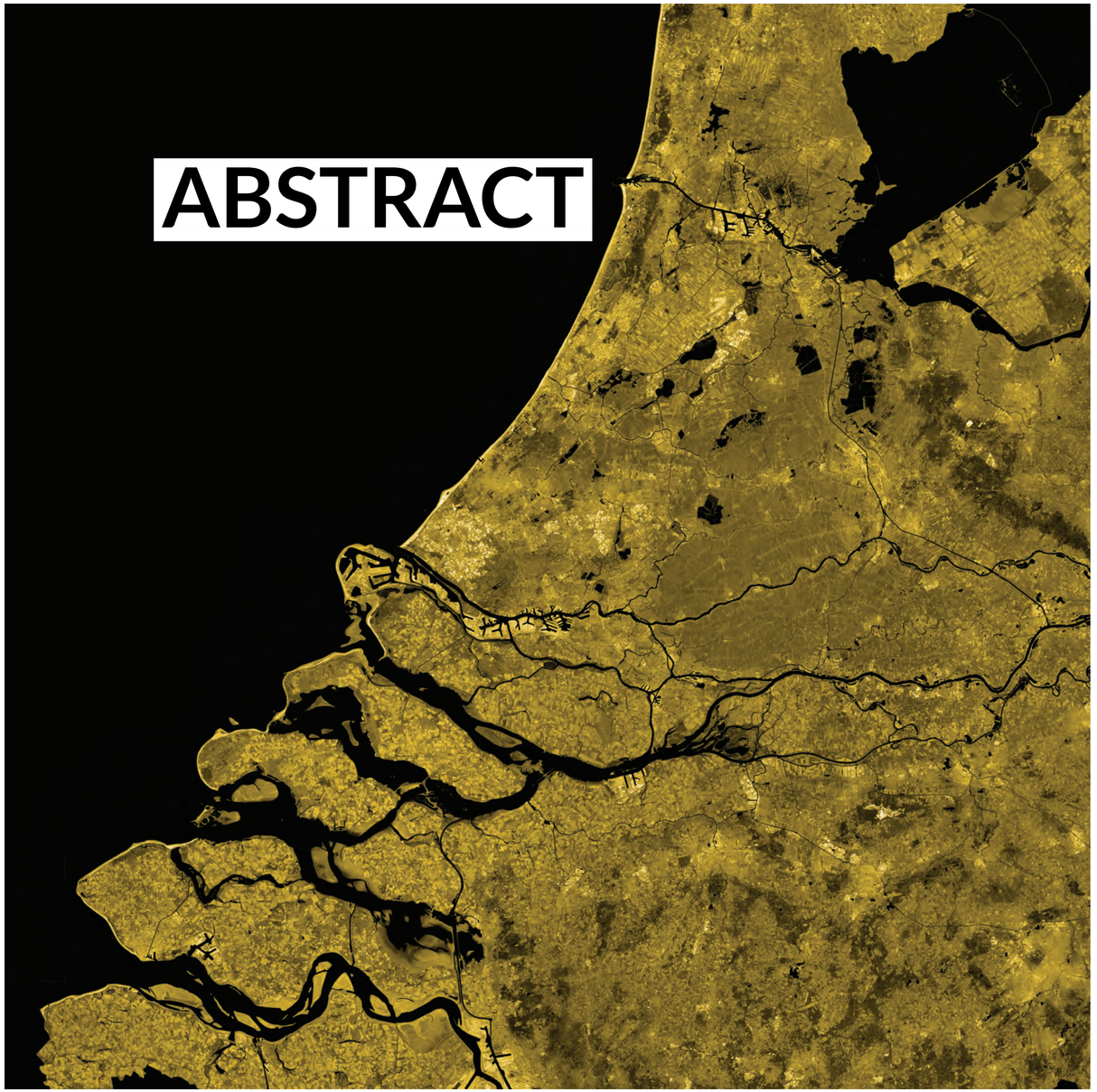
CONTENT



ABSTRACT

Currently the Construction & Demolition (C&D) sector in South Holland produces 2.581.840 tons of waste every year, it is also responsible for 50% of raw material usage and 35% of CO2 emissions. This issue is aggravated when considering the 200.000 houses that still need to be built in the region in the upcoming decade, increasing the amount of waste and pollution produced, not only by the construction of new houses, but also by new infrastructure. The province government has multiple obligations to reduce its greenhouse gas emissions and so has committed to achieving an entirely circular economy by 2050.

This report focuses on the Construction and Demolition sector and its implications on the province's spatial structure, focusing on three key themes: housing, socio-spatial justice, and the C&D Sector.

By using methods and practices found in Soft Planning theories, such as soft spaces, horizontal structure of stakeholders and open-ended proposals and design policies, the outcome of this research provides new perspectives on how to tackle social and spatial inequalities for the province of South Holland, whilst shaping the C&D Sector towards more sustainable, circular practices.

The soft transition takes the existing initiatives within the construction sector into account and aims for utmost collaboration with all stakeholders. Particular attention is paid to low-income neighborhoods that bear the brunt of construction companies' externalities and do not directly benefit from their proximity to educational institutions and job opportunities.

Resultantly, a set of patterns is formulated in order to set the stage for co-creation and facilitate the collaboration of the different actors at the scale of province, city and neighborhood. The report further details how these patterns could be applied on a contextual basis, and explores these scenarios in two locations within the province; Binckhorst, in The Hague, and Dordrecht.

Key Words; Circular construction & demolition sector, Housing, Socio-spatial justice, Soft planning, Circular jobs.

INTRODUCTION

The power of the city

A thousand lights together
Shining bright but blinding
Into the eyes of a million

It's creating chaoses and messes
Which the people try to solve
But are we allowed to be involved?

As we touch it, it sometimes reacts
Just like a mirror it reflects
Who we are and who we want to be

A thousand lights together
Shining bright but blinding
And no one knowing what we'll be finding

Poem by Robert van Overveld

Introduction

Rotterdam-The Hague metropolitan area is 10th largest in Europe

South Holland is the most populated province among the twelve provinces of the Netherlands and one of the most densely populated areas in the world with a total of 52 municipalities.

The largest cities within the province are Den Haag and Rotterdam. Den Haag is the seat of the Dutch government and the capital of the South Holland province. It is also known internationally as the 'city of peace and justice' and hosts multiple diverse organisations working towards a more just world, such as the Peace Palace and the ICC. Additionally, the city also hosts many educational and research institutions, attracting a number of expatriates from all over the world, making Den Haag one of the most culturally diverse cities in the Netherlands. Rotterdam, known as the 'gateway to Europe' hosts Europe's largest sea port, making it a logistics and economic hub for the region. As a result, it attracts people both from outside and within Holland and is home to over 180 nationalities. The Rotterdam-Den Haag metropolitan region is one of the most culturally diverse and populous regions of Europe.

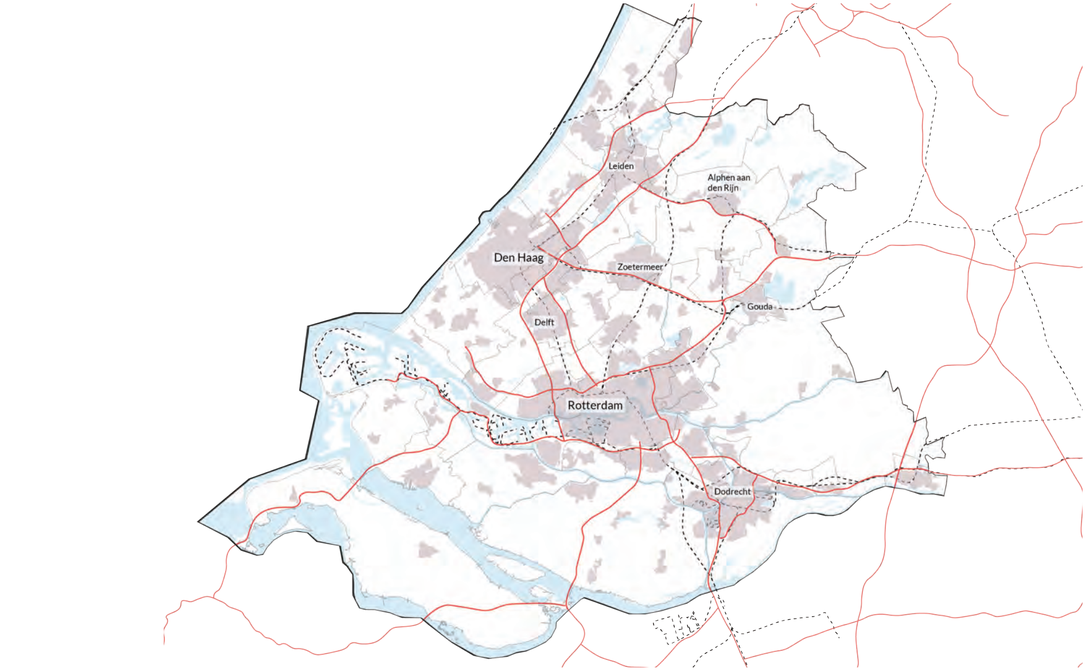
At the moment, the province is facing a range of challenges, among which; the housing shortage to meet the demands of a growing population and increased social inequality within residents and neighborhoods are prevalent . The province needs to build more than 200.000 units before 2030 to counter this shortage.

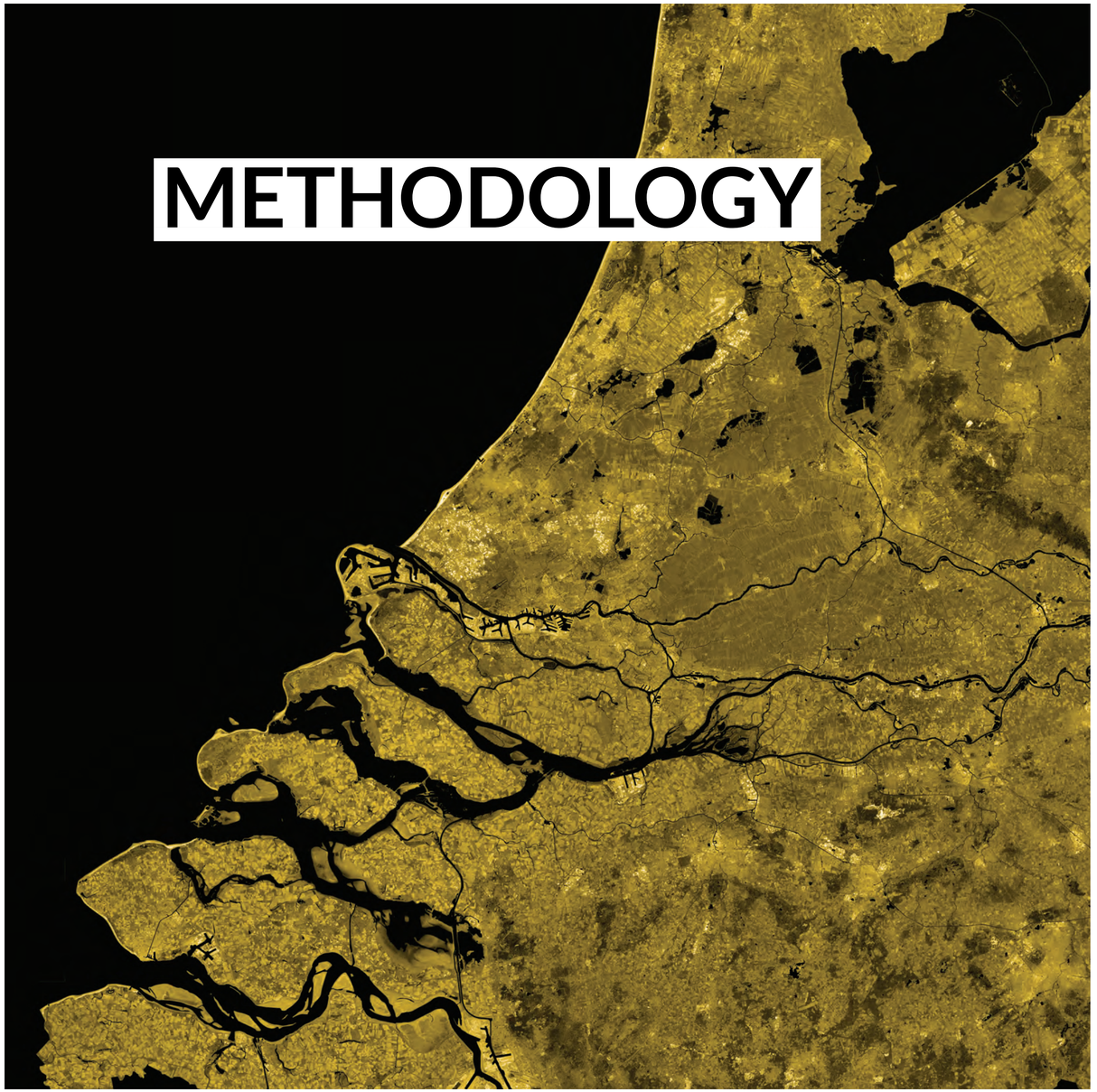
As a result, this has increased the demand, causing a price surge to over 1.5 times compared to 6 years ago (Centraal Bureau van de Statistiek, 2021), pushing low and middle income residents out of the city or into neighborhoods with higher unemployment rates and low livability scores. The medium sized and small cities within the province offer an opportunity to alleviate some of the pressure from the larger cities, however, this calls for precautionary planning to avoid transferring the same challenges to different locations.

These social and economical complications, coupled with environmental concerns expose the urgent need for change from a linear to a circular economy before 2050. In order to meet it's housing target, the province has to devise means of implementing circularity within the C&D sector whilst making every effort to accommodate all groups of people. This is a momentous task that would require input from all actors and stakeholders involved.

The soft transition is a vision and strategy for the province of South-Holland that attempts to address these socio-spatial challenges and the transition to a circular construction and demolition sector with the aim of meeting the housing demand.

Fig. 1
Insertion map showing the Province of South Holland





METHODOLOGY

This chapter expounds on the problem field and the task at hand. This is done by first highlighting the main research question, and then breaking it down to sub questions that will govern the methods used in the analysis. Thereafter, the theoretical framework elaborates on the paradigms within which this project is situated. The chapter concludes with the conceptual framework that illustrates how the three main pillars of the project are related, and the methodology used in the projects' execution.

Problem Statement

The steady economic growth in the Randstad is driving a large wave of migration into the region from other parts of the Netherlands and beyond. As a result, the Dutch government has set the ambitious target of delivering of an additional 200,000 homes in the province of South Holland by 2030.

The current construction & demolition process exists as a linear chain which creates environmental, spatial and social challenges. At the moment, the construction sector is responsible for 50% of the use of raw materials and for 35% of CO2 emissions in South-Holland yet the housing shortage calls for increased construction which will worsen these negative impacts on the environment. In addition, the shortage of affordable housing in the area is forcing low-income groups out of the cities, while a large percentage of the existing housing stock is in poor condition and in need of renovation. As a result, inequality is further amplified.

How can the demand for affordable housing be met whilst facilitating a soft transition to a circular construction sector in South Holland?

Fig. 2
Conceptual collage illustrating problem field

Research Question

Fig. 3
Schematic representation of problem statement

How can the demand for affordable housing be met whilst facilitating a soft transition to a circular construction sector in South Holland?

Sub research Questions	Methods
Housing	
What is the Housing Demand in South Holland? -What is the existing housing stock? - How much more housing is needed? - Who is the target market for the housing? - Where will this housing be located?	Mapping Policy analysis Interviews Reports and news articles
Socio-spatial justice	
What is a soft transition? - What is soft planning? -How can soft planning ensure the inclusion of all groups of people towards the transition to a circular economy?	Mapping Literature review (inc. papers, articles) Policy analysis Review of ongoing research (cities of making)
Circular Construction	
How can the existing linear construction sector be transformed into a circular construction sector? - What is the current form of the linear construction sector in South Holland? - What form would the ideal circular construction sector take in South Holland? -What is the spatial implication of a circular construction sector in South Holland?	Policy analysis Mapping Research by design Interviews

Theoretical Framework

The apparent threat of climate change has pushed the discussion of sustainability to the fore front in recent years. A key focus in this debate is urban areas and systems, which present as a threat to sustainable development but also offer opportunity for change. This research project is situated within the broader paradigm of sustainable urban development, with a specific focus on the circular economy and the construction and demolition sector.

Circular economy

The circular economy can be understood as an economic model that ensures the fair distribution of resources in the process of development, without any detrimental effects to the planet. (Drift & Metabolic, 2018) Simply put, it's a system that is restorative by intention and design (Ellen Macarthur foundation, 2013), meaning it minimizes waste through closing production cycles. This research project considers the different scales at which flows or cycles can be closed; neighborhood, regional and global, specifically within the C&D sector.

The three pillars of the project

The three pillars of sustainability are; economic, social and environmental. They can be referred to simply as people, planet and prosperity. The structure of this research project adapts these three pillars into three main themes through which an analysis of the challenges and potentials of a circular C&D sector for the province of South Holland is made. These three themes are; Socio spatial justice, housing and the C&D sector (Fig 4).

Socio-spatial justice

It is important to note that in the transition to a circular South Holland, the benefits accruing from the system change may not be evenly spread across all groups and sectors. There exists the social consequences to circularity which can either be material or intangible (ECORYS, 2019). It is probable that the marginalized groups in society such as the unemployed and residents of low income neighborhoods will be left out. This research focuses on the material consequences such as work and income, and investigates how the transition can be sensitive towards the most marginalized groups in society.

Housing

There is an increasing demand for housing in South Holland, yet buildings are also being demolished at an alarming rate. Unfortunately, the materials from demotion cannot meet the large requirements for the materials for the new construction (Drift & Metabolic, 2018). This imbalance reveals that a new approach has to be taken in terms of how the province meets the housing demand without necessarily more building. At the same time, specific measures have to be taken to improve on the state of the existing housing stock and ensure the extension of a buildings life span. Therefore, this research focuses on alternative ways of meeting the housing demand through transformation of existing housing stock and exploring innovative building practices like the open building concept (Open building, 2021).

Fig. 4
Schematic diagram showing how the three pillars of sustainability relate to the project pillars

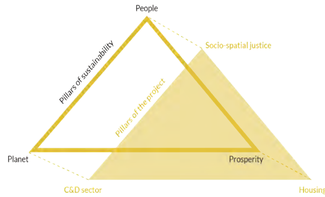
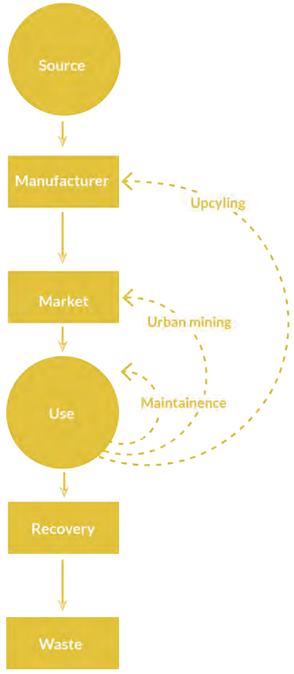


Fig. 5
Schematic diagram showing circular construction activities along the construction chain

Adapted from Ellen Macarthur Foundation, 2013



Construction and demolition sector

Building materials are the second largest flow of materials within the South Holland region (Drift & Metabolic, 2018). However, these materials are not reused and are usually down cycled. Specific attention has to be paid to this sector if the province is to attain its goal of becoming circular by 2050. The focus of this research is how to transition from a linear C&D sector to a circular one by fully incorporating two CE principles; 'design out waste' and 'rely on renewable raw material sources' (Ellen Macarthur foundation, 2013). In doing so, the project proposes a shift to biobased materials as the major source of raw materials for construction and explores the potentials of circular activities such as urban mining and upcycling of C&D waste materials.

Soft Transition

The process of shifting from a linear model in the C&D sector to a circular one can be called a transition. A transition involves building new structures and systems while dismantling old ones, a dynamic that can best be illustrated on the x-curve (Drift & Metabolic, 2018). This process can create a lot resistance and result into chaos which sometimes slows down or inhibits the process of change (Fig 5). For this reason, we propose a soft transition, which adapts a new approach to planning known as soft planning.

Soft planning

Soft planning can be described as 'processes outside the statutory that none the less contribute to the development of an area' (Purkarthofer, 2016). The processes can involve multi stakeholder and multi actor negotiations and cooperation. Soft planning has two aspects to it; geographical and institutional. The project references to the geographical aspect as soft spaces and the institutional as soft policies. The research explores how soft planning through spaces and policies can be used to accommodate and encourage cooperation between all actors involved in the transition towards a circular South Holland.

Why soft planning

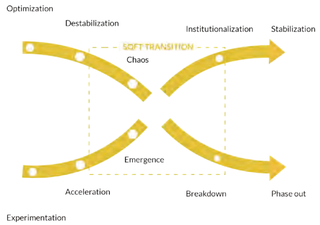
Whereas conflict can be a necessary tool in the development of new systems, it can also be detrimental if not managed and controlled well. Soft planning builds on the existing structures and systems within the economy and society, therefore ensuring smoother transition processes with manageable conflict. The idea is not to entirely shift from the existing hard/ top-down planning approach, but rather to integrate the two approaches. Soft planning offers the opportunity to introduce more bottom-up approaches that allow the involvement of all actors from project inception to completion and management which comes with a lot of benefits for example reduced costs, and speedy implementation.

Set of Patterns

The approach taken in the proposed implementation of this project is the use of a set of patterns, which was inspired by the ongoing research project by cities of making (Cities of making, 2018). These patterns are a set of actions, guidelines and policies translated from existing projects, planning visions and proposals.
The idea behind this, is that the patterns are developed in collaboration with all relevant stakeholders and can be adopted to different areas and projects. They can also be applied at different scales and can be revised and suited to different periods of time. This open-ended and flexible nature is what encompasses the soft transition, and justifies this approach.

Fig. 6
An illustration of the process using the X curve

Adapted from Drift & Metabolic, 2018

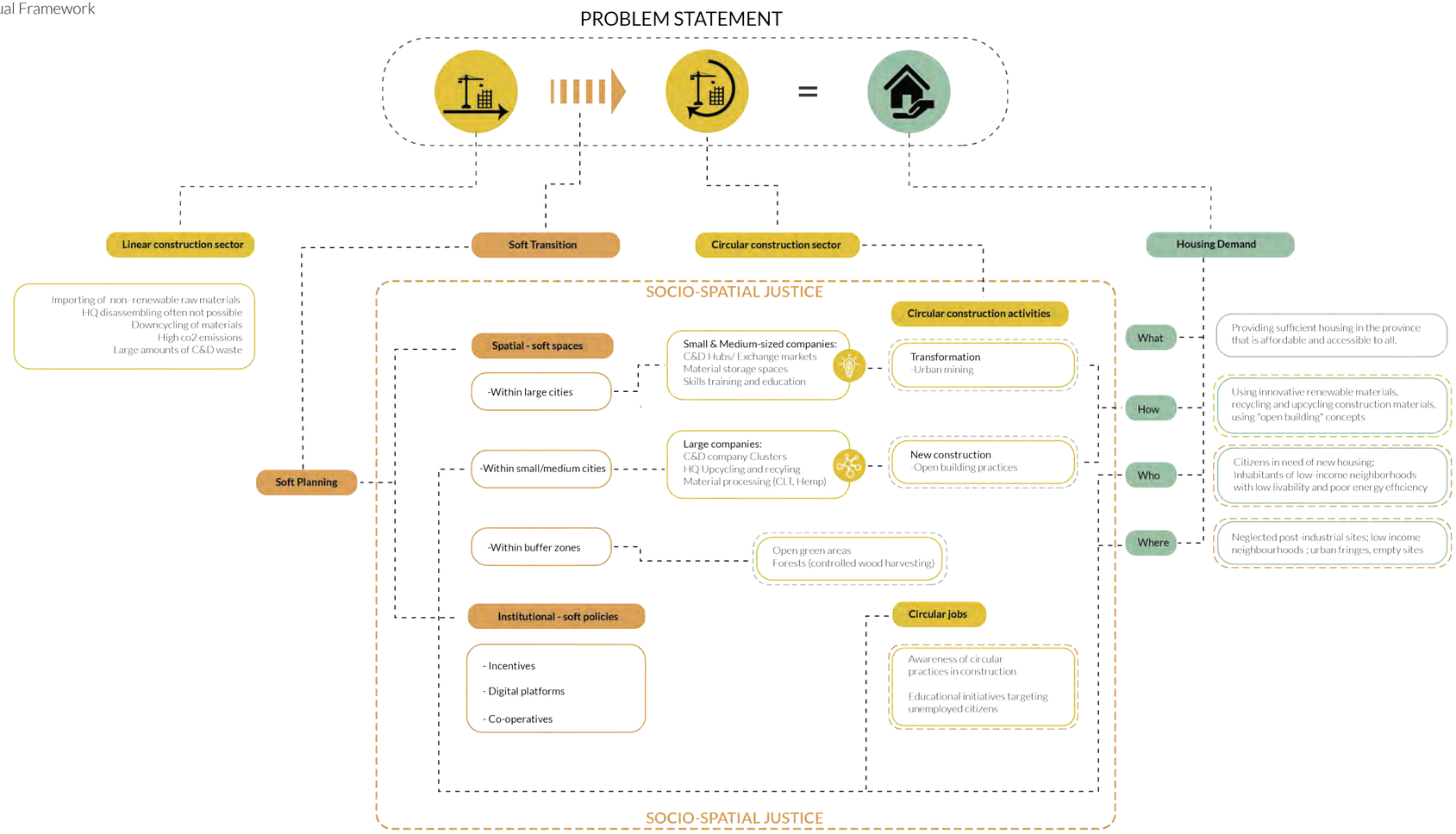


Conceptual Framework

The conceptual framework brings together the three pillars of the project; Socio-spatial justice, Housing and the C&D sector, and elaborates on the common ideas and links within them. Socio-spatial justice is a cross cutting theme and acts as a lens through which other themes are explored and discussed, making it the most central pillar in this research.

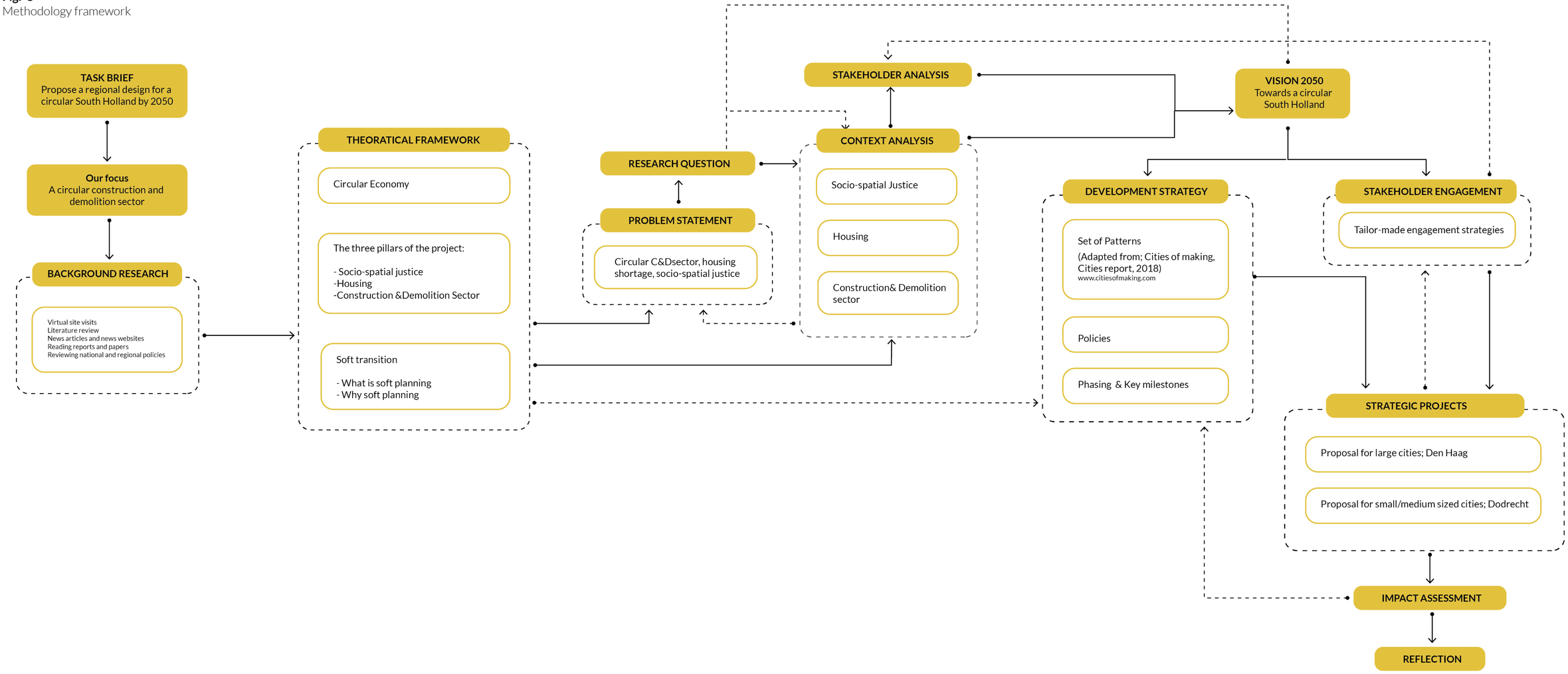
The core idea behind the soft transition is two pronged; first, is to create soft spaces which would be new areas that can accommodate activities related to circular construction and also facilitate collaboration of the various actors involved. Second, is to use soft policies which could take the form of incentives that can nudge different actors into a preferred direction and create a favorable climate for circularity.

Fig. 7
Conceptual Framework



Methodology

Fig. 8
Methodology framework



SOCIO-SPATIAL JUSTICE

Socio-Spatial justice is presented in this report as one of the three main pillars structuring the research. Furthermore, it is a theme that permeates the entire discussion around the issues of Circularity (how could the transition impact the Dutch population and who will suffer or benefit from it), Housing provision (where is new housing planned to be built and how connected it is to the existing infrastructure and other externalities that emerge from public investment through time), as well as the Construction and Demolition sector (how well-distributed are the benefits and the burdens of the sector).

With such questions in mind, this part of the report presents the findings on accessibility to social infrastructure, jobs, and education, relating it to the target group: Residents of lower-income neighborhoods, with a non-western immigration background, who are nowadays at the fringes of the system.

Furthermore, some findings on the relationship between the condition of the housing stock related to energy efficiency and lower-income neighborhoods instigate ideas of how the transition towards a circular Construction & Demolition Sector in the Province of South Holland (PZH) could change, for better, the life of its citizens.

Socio-spatial justice and the C&D

Alongside making sure that a fully circular economy is achieved by 2050, the Province of South Holland is engaged in using this period of severe change as an opportunity to enhance the balance between economical, societal, and environmental matters. The transformation of the Province, which is also embedded in national and European policies, must foresee that not only the structure of the economy and flows of materials will change, but also the social.
So far, not a lot is known still about the social consequences of this transition and how people could benefit from it and, therefore, special attention was paid to try to fill these gaps in the following pages.

Citizens that already struggle to make a living nowadays can be further impacted by the phasing out of certain businesses

To achieve a fully circular economy by 2050, it is certain that profound change must occur within all sectors of the economy, including the C&D sector.

The transition towards a circular economy must be made with sufficient attention to the unforeseen impacts in the social structure of the Province. Citizens that already struggle to make a living nowadays can be further impacted by the phasing out of certain businesses, or the change in technologies available for the manufacturing of goods and provision of services.

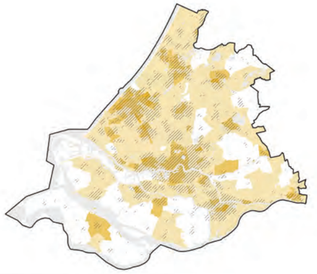
One way of assuring that residents are secured and that the possible negative, even if momentary, impacts of the transition are felt by the least amount of people is by guaranteeing universal access to public services, equipment, health care, and financial support. To assess the current state of affairs of the Province in those terms, a starting point for the research on this pillar was investigating how evenly spread are the gains of capital that are concentrated in the province and who has access to it.

By defining Social Infrastructure as a series of different types of public equipment in the realms of education, health and culture, and leisure, it was observed that the Province already presents an optimal situation in terms of access to these infrastructures in terms of distance traveled between households and the types of equipment, from almost all corners of contiguous urban areas in the region.

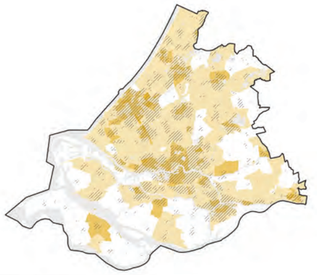
Concerning education, health, and culture & leisure no critical distinctions were noted between neighborhoods of higher/lower-income and inner cities and suburbs. However, it is worth mentioning that the issue can not be put away simply by this statement. Further assessment of the quality of the services provided and how truly accessible they are to all groups of society could reveal further issues.

Fig. 9
Access to selected equipments and social infrastructure in the PZH

Education

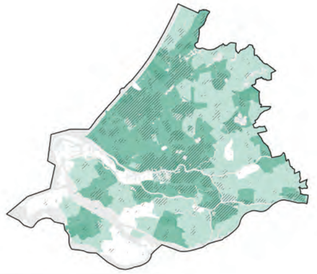


Average distance to secondary education schools (in km)
(CBS, 2018)
- < 0,5
- 0,5 - 1
- 1 - 5
- > 5
- Province of South Holland (CBS, 2020)

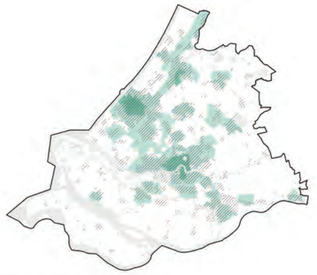


Average distance to VMBO schools (in km)
(CBS, 2018)
- < 0,5
- 0,5 - 1
- 1 - 5
- > 5
- Province of South Holland (CBS, 2020)

Health

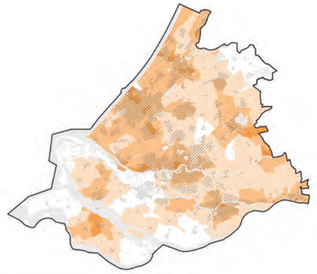


Average distance to hospital including outpatient clinic (in km)
(CBS, 2018)
- < 1
- 1 - 5
- 5 - 10
- > 10
- Province of South Holland (CBS, 2020)

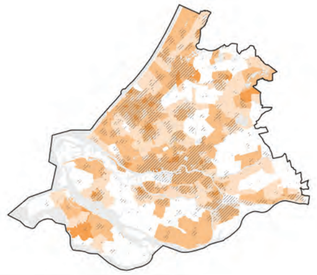


Number of GP practices within 3 kilometers
(CBS, 2018)
- 0 - 5
- 5 - 25
- 25 - 50
- + 50
- Province of South Holland (CBS, 2020)

Culture & leisure



Average distance to the nearest museum (in km)
(CBS, 2018)
- < 1
- 1 - 5
- 5 - 10
- > 10
- Province of South Holland (CBS, 2020)



Average distance to the nearest swimming pool (in km)
(CBS, 2018)
- < 1
- 1 - 2,5
- 2,5 - 5
- > 5
- Province of South Holland (CBS, 2020)

Energy efficiency and the C&D

The sector needs to build better, using materials that are less harmful for the environment

Fig. 10
State of social housing in the Province

Google Street View, 2021

State of social housing and post-war housing

It is estimated that 7 million homes need to be post-insulated in the Netherlands (Studio Marco Vermeulen, 2020), apart from the 1 million homes that will have to be built in the upcoming decade and the many more that will follow after 2030.

Enhancing the quality of the built stock is key in achieving the emissions and energetic goals of the country, as well as providing a better economic balance between citizens.

These ambitious goals are hard to achieve with the already heavily pollutant construction sector and the scarcity of land in this region of Holland. Long-term energy efficiency means that the sector needs to build better, using materials that are less harmful to the environment, but also that existing buildings located in consolidated areas of inner cities, are future-proofed and updated to the current standards of energy-saving and comfort.

The research explores the challenges in the Province regarding the improvement of homes and possible underlying questions related to these issues, e.g. economic disparities in people living in sub-optimal homes.

Focusing on the homes built during the post-war period, from 1945 to 1960, the issue's relevance becomes evident. Not only the PZH will have to deal with the challenging goals in housing construction and subsequent flows of materials necessary for this, but also think of new ways in which homes in need of retrofitting can be improved.

Around the main cities of the Province, such as Rotterdam or The Hague, many clusters of buildings from the analyzed period can be found. When looking at these municipalities on a smaller scale, it is evident that many of these clusters are superimposed with lower-income areas, where at least 50% of the households are on the bottom 40% of the country in terms of income. Therefore, the issue of how poorly these homes perform in energy efficiency terms is far-reaching. Residents of these homes would not be able to upgrade their homes on their own, in case no broader policies to subsidize and incentive post-insulation works can easily be accessed by the citizens. These same residents also pay higher energy and gas heating bills, contributing to making their economic situation worse.

Furthermore, as more energy is required for heating these homes, the carbon footprint of these areas is larger, increasing the emissions of the country.

Fig. 11
Clusters of Post-war neighborhoods in the PZH

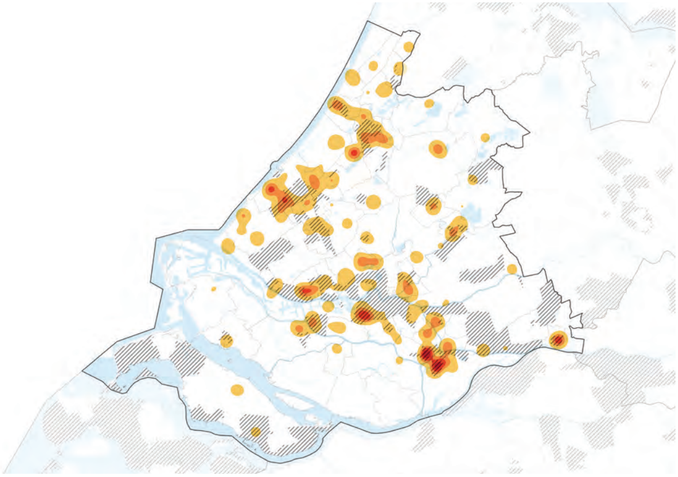


Fig. 12
Clusters of Post-war neighborhoods in the city of The Hague

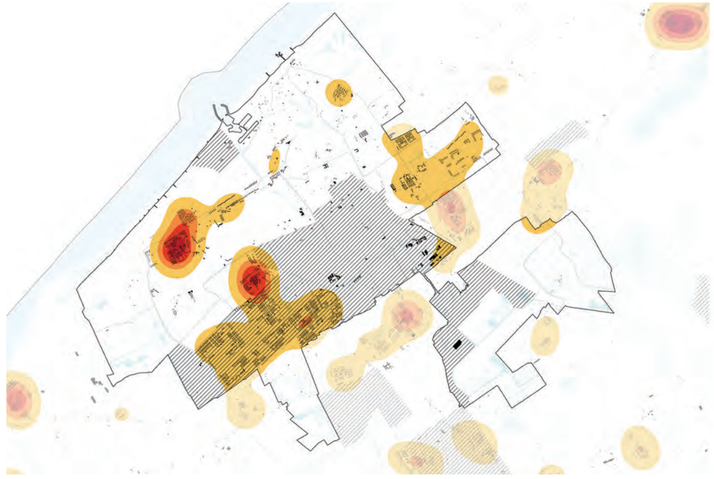
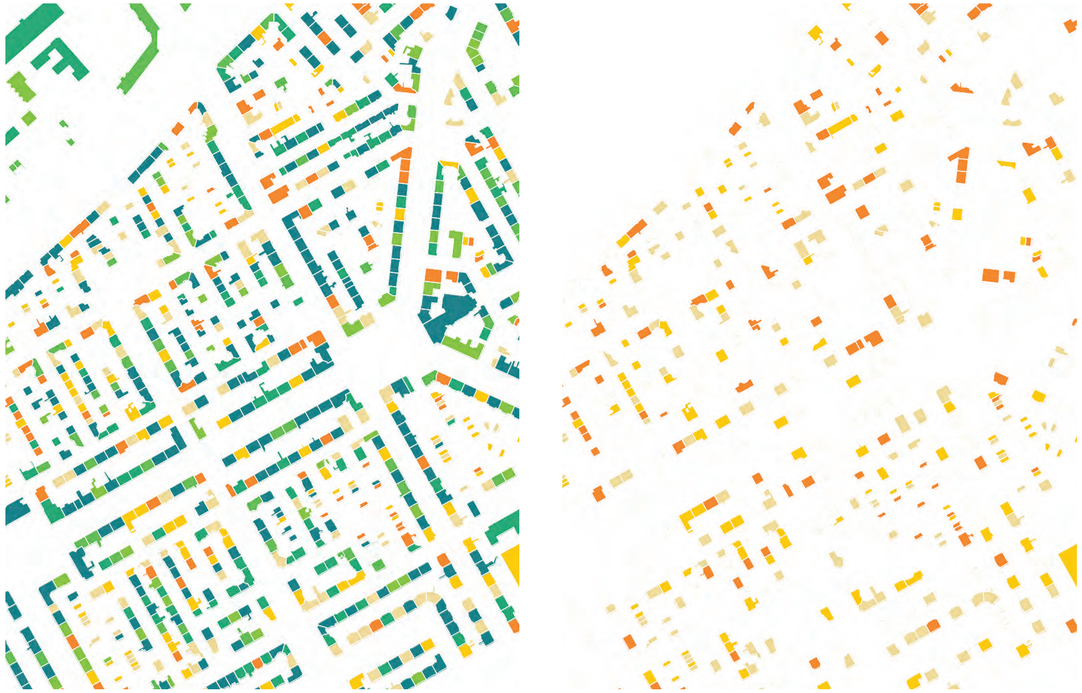


Fig. 13
Energy efficiency in lower-income neighborhoods: Laakkwartier



In neighborhoods with lower income, as depicted above in Laakkwartier to the south of Holland's Spoor Station, many households are labeled as poor performing in terms of energy efficiency. Although significant parts of the neighborhood present sufficient or more than sufficient labels, many still need to go under renovation works.

Expanding the lifespan of buildings by refurbishing them would not only enhance their performance but also decrease the amount of waste produced in the Province by the Construction and Demolition sector, as fewer homes would end up being torn down.

Energy label for individual buildings (RvO, 2021)

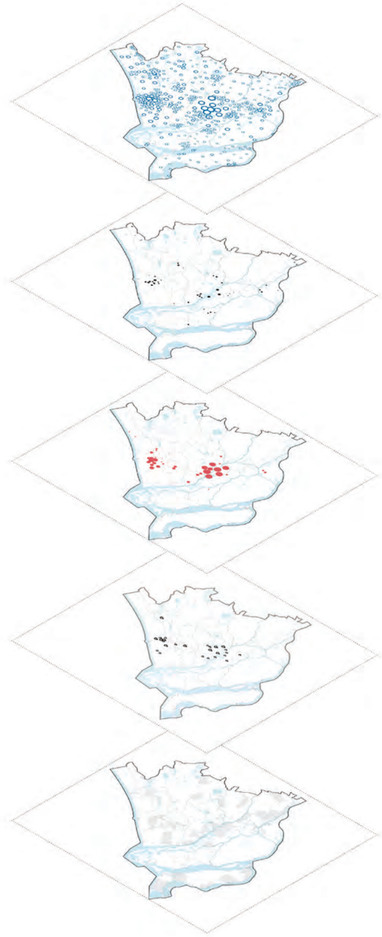
- Label A
- Label B
- Label C
- Label D
- Label E
- Label F
- Label G

0 100 200 km

Scale 1:5.000

Jobs and education

Fig. 14
Maps of access to jobs and education



Number of companies per neighborhood/buurt

(CBS, 2018)

Neighborhoods with more than 3% of the population relying on unemployment benefits

(CBS, 2018)

Neighborhoods with more than 30% of the population with a non-western migration background

(CBS, 2018)

Higher education institutions

(CBS, 2018)

Neighborhoods in the bottom 40% of the country in terms of income per household

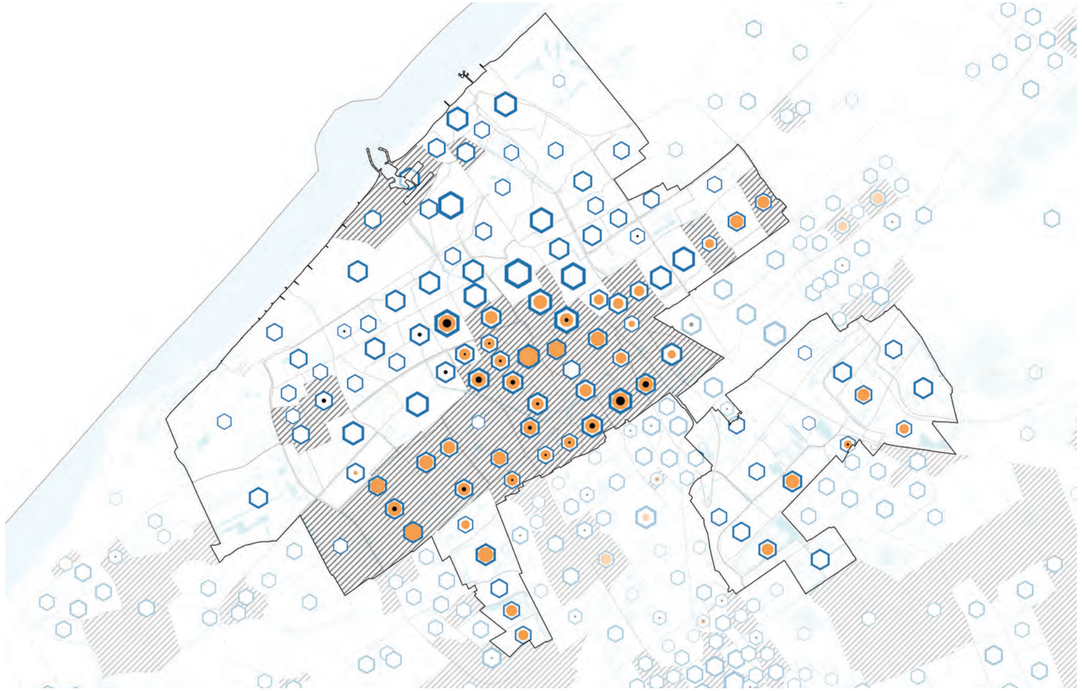
(CBS, 2018)

Many neighborhoods located immediately next to the inner-cities of the financial cores of the Province present relatively high rates of unemployment and low income. These areas are mainly occupied by citizens with a non-western immigration background.

Surprisingly, these low-income neighborhoods are well connected and close to the city centers, where there is a high amount of jobs and companies, as well as good social infrastructure indicators.

Therefore, the problem of concentration of unemployment and lower income in some parts of the Province, as well as in some groups of citizens can not be explained by a lack of connectivity between certain areas and the financial cores where most jobs are located.

Fig. 15
Employment and social background



Number of companies per neighborhood (CBS, 2018)

Neighborhoods with more than 30% of its population with a non-western background (CBS, 2018)

Percentage of the population receiving unemployment benefits (CBS, 2018)

Districts with more than 50% of the population in the bottom 40% of the country in terms of income (CBS, 2018)

The Hague's boundaries (CBS, 2020)

Open water (BRO, 2020)

0 1 2 km

Scale 1:85.000

Fig. 16
Percentage of population without basic training (2008-2019)

Adapted from: De sociale staat van Nederland, SCP, 2020

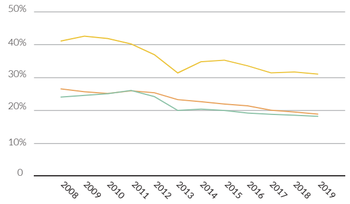
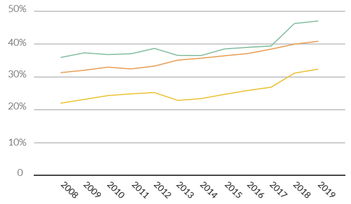


Fig. 17
Percentage of population with higher education training (2008-2019)

Adapted from: De sociale staat van Nederland, SCP, 2020



Native dutch

Western migration background

Non-western migration background

The disparities between native Dutch / Western and Non-western peoples can partially be explained by the gap in education levels between these groups.

Although the numbers have improved during the last decade, citizens with a Non-western background still lag in education and professional training.

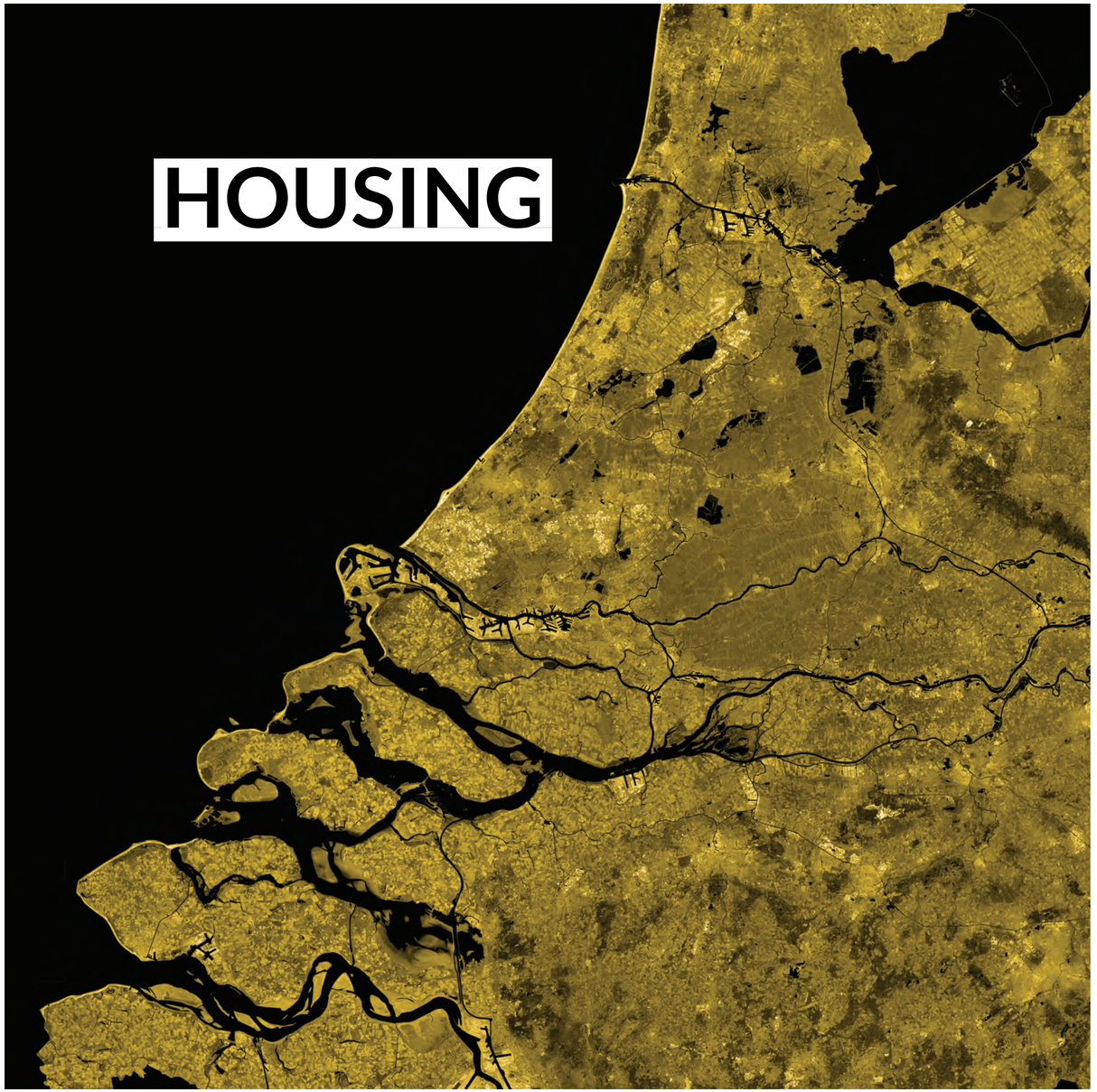
Considering that a large share of residents of the neighborhoods in need of renovation works, as well as neighborhoods with relatively high rates of use of unemployment benefits, special attention needs to be paid to this demography.

As put forward by the analysis of the location of jobs X distance to these neighborhoods, in the case of the Province of South Holland lack of access to the job market can not be explained by spatial disparities only. Considering that already many residents of these neighborhoods enter the job market without basic training skills, as the Province shifts towards a fully circular economy, this group of citizens can be left behind, should their jobs disappear due to the phasing out of industries. Another issue that needs to be acknowledged is that many manufacturing jobs will require further training of its workers to adapt to the Circular Economy.

Furthermore, these lower-income neighborhoods adjacent to inner-cities and construction sites, e.g. the Laakkwartier, close to the Binckhorst in The Hague, could function as a pool of workers for the new jobs required by the circular economy. It is estimated that an additional 54.000 new jobs will be required by the transition (TNO, 2013) and it is key that people at the edges of the market are included in the process.

The Province depends greatly the jobs in construction sector, providing an estimation of 100.000 jobs and € 13 billion to the economy. (Drift & Metabolic, 2018).

HOUSING

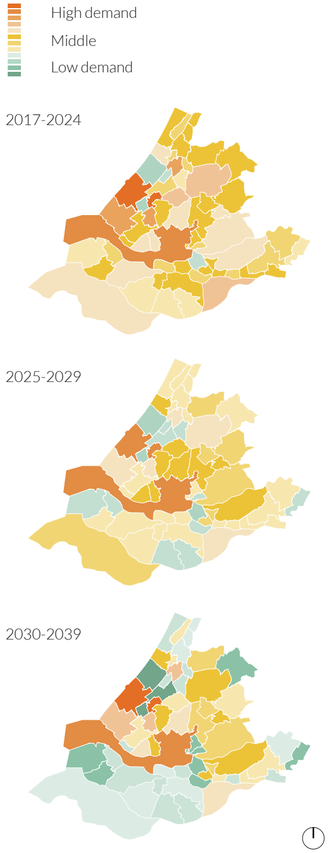


This chapter tackles the second pillar; housing. Briefly, the lack of space and the lack of quality high housing is analyzed in the province of South Holland. The housing market is very tense at the moment and prices are higher then ever. Although, the housing shortage is somewhat of a technical problem, the implications that it has on our society reach far beyond. At the same time, does it conflicts with tackling climate change since building about a million houses means more pollution, even when done in the most sustainable way possible.

The housing challenge

The Netherlands is facing a demand of one million new dwellings, of which 200,000 have to be realized in the province of South-Holland. The national housing shortage can be explained on the one hand by the low housing production in recent years and on the other hand by a faster increase of the population (ABF Research, 2019). At the same time, the demand is not evenly spread across the country and within the province, but instead there is a growing shortage in the larger cities in particular. There is a shortage of space in these urban areas and with the current approach to constructing houses, making up for the shortage will only lead to more problems for the construction sector.

Fig. 18
Supply and demand for housing in the PZH
Adapted from: De Zwarte Hond, 2020



Looking at the prognosis of the population trend in South Holland over the next 20 years, a clear growth becomes apparent. Figure 20 also shows that especially the groups above 65 years of age will increase. This aging of the population, together with individualism and migration, plays a role in the increase of the number of households in the region (De Zwarte Hond, 2020).

It was mentioned earlier that the distribution of demand is not evenly spread across the Netherlands and the province of South Holland. The provinces that are part of the Randstad, such as South Holland, face a higher shortage than other provinces. When looking more specifically at the spread of demand across the province, it becomes clear that the greatest growth will take place in the proximity of the largest cities, such as Rotterdam and The Hague. The map also shows where the province has planned urban growth. This is also mainly in the concentrated urban areas, while other parts of the region, such as the west of Goeree-Overflakkee, continue to shrink.
Zooming in even further on the distribution of demand, results in an analysis of the distribution between living environments. This shows that most housing has been added in the urban center and outside center, which can be explained by the popularity of living in the large cities. Another point that stands out is that there is mainly transformation taking place in most urban residential environments and new construction mainly outside these areas. So where there is the highest demand, there is also the greatest shortage of space.

Inefficient buildings and building practices

Apart from the shortage of space and the slow pace of production at present, one of the biggest problems is the way in which many of these houses are built and will probably continue to be built. This is because of an inability to change their function, due to the hardness of the design and construction methods. Habraken advocates a vital architecture that gives shape to everyday life and allows for change. He makes a clear distinction between the support and the infill and emphasizes that this distinction is not only technical in nature, but more importantly focused on the ability of personal influence". There are opportunities in the sector with the use of dismantling constructions, for example, that could reduce the amount of waste produced, should these buildings or neighborhoods be transformed in the future.

Fig. 19
Housing provision until 2030 in the PZH

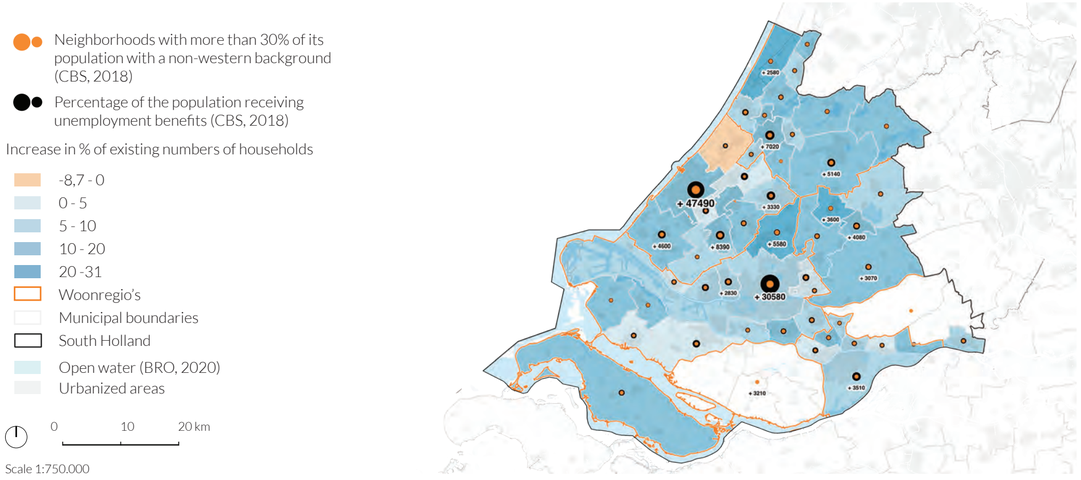


Fig. 20
Households to age in South Holland

Adapted from: CBS & South Holland Province, 2021

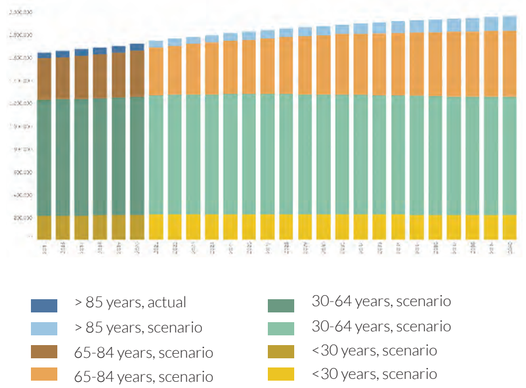


Fig. 21
Added and extracted dwellings by living environment in South Holland

Adapted from: Edit by PZH with data from CBS & ABF Research, 2021

C&D SECTOR

The third pillar of the Soft Transition is the construction and demolition sector. The linearity of the sector is the core of this chapter, as well as its consequences. This will be investigated by means of research into which materials are used in the current sector and how these flows through the province. In addition, many non-circular ways of treating the waste materials are currently being used. Also, the distances of flows are large and the sector relies heavily on imports of materials. And finally, the externalities of this sector will be discussed and how this can affect the livability of surrounding neighborhoods.

Material usage & waste

The previous chapter outlined the challenge of housing demand and inefficient buildings and practices. This is in addition to the current excessive amount of materials and waste being produced and moved around the province. Current flows in the sector are linear and distances travelled by flows are long, generating a lot of waste and emissions through transport. Not to mention the extra houses that will have to be built after 2030, which will create even more waste and emissions.

The construction material flow is the largest material flow in the region after the chemical sector and container handling

In the province of South Holland, the current C&D sector produces more than 2.5 million tonnes of construction and demolition waste (CDW) per year (Drift & Metabolic, 2018). Figure 20 shows how this waste is processed, this is mainly done in three ways: recycling, downcycling and incinerating.

Most of the CDW comes from demolition processes, of which almost half consists of asphalt and almost the other half of stony rubble. This stony rubble is a result of the use of concrete in the construction of buildings. Concrete is the most commonly used material in terms of volume, generates the most waste and its production also generates many emissions (Studio Marco Vermeulen, 2020) Chapter 4.3.2 discusses concrete in the C&D sector in more detail.

Fig. 23
Conceptual section of the current state of the C&D Sector

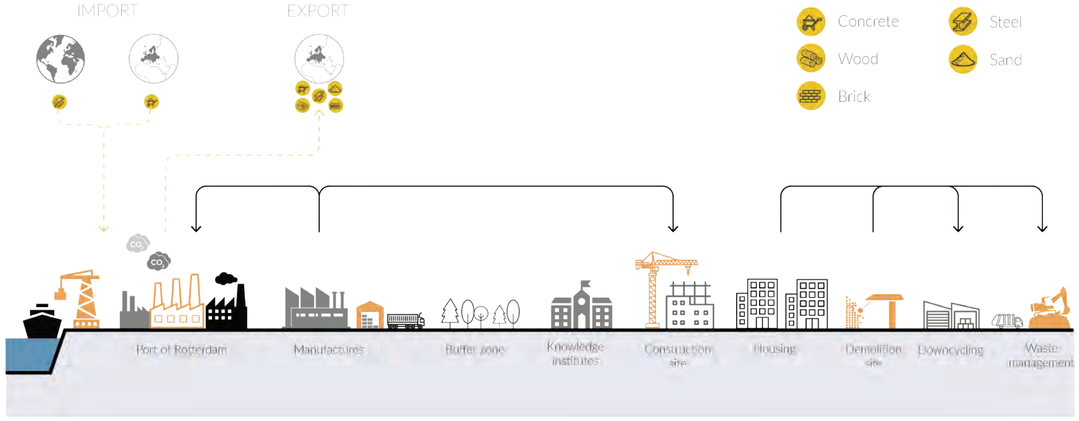
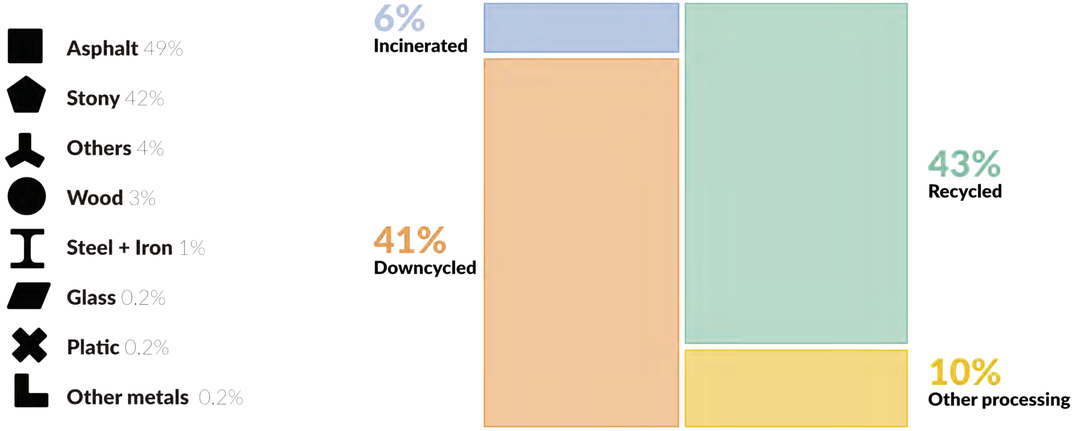


Fig. 22
Waste generated by the sector

Adapted from Drift & Metabolic, 2018



Then there is steel and iron, which only account for 0.6% of the material volume but whose contribution to CO2 emissions is 11% (Studio Marco Vermeulen, 2020). During demolition, this material is not properly recovered, so it loses quality and is therefore classified more as downcycling than as recycling. Thus, there is still much progress to be made in the use of steel and iron.

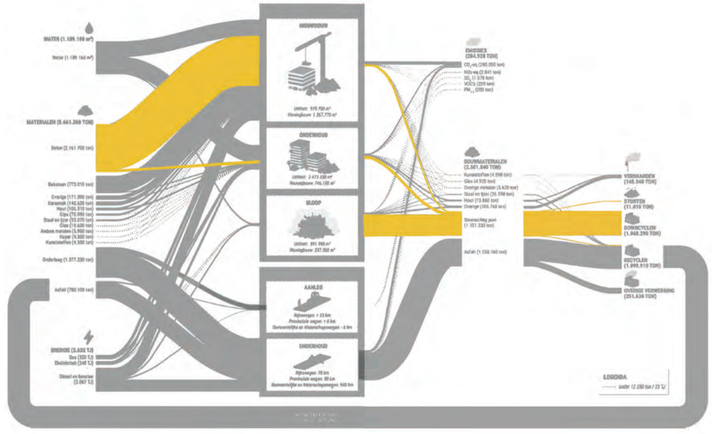
For the use of these materials in the sector, the province of South Holland relies heavily on imports from Europe and the rest of the world. The import of raw materials from Europe is mainly for the processing of concrete and steel and on a smaller scale other materials, such as wood, come into the province from other parts of the world through the Port of Rotterdam.

The section of figure 20 shows the import, export and current flows within the C&D sector. This shows not only a material flow from demolition site to downcycling and waste management, but also a waste flow from housing. This is because during the lifespan of buildings, through maintenance and renovation, waste is also produced (Drift & Metabolic, 2018). But in the following phase, during demolition, by far the most waste is produced through the use of materials that are not easy to disassemble, such as concrete. After this demolition, the waste is often downcycled or taken to waste management, this illustrates well the linearity of the sector, with demolition as its end point.

97% of concrete waste is downcycled

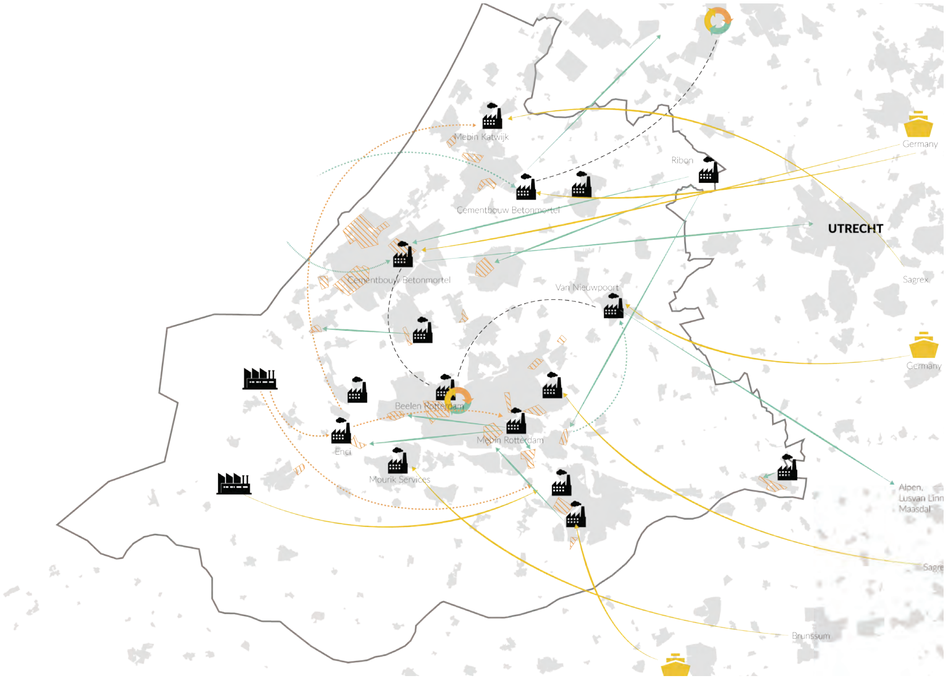
Fig. 24
Flows of waste generated by the sector: concrete

Adapted from Drift & Metabolic, 2018



A distinction is now made between the material flows discussed in the previous chapter, those relating to load-bearing and non-load-bearing construction materials. Concrete is the largest of the load-bearing construction materials, in terms of both emissions and waste. Figure 21 shows that 42% of the total waste flow consists of concrete. From the 1,101,330 tons per year (42%), 1,068,290 tons of concrete waste is downcycled, which corresponds to 97%. While only 3% of concrete waste is recycled, this concrete flow goes back into the infrastructure flow for road construction and not into the building flow. In the challenge of making the linear construction processes more circular, there is thus a great profit to be made in the area of building with concrete (Drift & Metabolic, 2018).

Fig. 25
Flows of materials: concrete
Adapted from Gao, C. Kariuki, J. Broek, J. V. D. Jeronimus, R., 2020



The current patterns of concrete flows in and out of the province demand that materials travel long distances, resulting in a high consumption of fuels. This is because the construction sector is still very reliant on importing raw materials for concrete from Belgium and Germany. In addition to the import of raw materials, long flows also occur because concrete companies use the concrete for projects that are not in close proximity, which also leads to a lot of transport and therefore more emissions.

- Construction company
- Import from Hoogovens
- Import from other countries
- Recycle company
- Planed construction site
- Wet concrete
- Aggressive resource
- Cement resource
- Sand resource
- Recycle concrete

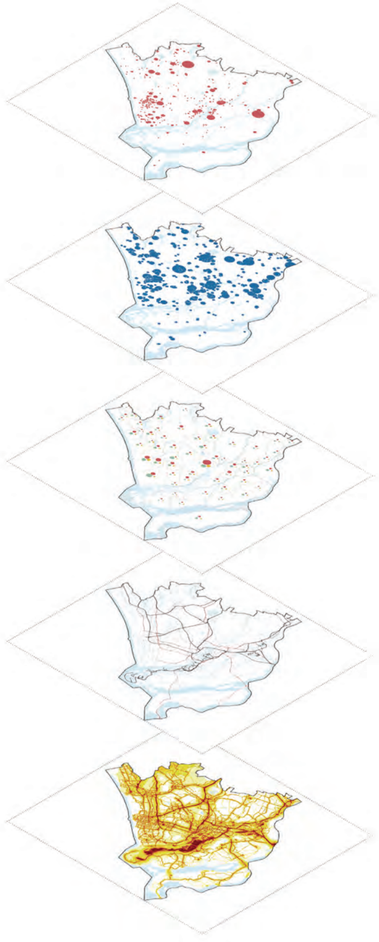
- Highways
- Railways
- South Holland
- Urbanized areas

0 10 20 km

Scale 1:500.000

Externalities of the C&D sector

Fig. 26
Maps of construction and demolition sector externalities



Location of demolition companies

(LISA, 2019)

Location of construction companies

(LISA, 2019)

Location of construction , demolition and renovation works

(PZH, 2018)

Highways and railways network

(OSM, 2021)

Noise pollution around roads

(RIVM, 2021)

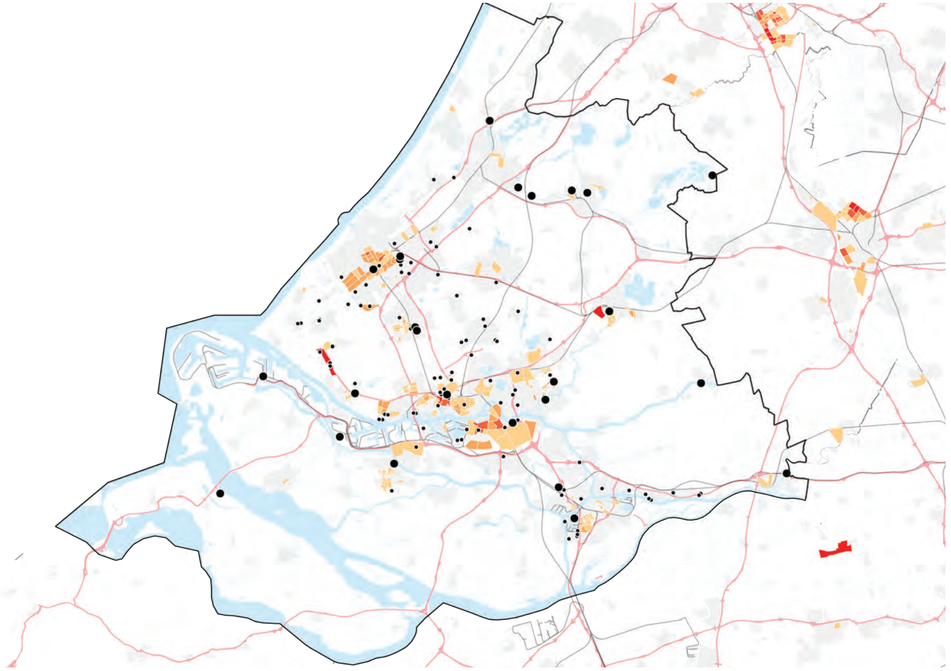
In the current flows of concrete materials, it was already illustrated that the C&D sector can lead to externalities such as emissions. If we overlay noise nuisance, the road network and the C&D companies for this sector, we see in figure on the side the result of the externalities. The main causes are the C&D companies that generate noise nuisance and the vehicle transport that is causing congestion along the road network.

To understand the implications of the sector on the lives of residents, reviews of the C&D companies on Google Maps were explored. A resident of a neighborhood next to the concrete plant in Katwijk commented the following:

"Company causes a lot of dust. Noise nuisance and too much light in the evening. I wonder more and more whether all environmental conditions are being met. It is possible to do something about it. Plant trees on the neighbor's parcel of land."

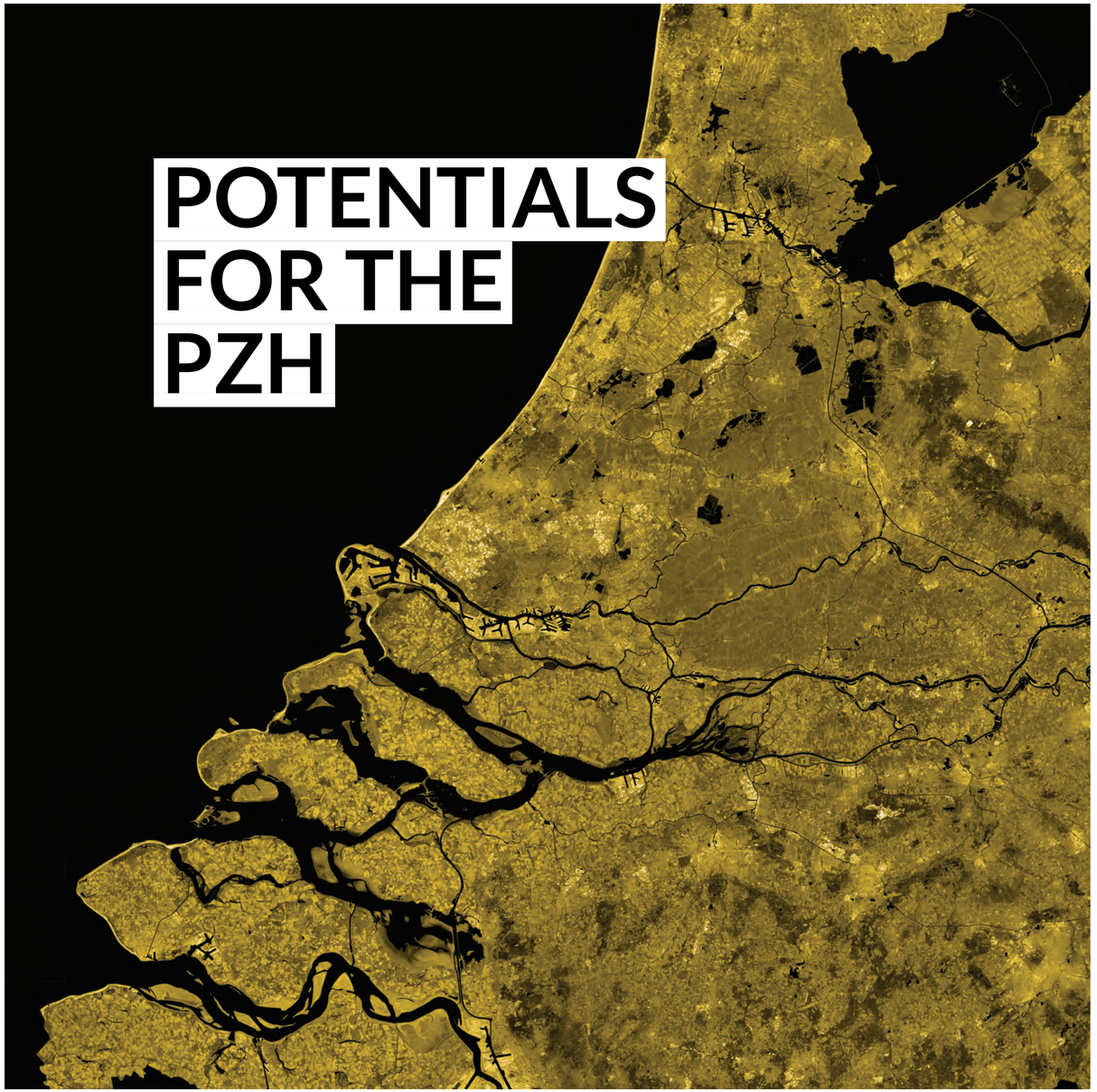
This shows signs that the C&D sector may negatively affect residents and many other stakeholders.

Fig. 27
Livability regarding C&D companies in urban areas



The effect of externalities can be seen in the livability of neighborhoods. Many of the neighborhoods that we have identified with lowest livability scores (areas highlighted in figure 24) are located next to large wet concrete factories or other C&D industry related companies. Although the proximity to these factories is for sure not the only cause of the lower standards, without question the concrete plants provoke externalities.

POTENTIALS FOR THE PZH



Following the exposition of challenges faced by the Province of South Holland in the transition of the Construction & Demolition sector, this chapter aims to develop opportunities and potentials observed. After extensive research on biobased alternatives, a few new construction materials made of natural components are presented, as well as other practices related to the sector, e.g. recycling and upcycling of concrete, urban mining, and open building platforms.

Apart from the listing of new materials, this chapter explores the chains of flows related to the PZH, and the possibilities of working on a broader scale, at the European level, placing the Netherlands at the center of the exchange of goods within and outside of the continent.

Lastly, prior to the presentation of the Vision 2050 for the PZH, different frameworks are analyzed and linked to these potentials, framing the opportunities within a larger goal on the European and worldwide levels towards a more sustainable future.

Use of biobased materials

To better understand the potentials in the shift towards a circular Construction and Demolition sector, innovative materials and new ways of building were investigated. The main argument is that a large amount of the current waste and pollution produced by the sector, respectively 2.581.840 ton and 280.050 ton of CO2, can be decreased with the use of biobased materials and enhancement of recycling and upcycling practices.

Two types of alternative materials are investigated: load-bearing materials such as CLT, as an alternative to concrete, and non-load-bearing materials for insulation, such as mineral bonded wool boards as an alternative to stone wool.

In the Circular Economy costs are understood not only as economical, but also environmental

Concrete steel is the main material for structuring of buildings, with timber being the prime candidate for a biobased replacement

Alternatives for new housing developments

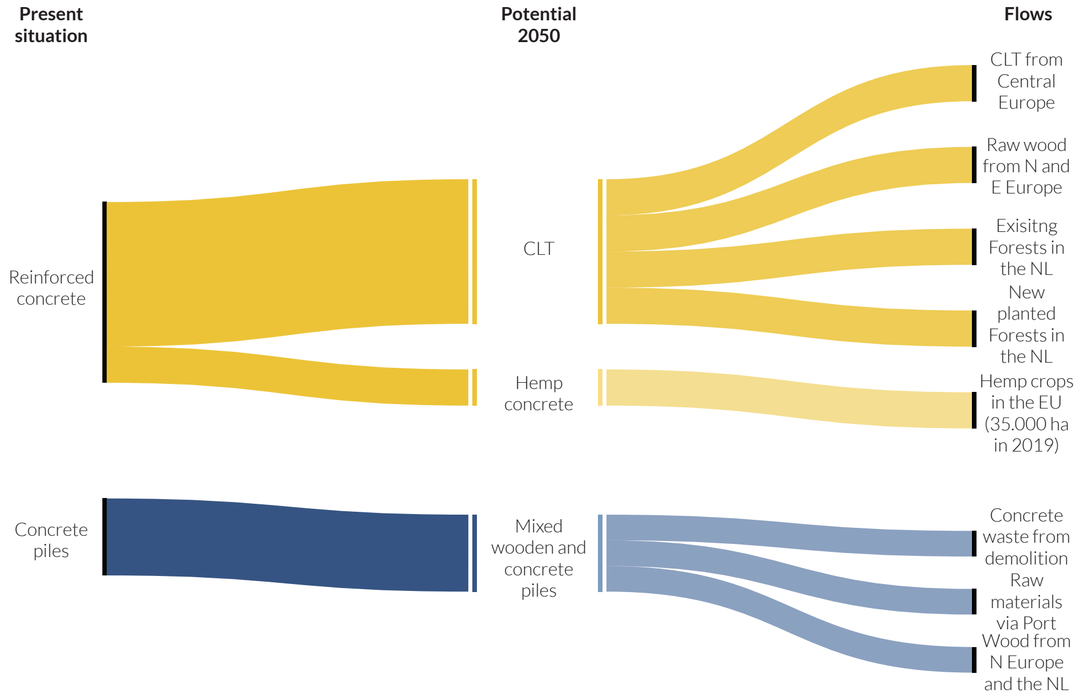
An important principle of the transition is that it does not stand in the way of the construction of the much needed homes. Embedded on the ambitious goal of providing 1 million dwellings in the whole country, the Province should make large-scale use of biobased, renewable materials for the construction of the approximately 200.000 dwellings that need to be built in the region. This means that not only the supply will be directed from different sources, but also that the whole chain of production must be fully circular, encompassing construction, demolition and renovation (Drift & Metabolic, 2018).

Because the Province is building a lot more than it demolishes, even if the recycling and upcyling rates increase, it would not be possible to guarantee that construction can be kept at the current pace only depending on recycled materials. Hence the expectation that by 2030, only 1/3 of all construction materials could come from residual flows (Studio Marco Vermeulen, 2020), the remaining 2/3 should come from renewable sources, that are long-lasting and affordable.

However, in the Circular Economy costs are understood not only as economical, but also environmental. According to the Environmental Cost Indicator, concrete, and insulation are the materials related to the C&D sector with higher environmental costs (NIBE, 2019), hence the focus of this report in providing alternatives to these materials.

Especially for new housing developments, lots of new materials are used, as new load-bearing structures need to be assembled and, in the case of this region of the Netherlands, a large amount of materials goes underneath the ground: foundation concrete piles that secure the buildings in the unstable soil. In the construction of new housing sites, 1.267.770 m^3 of new materials are used, amongst which concrete, summing up to 2.161.700 tons of raw materials.

Fig. 28
Alternatives for load-bearing materials



Wood as an alternative to concrete

The use of concrete as a building material in the Netherlands requires by far the largest amount of raw materials and contributes to the country's emissions of CO2. Between 75 and 80% of the material volume for single-family dwellings and 85% of apartment buildings are made of concrete (Economisch Instituut voor de Bouw et. al. 2020).

Wood is currently the main biobased material in the C&D Sector in the Netherlands, accounting for 8% of all materials used (NIBE, 2019). Although many buildings in the Netherlands have already been constructed using wood frames and CLT structures, most of the wood used in these developments was imported from neighboring countries in the EU.

Especially suitable for additions to existing houses and upscaling of volumes, timber framing, or HSB, is an extremely well-developed that has been used for decades in the Netherlands. This type of material works well with frameworks of insulation layers, which can also be manufactured with circular, biobased materials, as it will be further explored in the research.

Alongside HSB, laminated timber panels, also called KLH or CLT, are alternatives to concrete in solid structures. Such structures are also a lot lighter than conventional concrete framing, weighing up to 5 times

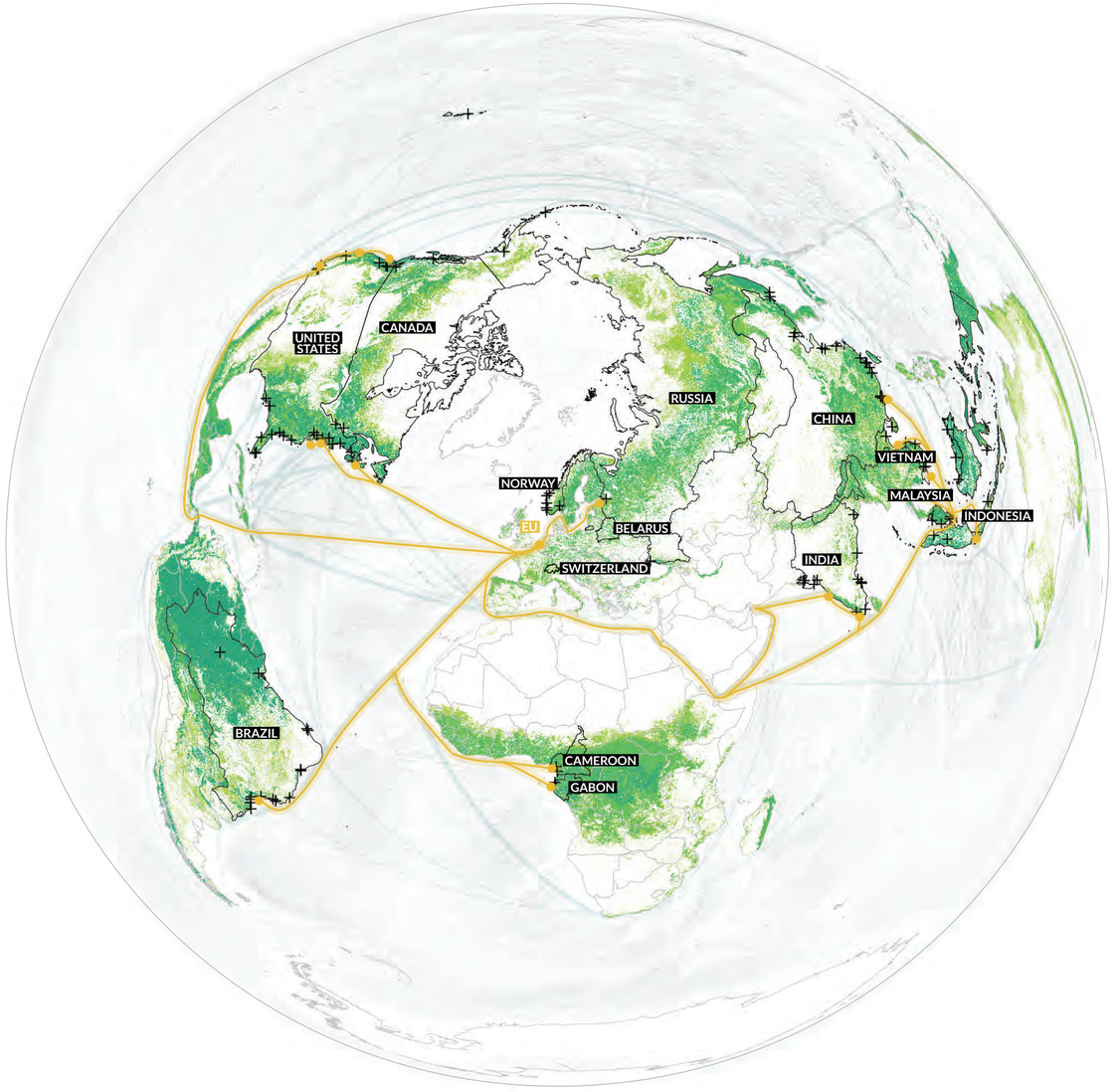


Fig. 29
Timber and timber products imported into the EU, in € million (2011-2015)
Adapted from: Ministry of Foreign Affairs, CBI, 2017

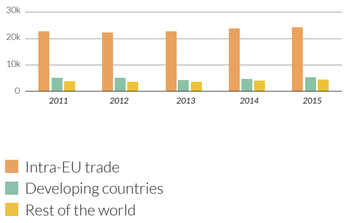


Fig. 30
Largest suppliers of timber from developing countries, in € million (2015)
Adapted from: Ministry of Foreign Affairs, CBI, 2017

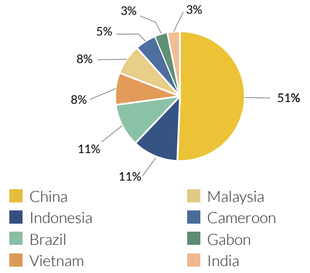


Fig. 31
Largest suppliers of timber from the rest of the world, in € million (2015)
Adapted from: Ministry of Foreign Affairs, CBI, 2017

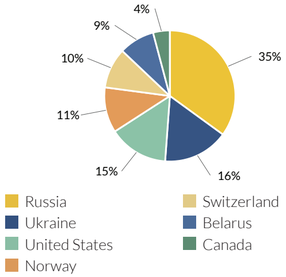
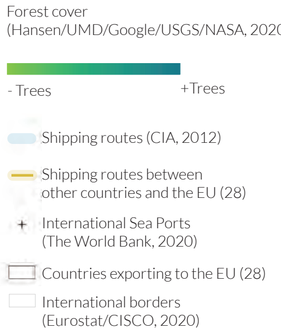


Fig. 32
Extra-Europe flows of timber and timber products - Imports to the EU (28)



Map not to scale/ No true north

less. Yet another advantage of using it in the Province of South Holland: lighter structures mitigate the impact in areas where the soil is unstable and the is a great risk of subsidence.

Considering that space is limited in the Netherlands as a whole, one of the first questions raised during the exploration of the potentials for the use of CLT as solid construction in the region was: where would all the necessary wood come from?

The reality is that timber does not need to be produced entirely in the Netherlands. The European Union (EU) has a long tradition in forestry with the Construction Sector in countries like Germany and Austria being pioneers in building with wood.

Regarding the flows of timber, during the analyzed period, from 2011 to 2015, the vast majority of commercial exchanges happened between EU countries. However, a fair share of timber and timber-derived products was imported from outside of the EU. The main sources can be divided into three groups of countries: Intra-EU, developed and developing countries. For that matter, China and Russia stand out in their groups, with a 51 and 35% share of the market, respectively (CBI, 2017).

There is not, still, a lot of experience in building with wood in The Netherlands, and regarding wood-framed buildings, 3% of all construction during the last decades was done using this material (NIBE, 2019).

Considering that the Sector shift towards a biobased, solid timber construction

framework, it is important to acknowledge that at least at an initial state, all materials would have to be imported from neighboring countries, as the Netherlands does not count with a CLT processing factory until now.

By the end of 2020, 1.500.000 m³ of CLT should be produced in Europe, with the countries around the Alps, in Central Europe, being the main producers of processed CLT panels (Studio Marco Vermeulen, 2020).

The timber exchange flows are expressive in the continent, with many top-harvesting countries not having a single CLT factory. This is due to the concentration of a large share of European forests in a handful of countries, such as Sweden, Finland, Spain, and France. In that manner, the Netherlands finds itself in-between the exchange of flows in the European continent but also regarding extra-EU imports and exports, as the Port of Rotterdam serves as one of the main gateways for these products in the continent.

Most wood used for construction in the continent comes from EU countries, with Germany, Poland, and Austria being the larger exporters of raw timber. Most CLT processing factories are located around the Alps, as CLT was developed first in the region. Germany, Austria, and Switzerland have the most CLT industries in the EU, with a small, but growing, amount of industries located in Scandinavia.

In the case that the Province profits from the strategic position that it has in the European market in term of exchange of flows and promote the installation of CLT factories around the Port for production of domestic consumption and exportation, it is worth understanding the potential for timber extraction in the country, as well as in the Province.

Currently, Dutch forests already produce timber from planted coniferous forests for mining. This wood is used for making products with a lot less added value than CLT, such as pallets and firewood. In that manner, the CO2 that was captured from the trees during its growth ends up in the atmosphere again, with the burning of wood (Studio Marco Vermeulen, 2020). The harvesting of wood in the country used for construction means that the CO2 contained in trees would continue to be stored for as long as the buildings stand. This is key for meeting the sustainability and emissions goals that the country has agreed with.

Timber harvesting in dry forests in the Netherlands can enhance biodiversity, as coniferous trees would selectively be cut down and new deciduous trees would be planted in their place. Nature would, therefore, benefit as well from the transition towards a Circular C&D sector, but one threshold, in this case, would be the resistance towards these practices. Although forests are already cultivated and used for extracting wood for centuries now, public opinion is skeptical about using trees for construction, afraid that it might lead to deforestation.

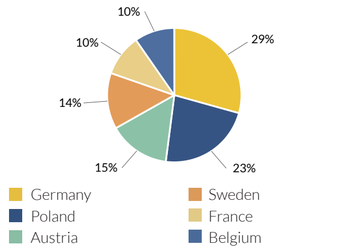
Fig. 33
Round wood production in the EU (2019)

Adapted from: Eurostat, 2019

	Total	Fuelwood	Industrial roundwood
	(1000m3 under bark)		
EU-27	500 227	116 087	384 084
Belgium	-	-	-
Bulgaria	6 529	2 849	3 680
Czechia	32 586	5 922	26 664
Denmark	-	-	-
Germany	76 167	22 742	53 425
Estonia	12 034	4 681	7 353
Ireland	3 541	211	3 300
Greece	-	-	-
Spain	18 961	3 538	15 422
France	49 686	24 186	25 445
Croatia	5 400	2 205	3 195
Italy	11 449	3 921	7 528
Cyprus	9	7	2
Latvia	-	-	-
Lithuania	6 688	1 771	4 917
Luxembourg	385	65	320
Hungary	5 575	2 648	2 892
Malta	0	0	0
Netherlands	2 805	2 063	742
Austria	18 904	5579	13 325
Poland	43 521	5 069	38 452
Portugal	14 141	1 467	12 674
Romania	15 922	5 626	10 296
Slovenia	4 618	1 117	3 501
Slovakia	8 957	600	8 357
Finland	63 964	8 013	55 951
Sweden	75 472	5 460	70 012
United Kingdom	10 786	2 478	8 308
Liechtenstein	9	4	5
Norway	12 568	1 530	11 039
Switzerland	4 397	1 744	2 654

Fig. 34
Largest suppliers of timber from EU countries, in € million (2015)

Adapted from: Ministry of Foreign Affairs, CBI, 2017



Wood production in Europe
Units: m3 ha-1 land yr-1
(Verkerk, Pieter J. et al, 2015)

0.1 - 0.5
0.6 - 1
1.1 - 1.5
1.6 - 2
2.1 - 2.5
2.6 - 5
5.1 - 10
> 10

CLT Factories in Europe (Studio Marco Vermeulen, 2020/ Timber-Online estimation, 2017)
Selected locations for timber harvesting in the top exporting countries in Europe (Verkerk, Pieter J. et al, 2015)
Routes between timber harvesting locations and CLT processing industries
Highways in Europe (OSM, 2020)
Shipping routes (CIA, 2012)
International borders (Eurostat/CISCO, 2020)

0 500 1000km

Scale 1:25.000.000

Wood production in Europe
Units: m3 ha-1 land yr-1
(Verkerk, Pieter J. et al, 2015)

0.1 - 0.5
0.6 - 1
1.1 - 1.5
1.6 - 2
2.1 - 2.5
2.6 - 5
5.1 - 10
> 10

CLT Factories in Europe (Studio Marco Vermeulen, 2020/ Timber-Online estimation, 2017)
Selected locations for timber harvesting in the top exporting countries in Europe (Verkerk, Pieter J. et al, 2015)
Routes between CLT processing industries and the PZH
Highways in Europe (OSM, 2020)
Shipping routes (CIA, 2012)

© EuroGeographics for the administrative boundaries
© Timber-Online 2017

0 100 250 km

Scale 1:10.000.000

Fig. 35
Intra-Europe flows of timber - From timber harvesting to CLT processing industries

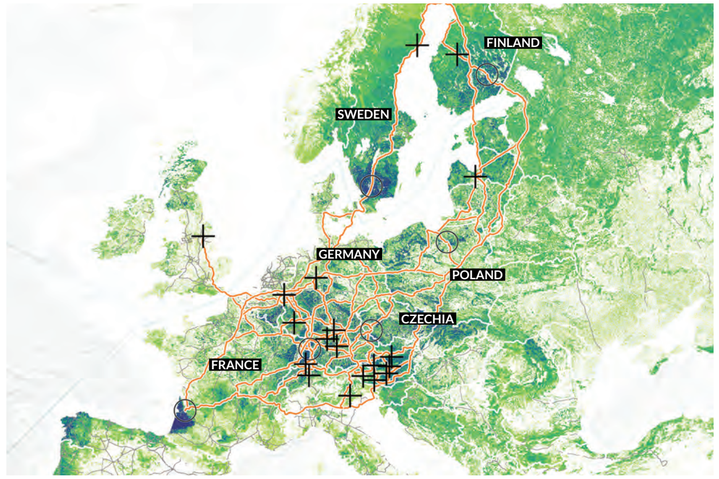
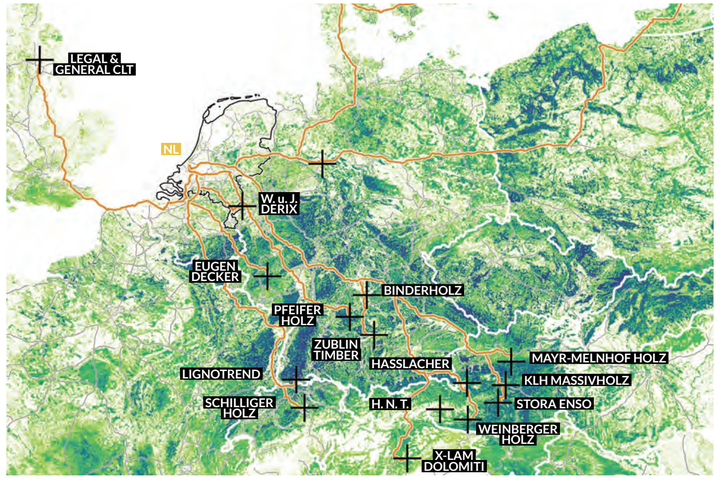


Fig. 36
Central and Western Europe flows of CLT - From CLT processing industries to the NL



As for the production in the Province of South Holland, it is important to notice that sandy and clay soils, which are very common in the Province, are very prone to planting forests.

Furthermore, many species in these types of soils could be suitable for CLT production, enhancing biodiversity and creating resistance to droughts. These trees attract more insects than coniferous woods and have the ability to store more water (Studio Marco Vermeulen, 2020). Peat and Sea clay lands that are located close to preservation areas and face problems with subsidence and oxidation can have their uses transformed from agriculture and livestock farming to agroforestry, also contributing to solving the current nitrogen crisis.

The shift towards a more circular, biobased Sector is desperately needed. Planting forests for further harvesting can have many positive impacts on peat soils in danger of subsidence and oxidation, which are exhausted from centuries of livestock farming. In many areas of the Province, peat lands should drop by half a meter until 2050 (BOOM, 2020). A more biodiverse agroforestry activity in these regions could be achieved planting a mosaic of different crops and bog forests. The resulting elevated water table level would prevent oxidation and subsidence.

In Sea clay soils, agroforestry can help with issues such as salinisation, which is currently the biggest problem with this type of soil. With the creation of bog forests in the so-called creek landscape, freshwater would flush out seawater, turning the exhausted agricultural land into a varied landscape with many products (BOOM, 2020).

Regarding numbers and real production potentials, a shift to a biobased Sector during the construction of the 1 million homes needed could capture 45 Mton of CO2, instead of emitting an extra 55 Mton of CO2 with the use of raw, mineral materials. In other words, a difference of 100 Mton over 10 years (Studio Marco Vermeulen, 2019).

Fort the construction of the 1 million homes entirely with CLT structures, it is estimated that 10% of the country would have to be covered in harvesting forests, or 165.000 ha. This is not a lot more than what the country already has, excluding preservation areas. The Netherlands has 140.000 ha of forests and new areas could be planted in strategic locations across the country, but especially in South Holland in peat and sea clay areas.

Fig. 37
Largest importing countries into the EU, in € million (2015)

Adapted from: Ministry of Foreign Affairs, CBI, 2017

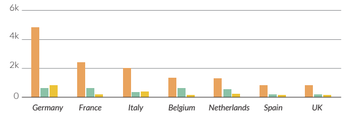


Fig. 38
Leading EU re-exporters of timber, in m^3 x 1000 (2010-2014)

Adapted from: Ministry of Foreign Affairs, CBI, 2016

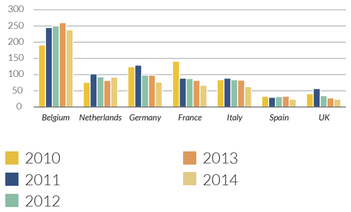


Fig. 39
Species of trees for CLT production suitable for Peat and Sea clay soils

Adapted from: Studio Marco Vermeulen, 2020

Tree species	Peat	Sea clay	Production (m3/ha/year)	Further research needed?
Fraxinus excelsior	●		6,5	
Quercus robur	●		6,0	
Betula pendula		●	4,5	
Sorbus aucuparia		●	3,0*	Yes
Populus tremula		●	6,0*	
Populus nigra	●		17,0	Yes
Prunus avium	●		9,0*	Yes

Wood production in Europe
Units: m3 ha-1 land yr-1
(Verkerk, Pieter J. et al, 2015)

- 0.1 - 0.5
- 0.6 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 5
- 5.1 - 10
- > 10

- CLT Factories in Europe (Studio Marco Vermeulen, 2020/ Timber-Online estimation, 2017)
- Routes between CLT processing industries and the PZH
- Highways in Europe (OSM, 2020)
- Production forests in the NL (BIJ 12, 2020)
- Province of South Holland (CBS, 2020)
- Borders of the Netherlands (Eurostat/CISCO, 2020)

0 25 50 100km

Scale 1:3.000.000

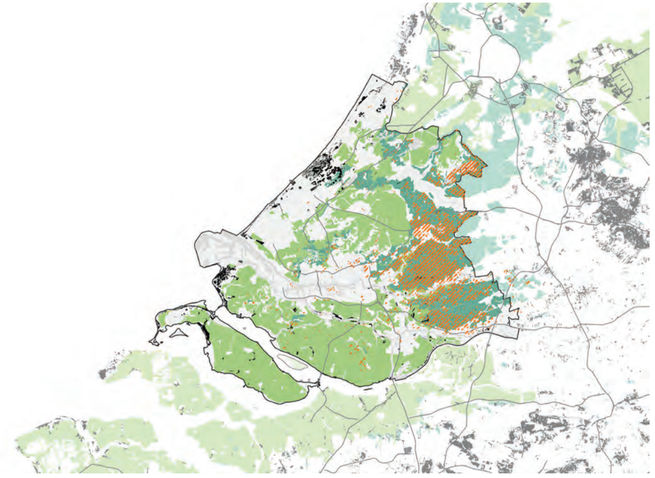
- Heavy subsidence (PZH, 2018)
- Peat soil (Wageningen UR, 2014)
- Sea clay soil (Wageningen UR, 2014)
- Production forests in the NL (BIJ 12, 2020)
- Highways in Europe (OSM, 2020)
- Province of South Holland (CBS, 2020)

0 25 50km

Scale 1:500.000

Fig. 40
Potential for timber manufacturing industry in the NL - Production forests in the NL

Fig. 41
Potential for timber manufacturing industry in the PZH



Urban mining

In January 2021, the Netherlands consists of 9.130.640 buildings (CBS, 2021), each of which is a source of materials at some point. The re-use of these building materials is called urban mining, a concept closely related to the circular economy. In 2014, a total of 7,3 million ton of materials became available after the demolishing or renovation of buildings; this was about 41% of the total amount of materials needed that year (Metabolic, 2020). Urban mining has, therefore, the potential to answer a big part of the demand.

Of the total amount of C&D waste, about 85% of it is concrete (Yu et al., 2021). Since concrete is the most-used material in The Netherlands in the last 70 years, concrete waste will likely remain predominant in the coming decennial. A few companies succeeded in retrieving the concrete from old buildings and make it into new concrete. New Horizon is one of these companies, who claim to reduce co2 emissions by a minimum of 62% with their circular concrete.

The process entails; a good analysis on-site to see which elements can be retrieved in which way, after which the materials are harvested and transported. After, the concrete is cleaned to remove any unusable residue. When everything is clean, each part is filtered and stored. In the final phase, the elements are used to create new concrete and transported to a construction site.

As for other materials, it is difficult to tell the amounts that can be mined in the future. Companies like Metabolic are evaluating methods currently used by analysing buildings that are demolished (Metabolic, 2017)

At the moment, the estimates per single-family house for metals are about 5m3 of iron, which is mainly construction steel and heating, and about 1.5 m3 of all other metals (Koutamanis et al., 2018). About 90% of the metals inside concrete are likely to be recycled.
Even without the right assessment tools, are many materials already recycled. Each recycling reduces emissions significantly, as can be seen in figures 39 and 40.

In conclusion, cities are mines indeed, but it's complex to make more than estimations about what can be found where and when the materials are going to be available (Koutamanis et al., 2018, p. 38). This makes it hard to make policy, planning, design or management. However, this does not mean that nothing can be done, but it does take energy to find new ways to analyse and finally re-use the mined materials. It all comes down to will-power (Koutamanis et al., 2018)

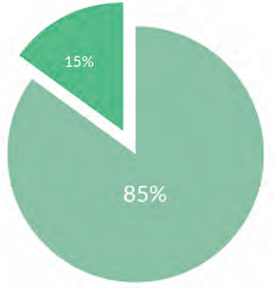
Fig. 42
Energy Requirement and Savings in Terajoules (TJ/100,000t)
Bureau of International Recycling, 2008

Material	Primary	Secondary	Saving/100,000 Tonnes
Aluminium	4700	240	4460
Copper	1690	630	1060
Ferrous	1400	1170	230
Lead	1000	13	987
Nickel	2064	186	1878
Tin	1820	20	1800
Zinc	2400	1800	600
Paper	3520	1880	1640

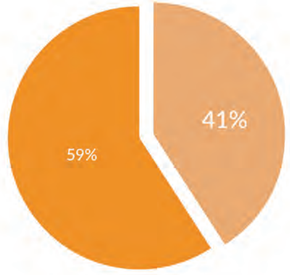
Fig. 43
Carbon Footprint and Savings Expressed in Kilo tonnes of CO2 (ktCO2)/100,000 Tonnes
Bureau of International Recycling, 2008

Material	Primary	Secondary	Saving/100,000 Tonnes (% savings CO_2 in paretheses)	
Aluminium	383	29	354	(92%)
Copper	125	44	81	(65%)
Ferrous	167	70	97	(58%)
Lead	163	2	161	(99%)
Nickel	212	22	190	(90%)
Tin	218	3	215	(99%)
Zinc	236	56	180	(76%)
Paper	0.17	0.14	0.03	(18%)

Fig. 44
Waste of materials
Bureau of International Recycling, 2008



Most waste is concrete and brick, only 15% are other materials.



Percentage of materials that could have been retrieved in 2014, in contrast to the total demand for new building-materials

Adaptive building

In addition to the choice of materials, there is also great potential in the design of buildings. At the moment, the sector needs more open building systems that allow for the simple switching between functions such as living and working (TU Delft, n.d.). This type of sustainable built housing combines main structures with a long lifespan and flexible infill.

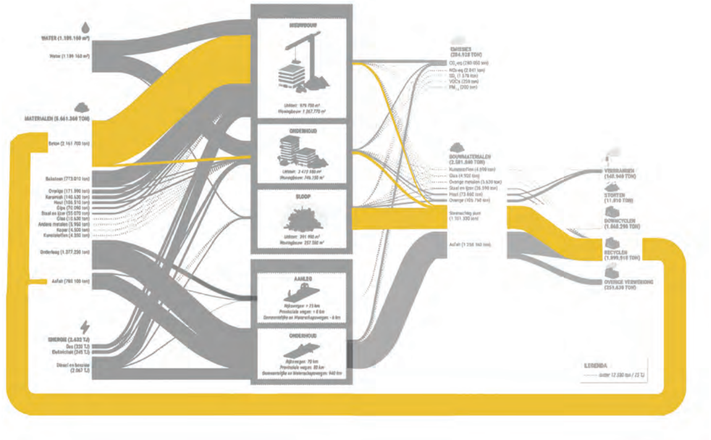
The Open Building Manifesto (2021) also has a vision of this more flexible and smarter building. The Open Building Manifesto consists of three main principles:

Open cities: anticipates designs for changing factors and incorporates policies and planning tools for flexible urban development
Open building: The supporting structure is physically separated from the main components of the facade and the adjustable and demountable infill systems for installations, internal walls and facade fillings. This makes the building easy to adapt over time.
Open systems: defining closed life cycles of materials, using new technologies and supporting the use of renewable materials.

The Open Cities principle fits well with the vision of this project to make a Soft transition to a circular sector, by keeping space in development open for change.

Fig. 45
Flows of recycled concrete

Adapted from Drift & Metabolic, 2018



Reuse, Recycling and Upcycling

In the Open Systems Principle (openbuilding.co, 2021) it was mentioned that the life cycles of materials should be closed. In the analysis of the current material situation, it was found that 41% of waste is downcycled and 43% is recycled. It was therefore decided to investigate the potential for reusing, recycling and upcycling materials in the sector. From the report 'Ruimte voor Biobased Bouwen' (Studio Marco Vermeulen, 2020), the following processes and suitable materials have been listed:

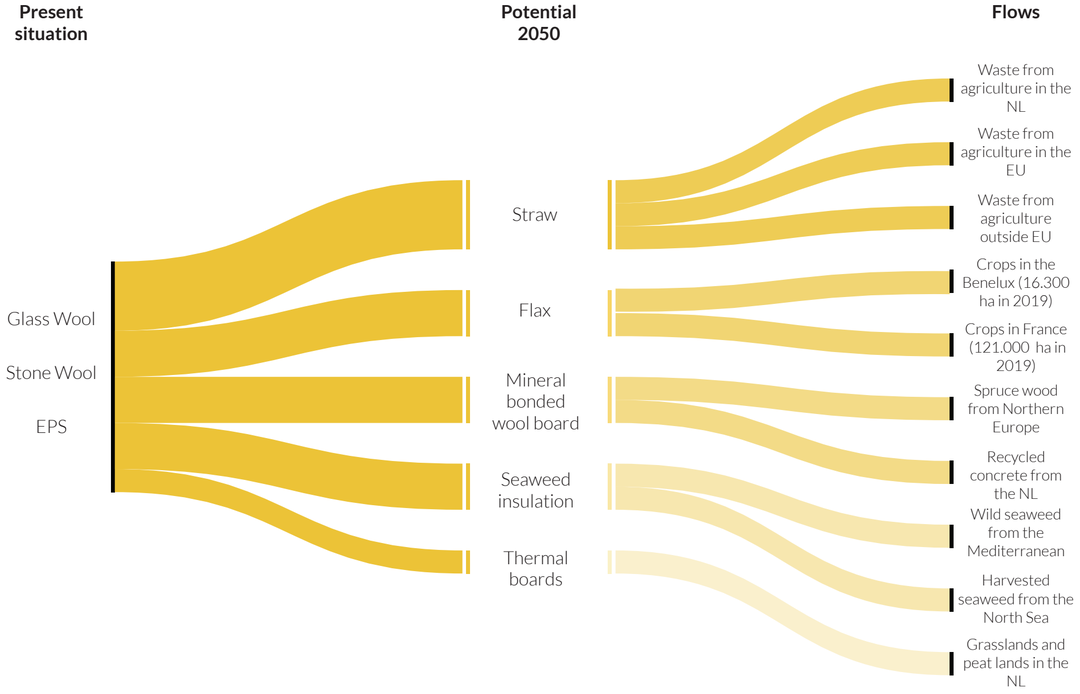
Recycling: concrete, steel and glass wool

Upcycling: use waste from other sectors
- Agriculture sector: straw
- Steel construction: waste from production as source for concrete

Reuse: Plastic window frames

These ways of maintaining the quality of the materials have been used to set up the possibilities of closed flows in the sector. As shown in figure 41, experiments have been made to improve the recycling of concrete, so that the flow is linked back to the construction of buildings, instead of being downcycled to construction for infrastructure.

Fig. 46
Alternatives for non load-bearing materials



Alternatives to housing improvements and post-insulation

One of the issues of the current C&D Sector in the Province is that a lot more new buildings are constructed each year than they are demolished or renovated. The outcome of this is that the Province consumes a lot of new raw materials, increasing the Sector's emissions and putting a lot of pressure on the environment. The Sector counts for the 3rd largest amount of flows in the country, with 5.6 Mton of materials being used in 2016 (Drift & Metabolic, 2018).

An alternative to the status quo of the Sector in the Province would be to encourage the renovation and refurbishment of existing buildings in inner cities that are suitable, saving the extra costs and flows of materials needed for new housing construction.

However, a large number of insulation materials would be in demand, as renovation works are mainly necessary for updating dwellings to current standards of energy efficiency and thermal comfort. Insulation counts for 21% of the total quantity of construction materials and it is responsible for 14% of the emissions of CO2 with the use of materials such as glass and stone wool and EPS boards (NIBE, 2019).

Acting as substitutes to linear mineral materials, biobased materials have the potential to not only comply with the current

demand for insulation materials but also foster the creation of new jobs and change the agriculture scene in the levels of the Province, the Netherlands (NL), the EU, and even the entire world.

A suitable type of agricultural waste that can transform into high-quality insulation material is straw, for instance. A leftover product from wheat and rice crops, it is found abundantly in European crops, and there is also potential for importing of this material from Africa, from wheat crops in the Delta of the Nile in Egypt, but also India and rice plantations in China (NL Agency, 2013).

Straw is a residual product from agriculture that has high insulation values and can be transformed into prefabricated facade insulation elements, being used for post-insulation in refurbishment works, but also homes expansion and addition of an extra floor volume made with timber frame construction, for instance.

For this, the Port of Rotterdam has the opportunity to become a waste-to-value also in matters of civil construction materials, playing a central role in the exchange of biobased materials between the EU and the rest of the globe, especially for the materials transformed from agricultural waste.

Especially in the case of residual straw from rice crops, transforming it into an added-value product has other environmental positive impacts. Despite being shipped from the North of Africa to Rotterdam, because of the short turnover time between rice and following crops, residual straw is often burned. Emissions from this process can account for up to 11 Mtons of CO2 during a single season in Egypt (NL Agency, 2013). In that manner, adding value to this residual waste product and having it shipped through the Port of Rotterdam would place the Province on the map in matters of waste-to-value economy.

There is also room for opportunities in transforming residual agriculture waste to value in the Dutch and European contexts also. The projection for 2030 is that extensive production of cereals will occur in the EU. The residual potential is estimated to range from 70 to 135 Mt, depending on the availability of straw (A.K.P. Meyer et. al. 2018).

The Port of Rotterdam has the opportunity to become a waste-to-value also in matters of civil construction materials

Fig. 47
Installing of Ecococoon's panels, a type of insulation made with straw

Ecococoon, 2020

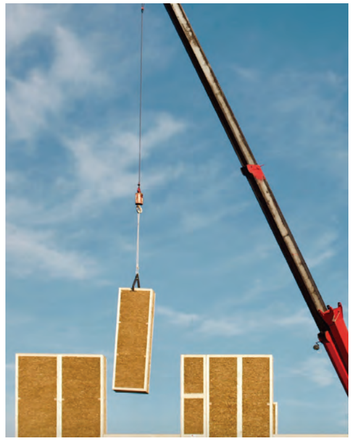


Fig. 48
Extra-Europe production of wheat crops

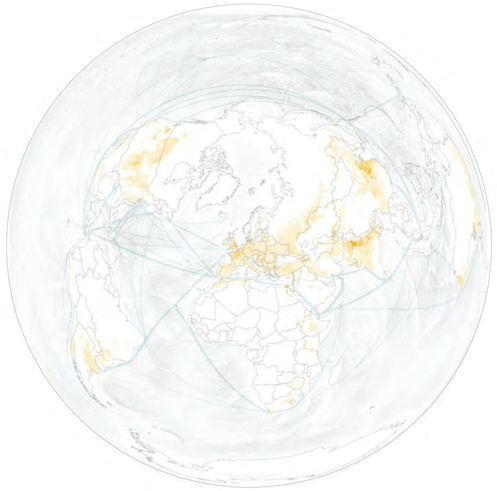
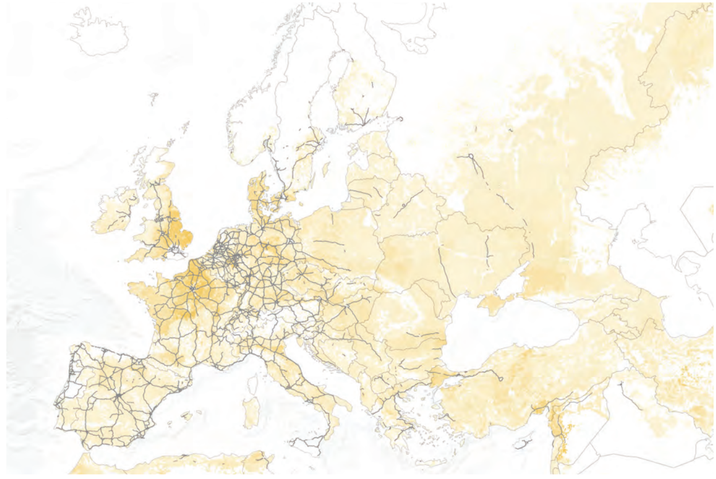


Fig. 49
Production of wheat crops in Europe



Many materials that are suitable for biobased construction are disputed with other sectors, such as the energy sector

One threshold of the construction industry is that many residual materials suitable for biobased construction are disputed with other sectors, such as the energy sector, for producing biomass. For the yielding of new biobased materials, a lot of space would be required. It should not compete with other relevant products of agriculture such as food or nature. This is why it is key to explore the possibilities of using products from by-products of other cultivations.

As these materials become more popular, the cost and time spent transforming residual waste into added-value products decreases. Scarcity is not an issue for biobased solutions, but there are challenges as to the availability of them in the short term because of their small share of the market currently (NIBE, 2019). As increasingly more options are becoming available in the medium term, these materials can compete with traditional insulation materials.

Two types of residual products from agricultural waste are flax and hemp. Although there is a high demand for these textiles in Europe, only part of the plants is used. The residual waste can, therefore, be employed for the manufacturing of insulation materials.

Hemp can be used as a load-bearing (in the shape of hemp-lime blocks with plaster) and non-load bearing (in insulation mats). It is also a highly-performing material and can capture a large amount of CO2 during its growth. A single hectare of hemp crop can produce enough materials for the insulation of 5 dwellings while capturing 13,5 tons of CO2 (Studio Marco Vermeulen, 2020).

In the Netherlands' case, hemp has the potential to provide enough insulation materials for the estimated 75.000 homes that need to be post-insulated per year in the upcoming decade using only 6,5% of the agricultural land available (Studio Marco Vermeulen, 2020).

Flax is a material that would be sufficiently available to replace traditional insulation materials such as stone wool. Flax has very similar yield rates as those of hemp, it is just as efficient in terms of hectares of land needed for the insulation of one home (1ha/5 homes).

Complementary to hemp as an insulation material, flax is more suitable for insulation of roofs and partition walls, being an optimal choice for renovation and post-insulation works. In short, flax and hemp by-products together have the potential to completely replace mineral, linear materials, such as stone and glass wool (NIBE, 2019).

Another great advantage of using flax for insulation instead of traditional materials is enhancing the quality of life of construction workers, as both hemp and flax insulations are skin tolerant, without causing itching and being non-toxic.

Fig. 50
Installing of concrete hemp blocks

Isohemp, 2020
©2021, IsoHemp - Natural Building

Fig. 51
Production of hemp crops in Europe

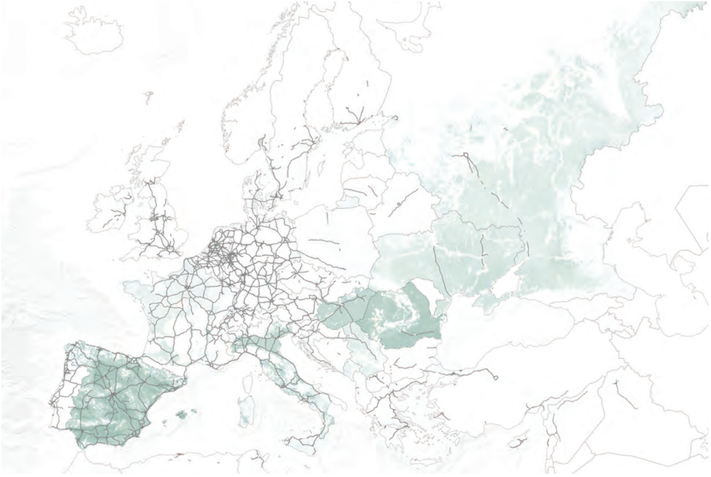
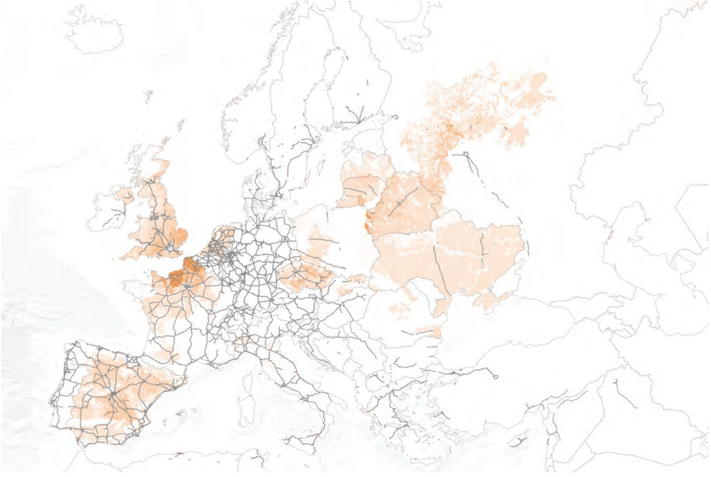


Fig. 52
Production of flax crops in Europe



Social potentials

The transition to a circular economy can provoke many impacts, which can be divided between material and intangible effects. On the following page, some of these consequences are highlighted, adapted from the report from ECORYS (ECORYS, 2019).

Fig. 53
Potential skills needs by circular economy activity
Adapted from ECORYS, 2019

Activity	Low skilled	Skilled	Professional
Closed loop recycling	●●●●	●●●●	●
Open loop recycling	●●●●	●●	●
Servitisation	●●●	●●●	●●●
Remanufacturing	●●	●●●●●	●●
Reuse	●●●●	●●	●

The transition towards a circular economy offers opportunities for people at the margins of the labor market, but also for people at the top of the market.

This is due to the multiplicity of worker's abilities needed to deal with the vast changes in extraction, production and transportation of goods and materials. As predicted by TNO (TNO, 2019), the largest employment opportunities can be found in the sectors of retail, business services, water companies and waste management. The transport industry, on the other hand, presents a smaller demand for workers in the Circular Economy, as materials are shipped from smaller distances, and with the reorganization of flows around clusters of activities (e.g. construction clusters).

Looking at the short-term, a slight mismatch between offer and demand of skilled workers can cause some disturbances. Almost all of these impacts in employment can be related to the Construction and Demolition Sector and, therefore, it is evident that the Province needs to work in partnership with workers and business owners to mitigate possible negative impacts in the case of job loss due to the phasing out of certain industries, for instance. Other foreseeable impacts are the necessity of retraining of workers, as new techniques and tools become available and employees receiving smaller wages, as they go through a period of adaptation and training in new companies.

Although there are no clear winners or losers at this point, the Province should work hand-in-hand with the population that will suffer the most from the transition: the main focus group of this report, citizens of lower-income neighborhoods, with a non-western immigration background and low professional skills.

There are many opportunities for new, circular companies to work with this population and learn from them, with the support of educational institutions present in the area.

Fig. 54
Conclusions on the social consequences of the transition
Adapted from ECORYS, 2019

Material Effects

Shift of employment

- From waste / raw material processing to recycling;

- From linear producer to circular producer;

- From producer to repairer from product sales to sharing platform.

Material Effects

Increasing demand for lower skilled labor /personnel at a distance from the labor market

- Skills more focused on disassembly (recycling) and repair.

Material Effects

Diffuse effect on purchasing power

- Increase in purchasing power / luxury products more accessible;

- Decline in purchasing power / less attractive to the average consumer.

Intangible securities

The mode of consumption is changing

- Increase incidental consumption;

- Less consumption of new products compared to higher ones consumption of refurbished products;

- Consumers are closing more subscriptions:
- Increase chances of debt for less financially educated as a result of subscription from products;

- Consumption not accessible to everyone (sharing economy).

Stakeholders

In the circles are stakeholders of all three pillars included. The links are based upon their most frequent relations. The different colours are the different pillars, from left to right: Social-spatial justice, housing and the C&D sector. The current situation can be seen at the top. The circles below show the connections in a circular world. In the bottom circles, three extra stakeholders can be found; the makers, the high-quality recycling centers, and the circular platform. The black lines are the new connections, the coloured lines are the existing connections, which means that part of the existing connections will not exist in the new situation.

The socio-spatial justice circles show a shift towards more connections between local residents, civil society and the three new stakeholders. In other words, it becomes possible for people to take a stronger position in this new economy because of the new players. They have more access to knowledge and are more involved in urban development.

The housing circles make new connections with the local residents as well. Besides, the three new players, again, play a big role. With the new high-quality recycling centers, a big part of the materials can now be mined from demolished buildings, which changes the playing field.

In the last circles, two stakeholders are dominating the connections; the knowledge institutions and the construction companies. There is a big role for either one of them in this new economy. With the arrival of new materials, there are new ways of buildings and designing. The two stakeholders play a big role in doing this successfully.

Fig. 55
Stakeholder analysis

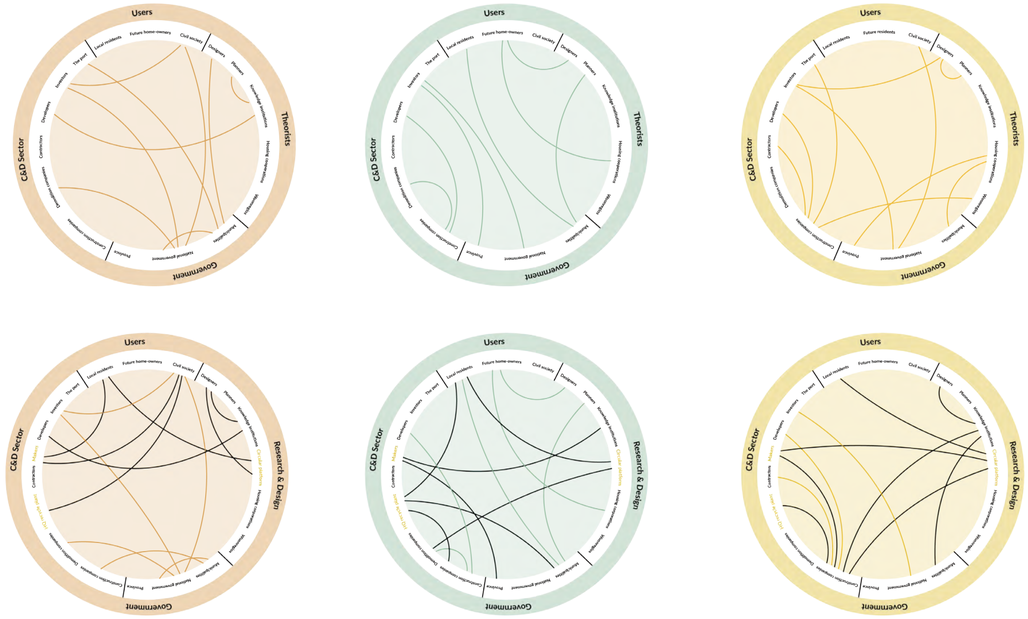


Fig. 56
SWOT analysis matrix

	Helpful	Harmful
Internal	**Strengths** S1 - High Quality of Life S2 - Strong & Varied Local Economy S3 - Multiple Competitive Urban Areas S4 - Cities with Character & Identity S5 - Extensive Infrastructure Network S6 - Large Potential Workforce S7 - Good Knowledge Institutions S8 - Circularity is on the Agenda	**Weaknesses** W1 - Severe Lack of Housing W2 - 75% of Economy is Linear W3 - Profit-Oriented Economy W4 - Entrenched Inequality Problems W5 - Areas of Acute Unemployment W6 - Congested Road Network
External	**Opportunities** O1 - Lots of Disused Industrial Space O2 - Cities with Low Population Densities O3 - Many Strategic Logistics Sites O4 - Capacity in Rapid Transit Network O5 - Space for the Circular Economy O6 - Supportive Government Bodies	**Threats** T1 - Climate Change T2 - Serious Flood Threat T3 - Raw Material Supply Depletion T4 - Lack of Intra-Company collaboration T5 - Gentrification T6 - Social Housing Relocation T7 - Cultural Preference for City Life

Sustainable Development Goals

“Our planet faces massive economic, social and environmental challenges. To combat these, the Sustainable Development Goals (SDGs) define global priorities and aspirations for 2030,” as can be read on the website of the United Nations (THE 17 GOALS | Sustainable Development, 2015). In this vision, the SDG’s are used as a guiding element. The United Nations gives five steps to approach the SDG’s. In this part, the relation with these steps and the applicable SDG’s will be explained.

Fig. 57
SDGs flows
UN, 2015

Step 1 Understanding the SDG’s

Since the goals are pretty broad and give no guidelines to the answer, they can be somewhat challenging to read. Especially some of them leave much space for interpretation. That’s why we mainly talked about them as a group to see which ones are applicable in our case.

Step 2 Defining priorities

This vision targets 9 SDG’s. Each of the goals is divided into different targets, the ones applicable in this case:

No poverty - 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including micro finance.

Quality education - 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

Decent work and economic growth - 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead.

8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products

Industry, innovation and infrastructure - 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

Reduced inequalities - 10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average.

Sustainable cities and communities - 11.1
By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

11.a Support positive economic, social and environmental links between urban, per-urban and rural areas by strengthening national and regional development planning.

Responsible consumption and production - 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

Climate action - 13.2 Integrate climate change measures into national policies, strategies and planning.

Peace and justice, strong institutions - 16.7
Ensure responsive, inclusive, participatory and representative decision-making at all levels.

Step 3 Setting goals

The UN translates “setting goals” by matching the goals of our group with the SDG’s. The socio-spatial justice and circular economy pillar closely relate to the SDG’s, but the housing shortage is a somewhat more technical problem that needs to be answered. The SDG’s, therefore, don’t need to be matched since they are the goal of our group in general.

Step 4 Integrating

Each target mentioned in step 2 has been used to guide us towards forming a vision and strategy. The SDG’s are therefore inherently connected to our proposal.

Step 5 Reporting and communicating

Even without the goals, the vision would have been tackling injustice, climate change, etc. But, the SDG’s make it possible to communicate to others in a familiar manner. That’s why it is interesting to use them; they have the capacity to unite people.

Fig. 58
The Global goals, SDGs
UN, 2015

The European Green deal

In 2020, the European Union came with the new green deal. Their main target is to become the first continent that is fully climate neutral.

It's an economic plan that tries to boost the economy within boundaries based on tackling climate change and, at the same time, tries to be inclusive.

Therefore, it resembled the vision for the province. With the soft transition, there's a focus on the current situation, and reshaping happens over time.

In the image are shown the 11 goals that the EU has set in this deal. The ones addressed;

1. Transition to a circular economy
2. Leave no one behind

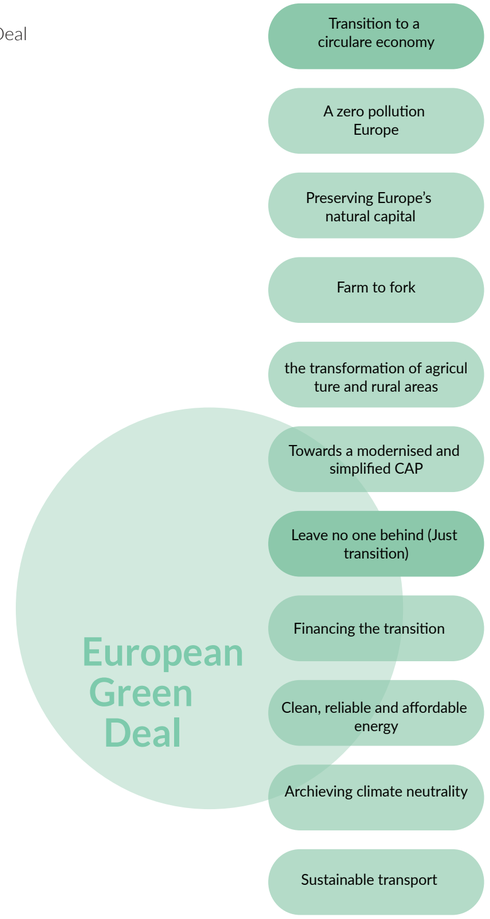
These two goals are both main targets. Since the scale of the province is different, the goals don't provide answers for the vision. For example, these two measurements, which are embedded in the goals, relate to our work:

1. 75% per cent of transport needs to shift from the road towards rail- and waterways.

2. Buildings need to be renovated to reduce emissions of co2 and lower overall energy consumption.

The first one relates since we try to find synergies between the port and the city for the C&D sector. The second is also inherently connected to making the C&D sector circular; therefore, it's a part that we're taking into our vision.

Fig. 59
The European Green Deal



Policy framework and agreements

Omgevingswet

When the so-called omgevingswet is going to be implemented is still a bit unsure, but it is likely happening in the coming years. It's a law that replaces 26 laws that currently exist. It's an attempt to make it easier for everyone to act. From now on, our stakeholders go straight to only one counter, after which they will get an answer within eight weeks instead of 26.

It's especially interesting in our situation since the law allows for more initiatives and flexible use of spaces, like industrial areas. Combining the circular economy with housing becomes more accessible, which will likely boost our circular economy ideas.

Concrete agreement

In 2018, the municipality, suppliers and the C&D sector agreed in a so-called concrete agreement.

In this agreement, they settled on making the sector more sustainable, reduce co2 emissions by 30% by 2030 and high-quality re-use of materials after the demolition. In comparison with governmental goals, they have set the bar low with this agreement. Nevertheless, is it good that these stakeholders are connected and trying to bring change.

Material passport

Another achievement was implementing a material passport in 2019. Companies are guided in creating an overview of the materials used in their buildings. Having this database will make it easier to subtract materials from buildings and know when they will be available.

This passport is not obligatory yet, but the government will decide in 2022 if this is going to be the case. For now, multiple test projects are running to see what the outcome would be.

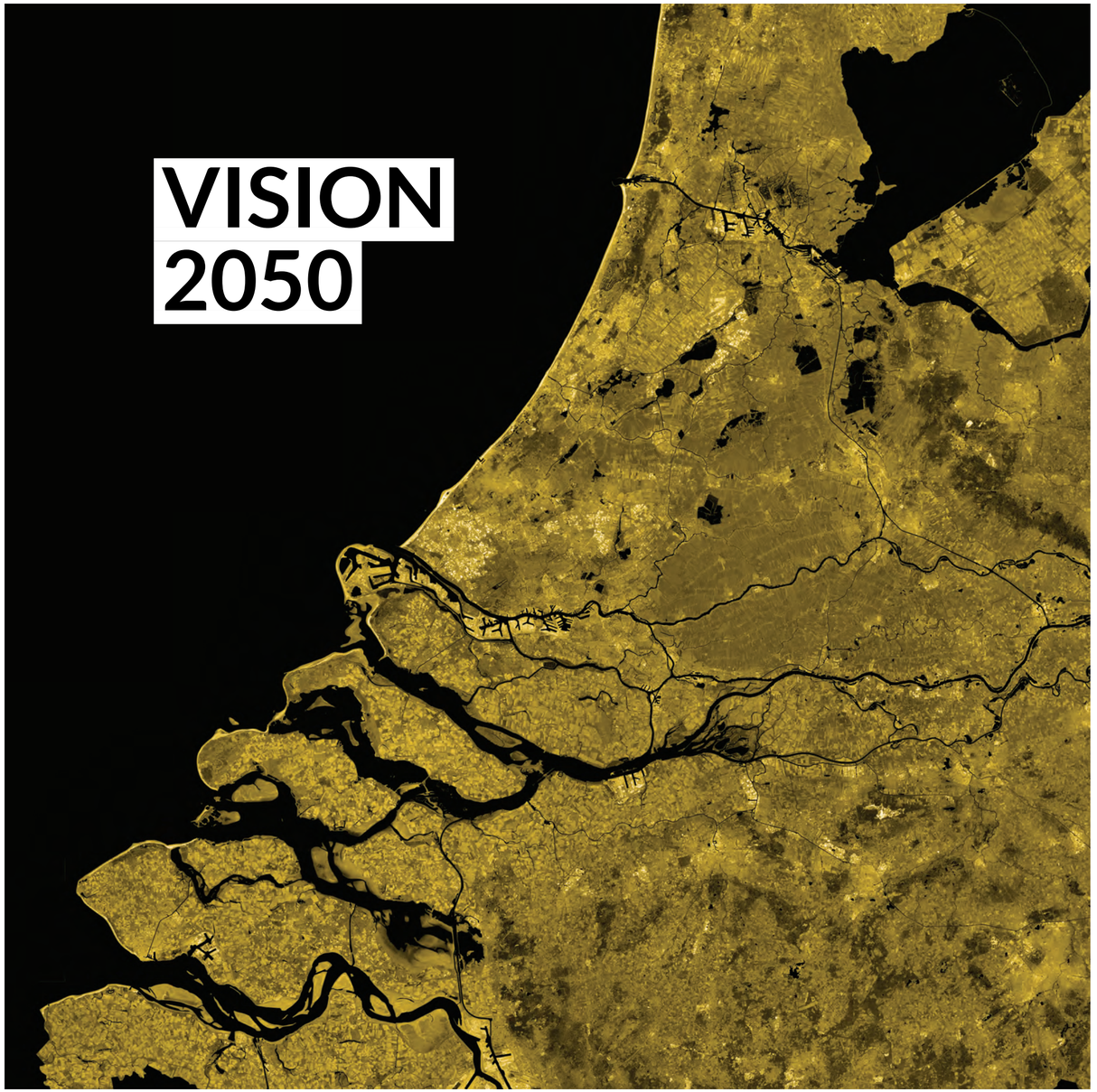
The transition agenda

The agenda has three phases. Currently, it focuses on making a so-called basecamp, which will be ready in 2023. The basecamp focuses on four pillars:

- Market development
- Measurements
- Policy, law and regulations
- Knowledge and awareness

This first phase is entirely focused on making the country ready for this transition. In the second phase, which is until 2030, 50% of all the final goals need to be met—the other 50% between 2030 and 2050.

These agendas will be guiding our proposed transition.



VISION 2050

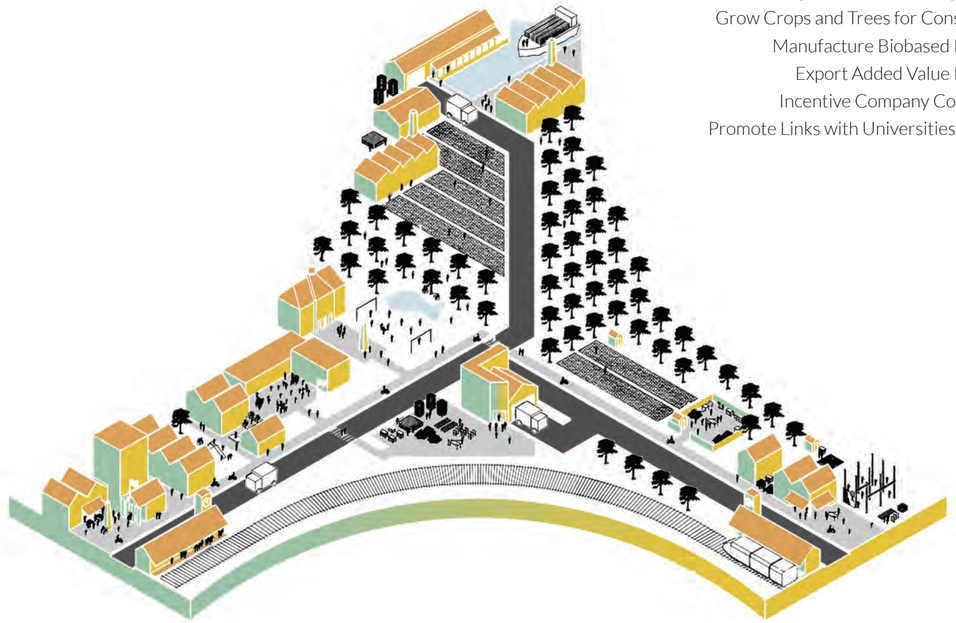
Within the vision section of this report the goals and objectives of the project are articulated with respect to the types of territory they affect. Subsequently the vision statement is outlined and transposed spatially onto the Province of South Holland.

Goals and objectives

Fig. 60
Conceptual diagram of the goals and objectives, per territory

Peri-urban areas

Construct High Quality Upcycling Centers
Grow Crops and Trees for Construction
Manufacture Biobased Products
Export Added Value Products
Incentive Company Co-location
Promote Links with Universities for R&D



Large cities

Adapt Existing Buildings into new Homes
Develop Brownfield Sites into Housing & Workspaces
Renovate and Improve Neighborhoods
Provide Skills Training for Circular Jobs
Introduce Community Circular Hubs
Catalogue Materials in Buildings & Projects

Small/Medium cities

Densify Neighborhoods with new Housing
Develop Brownfield Sites into Housing & Workspaces
Renovate and Improve Neighborhoods
Integrate Productive Green Spaces
Introduce Community Circular Hubs
Catalogue Materials in Buildings & Projects

By 2050, South Holland will have a completely circular construction sector. The Province will also have provided at least an additional 200.000 homes accessible to all those who need them and have developed a framework to match the housing demand moving forwards. Crucially, the Province will have achieved these milestones in a way that is just and resilient, with respect to society, the economy and the environment.

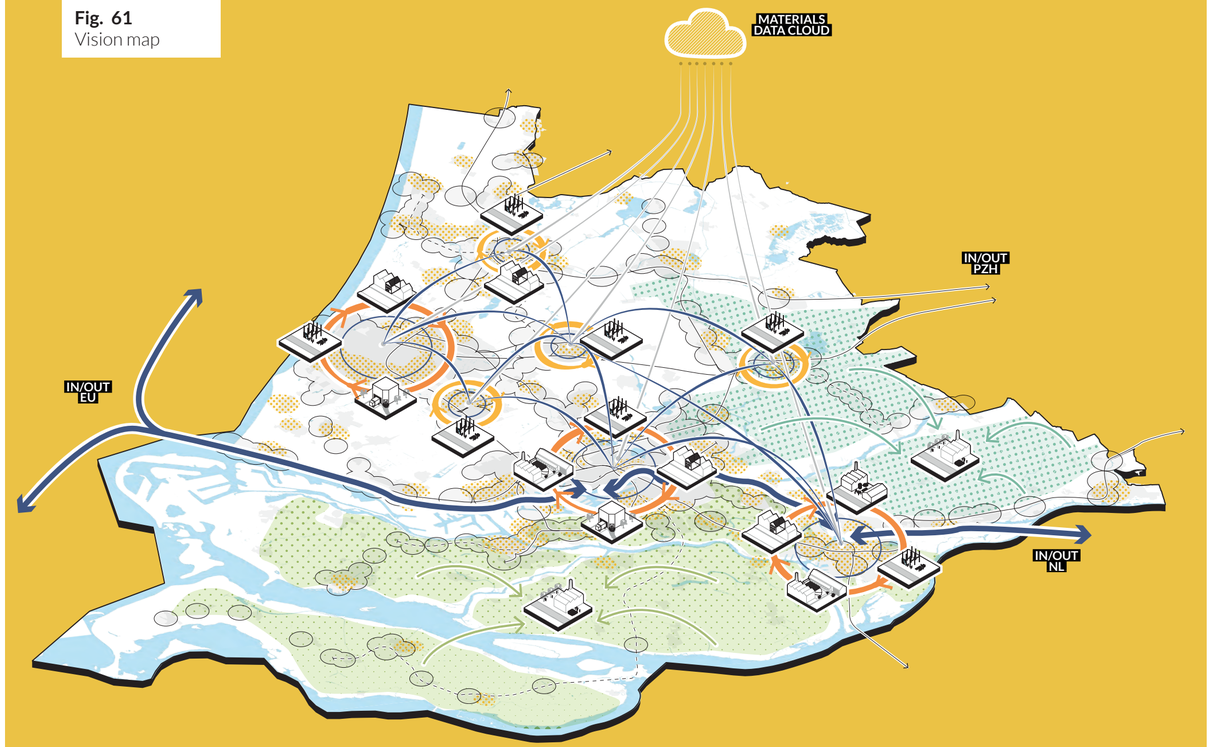
South Holland will be a place where innovative technologies, methods and processes are trialled and adapted within a network of well- functioning partnerships between people, contractors, manufacturers, government and education institutes. The Circular Economy will permeate everyday life through the introduction of workspaces for the makers industry, centers for high quality upcycling and hubs for community material and skills exchange in close proximity to the places where citizens live and work.

South Holland will be able to offer a path into gainful employment within the circular economy for people struggling to find work by offering appropriate skills training, provided by relevant employers in conjunction with institutes of higher education.

Ultimately, South Holland will be able to ensure that all citizens have the right, and the means, to lead a fulfilling and satisfying life in any one of the many vibrant, healthy and well-connected neighborhoods, and that their needs are the predominant concern in the ongoing development of the province.

VISION 2050

Fig. 61
Vision map



- Sea Clay soil
- Peat soil
- Renovation areas
- Urbanized areas
- Water
- Patterns
- In/out EU flows
- Public transit lines
- Planned public transit lines
- Flows of knowledge
- Flows of biobased materials
- Flows of virtual databases
- Range of educational institutions
- Flows within large cities
- Flows within small/medium cities
- Areas for TOD

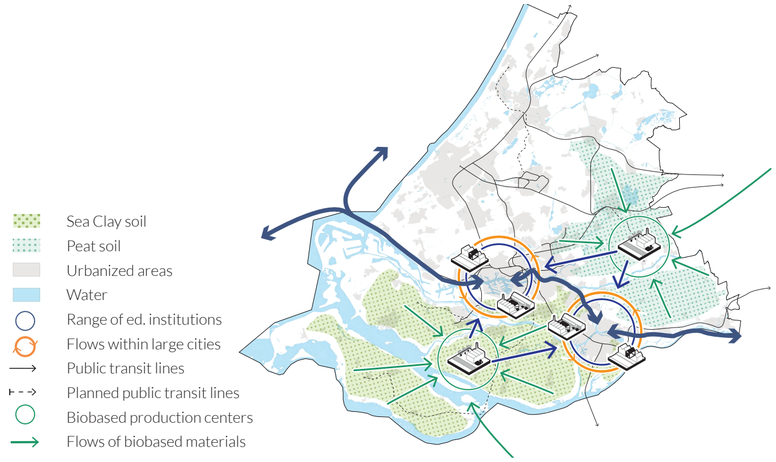
Vision Statement

We envision a province that makes space for the circular economy to exist spatially. Light industry, high-quality sorting centers, circular hubs, etc., should be centered in the places that we live and be an integral part of our urban fabric. We foresee a strong physical and non-physical network between the different stakeholder involved in the three pillars that we tackle. The circular economy needs to become something we do, see and want every day.

In this development, certain stakeholders should be protected from the power of capital. Living, working and developing should be available for everyone. The public sector is the one safeguarding these essential needs. The fabric that we suggest provides opportunities for those who did not get the chance to develop themselves and make them crucial players in the success of circularity. It will be a place full of diversity, liveliness and stimulants. A place that leads to creativity, which will enable us to innovate and remain hopeful in this battle against climate change.

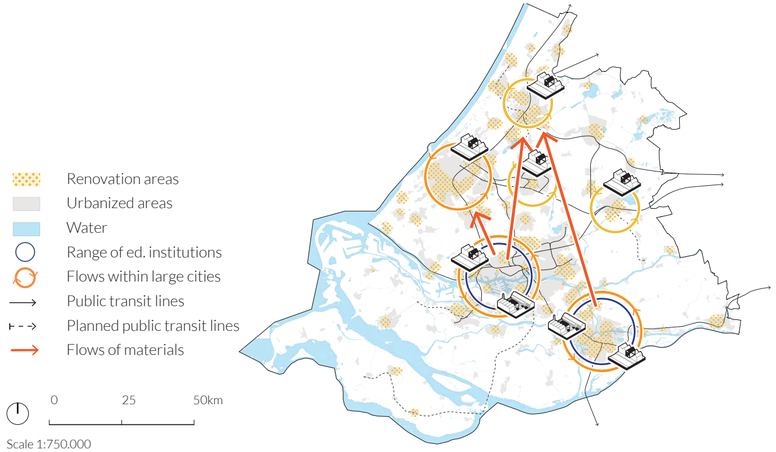
The patters are part of the playground in which the actors can act to ensure this transition. These could be considered as strong guiders. They can be altered and extended to a certain extend, which will depend on the situation.

Fig. 62
Vision map of Peri-urban areas



- Sea Clay soil
- Peat soil
- Urbanized areas
- Water
- Range of ed. institutions
- Flows within large cities
- Public transit lines
- Planned public transit lines
- Biobased production centers
- Flows of biobased materials

Fig. 63
Vision map of cities



- Renovation areas
- Urbanized areas
- Water
- Range of ed. institutions
- Flows within large cities
- Public transit lines
- Planned public transit lines
- Flows of materials

0 25 50km

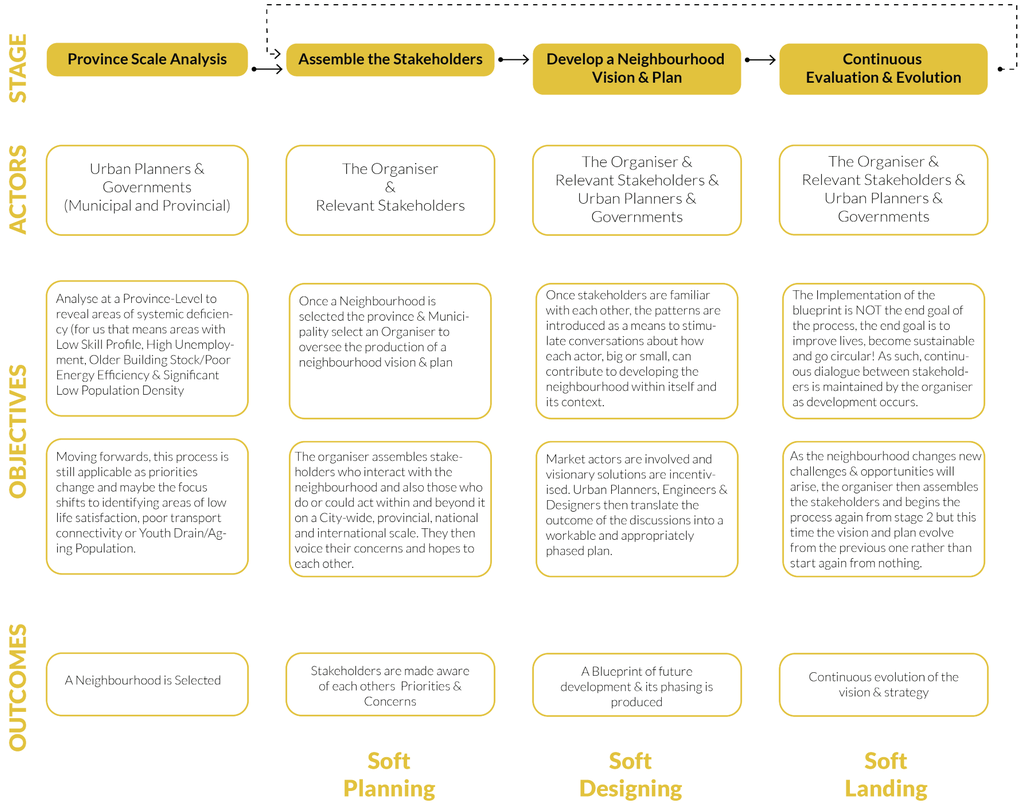
Scale 1:750.000

STRATEGY

Each of the case study strategic projects are developed in the same manner. Initially with discussions of each city's role within and beyond the province. Then with three intermediate scales of analysis and design. Stakeholders are also identified and the potential effects of the interventions are analysed with respect to their desires and goals.

Intervention Methodology

Fig. 64
Methodology of the intervention scheme



The Strategy for making our Vision a reality is composed of two key elements, the Intervention Methodology & the New Regulations.

The Intervention Methodology is the process by which neighborhoods are selected for improvement, stakeholders are engaged, a vision is agreed upon and a plan is implemented. This process is inherently non-prescriptive and builds on the principles of soft planning by focusing on stakeholder engagement and consensus to drive development.

However, a system of planning without some grounding in statutory instruments may be unlikely to deliver the required progress towards circularity and environmental sustainability quickly enough, for this reason our strategy also seeks to set out a number of new technical regulations.

By granting equal significance to the need for technical regulation and social engagement our strategy approaches the challenge of the transition to circularity in a more human-centered way than other more prescriptive technical-oriented approaches. This chapter will conclude with the presentation of two strategic projects which utilize our approach, one in the large dense city of Den Haag and another in the smaller less-dense city of Dordrecht.

THE PATTERNS

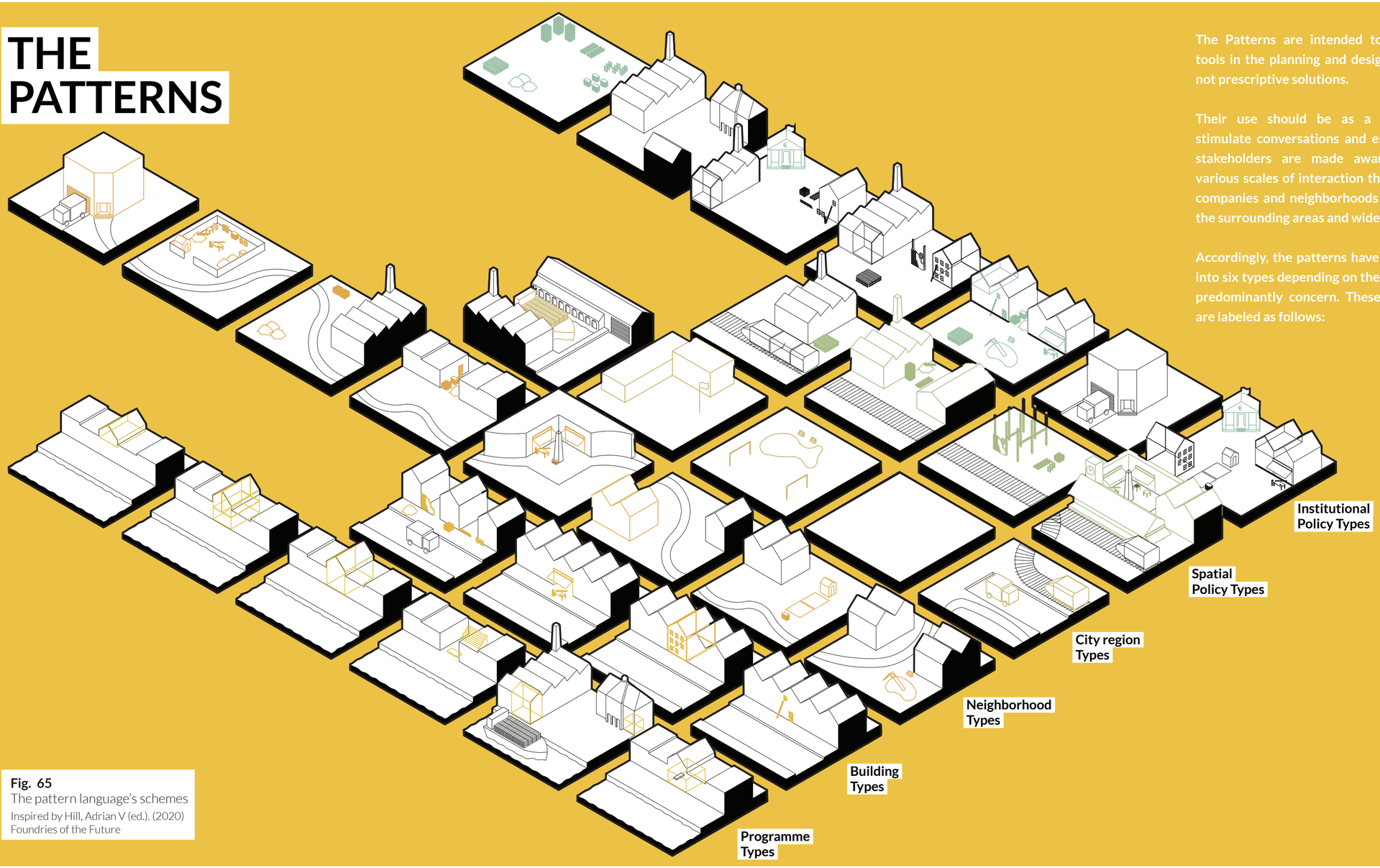


Fig. 65
The pattern language's schemes
Inspired by Hill, Adrian V (ed.). (2020) Foundries of the Future

The Patterns are intended to serve as tools in the planning and design process, not prescriptive solutions.

Their use should be as a means to stimulate conversations and ensure that stakeholders are made aware of the various scales of interaction their homes, companies and neighborhoods have with the surrounding areas and wider world.

Accordingly, the patterns have been split into six types depending on the scale they predominantly concern. These six types are labeled as follows:

Programme Types (P)

These concern alterations to the layout or living arrangements within existing homes and buildings.

Building Types (B)

These concern physical changes to the exterior fabric of buildings.

Neighborhood Types (N)

These concern either changes or improvements to the urban and green fabric of the neighborhood.

City Region Types (C)

These concern larger interventions that affect multiple neighborhoods and have wider implications for achieving the goal of C&D circularity.

Spatial Policy Types (S)

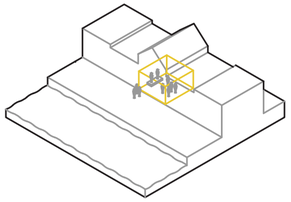
These concern interventions which do not operate within a singular aforementioned scale but still affect the province spatially.

Institutional Policy Types (T)

These concern interventions which do not have predominantly spatial implications.

These patterns naturally link with each other and the opportunity to use them in combination across multiple scales will be key to their success.

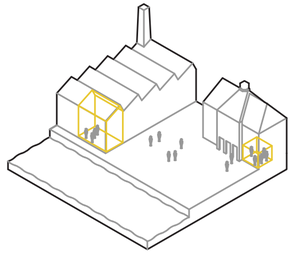
Programme types



P1 - Facilitate Community Hubs

Definition;
In order to meet and discuss solutions, stakeholders need a neutral and accessible space. Facilitating this space is essential in ensuring planning is collaborative and participatory.

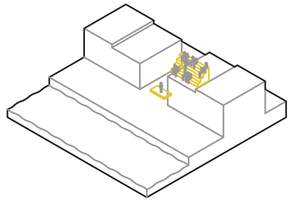
Proposal of how it could be used;
Community hubs could be an opportunity to introduce new public space in the area **(N1)** and also create a socio cultural focal point **(C4)**. They could also offer the space for skills training, development and education **(P2)** or where the co-designing of homes with future and existing residents takes place **(N3)**. All these activities could be managed by creating a role for an organizer **(T2)**. There also exists an opportunity to create circular jobs for the unemployed **(T4)** within these new activities and processes.



P2 - Provide Skills Training

Definition;
A variety of suitable spaces must be found for theoretical and practical educational activities of equally varying types. Activities might include: Training in chemical recycling processes, carpentry, welding, actor mediation and local administration.

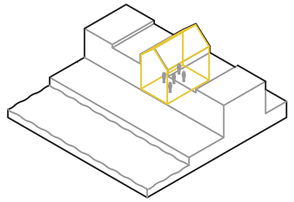
Proposal of how it could be used;
Spaces for skills training and education can also be community hubs **(P1)** facilitated through incentives for research and development **(T5)** and could take advantage of existing initiatives **(T3)** by partnering with vocational schools in the area. These interests can be aligned by creating the role of an organizer **(T2)** to identify the specific knowledge gaps. This stage is vital in order to ensure a skilled labor market for the newly created circular jobs **(T4)** for example people to work in the new workspaces and shops **(B3)**. These spaces for skills training and education can become socio cultural focal points **(C4)** and also facilitate the creation of a knowledge sharing network **(T6)**.



P3 - Use Meanwhile Spaces

Definition;
Proposals for each and every vacant site within the province do not need to be found immediately. Allowing social groups to propose initiatives for under utilized spaces (pop-up theaters, light industry-making, markets) should be encouraged and encouraged, in the hope it might provide a test-bed for a longer-term more permanent initiative.

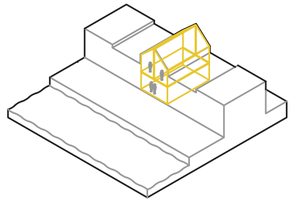
Proposal of how it could be used;
Meanwhile spaces can be used as community hubs **(P1)**, spaces for skills training and education **(P2)** and places for experimentation with designing and building circular **(B4)**. The initiatives could be facilitated through incentives for research and development **(T5)**. Financial levers **(T1)** can also be used to encourage land and building owners to avail their property for transitional uses. Such spaces could become social cultural focal points **(C4)**, and the activities between the different actors could be managed through an organizer **(T2)** at the city level.



P4 - Propose Co-Living Solutions

Definition;
Co-Living is a residential community living model that allows for unrelated people to live together.
Advantages of such living solutions include reduced loneliness, cost savings, potentially more flexible contractual arrangements and efficiencies through shared resources.

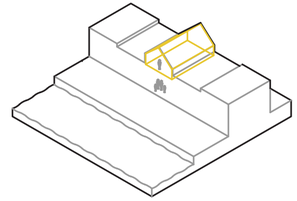
Proposal of how it could be used;
Co-living models could be developed through the provision of incentives for research and development **(T5)**, and can be experimented in neighborhoods with existing initiatives **(T3)** in co-housing and other house sharing models. An organizer **(T2)** at the neighborhood level could be in charge of registering available houses and negotiating rental contracts with future residents.



P5 - Adapt Existing Buildings

Definition;
Dwellings in South Holland are on average small by international standards. However, many house types across the region have proved adaptable from large single homes into numerous isolated apartments. By converting large houses into smaller apartments and developing private gardens into dwellings, whilst increasing the quality of public green spaces, many more residents can be accommodated within the existing building footprint of South Holland.

Proposal of how it could be used;
Incentives research and development **(T5)** could be used to increase uptake of this type of conversion and public financial levers **(T1)** such as taxes could be levied against those with "disproportionate houses". The process of re adapting existing buildings offers an opportunity to renovate and improve dilapidated neighborhoods **(N4)**, create circular jobs for the unemployed **(T4)** and can also be used to promote urban mining initiatives **(S2)**.

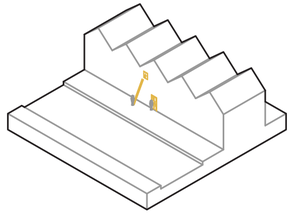


P6 - Convert Family Homes

Definition;
Many older residents live in housing larger than they require. By providing subsidies for families to convert portions of their dwellings into separate apartments for older relatives their previous oversized dwellings can be used by more suitable residents. In this way older residents are also able to move closer to assistance as they become less able to complete tasks and are able to maintain/improve their social support network. Conversion in the same manner but targeted towards younger people may enable them to begin living independently but with greater support structures.

Proposal of how it could be used;
Incentives for research and development **(T5)** can be geared towards efforts of conversion of family homes in order to accommodate more relatives. These efforts take advantage of the existing conditions **(T3)** e.g the demographics of a neighborhood. Conversion of houses also offers an opportunity to repair homes and ensure good living conditions **(B1)** and improve dilapidated neighborhoods **(N4)**.

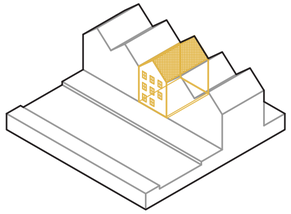
Building Types



B1 - Repair Homes

Definition;
Neglected housing can have a negative effect on housing satisfaction and thus quality of life for residents, many of whom cannot spare the expense to improve their living environments. By providing subsidies to maintain houses, dwellings and lives can be improved whilst also driving the local circular economy.

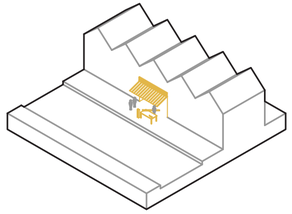
Proposal of how it could be used;
Existing houses in poor condition could be identified by residents or the Community Organizer **(T2)** and improved within wider maintenance schemes targeting dilapidated neighborhoods **(N4)**. A context-specific strategy should be developed through conversation with existing residents **(N3)** this may unlock opportunities for synergies to improve energy efficiency **(B2)** and introduce productive green spaces **(N2)**. Urban mining activities **(S2)** should be undertaken and materials taken to the Community Commons/Exchange Markets **(N7)**.



B2 - Improve Energy Efficiency

Definition;
Low household energy efficiency can lead to higher bills as well as potentially lead to structural and health problems caused by elemental intrusion. This issue disproportionately affects lower socio-economic groups who are forced into sub-standard housing.

Proposal of how it could be used;
An organizer **(T2)** at the city level could identify the neighborhoods in most urgent need of improvement and collaborate efforts to renovate and improve dilapidated neighborhoods **(N4)**. Public financial levers **(T1)** could be used to encourage housing developers to design and build circular **(B4)** by employing CE principles to ensure that all new houses met the energy efficiency requirements.

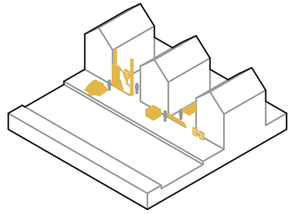


B3 - Introduce New Workspaces

Definition;
Increasing the housing stock in South Holland will inevitably lead to a population increment, there by requiring the provision of additional work spaces into the urban fabric which are essential to the maintenance of the quality of life.

Proposal of how it could be used;
Public financial levers **(T1)** can be used to urge housing developers to design and build circular **(B4)** by developing more mixed use plans (see: build varied **(S1)** such as incorporating work spaces within living areas. Such work spaces lead to the creation of more jobs **(T4)** within the neighborhood, can used for skills training **(P2)** or become socio- cultural focal points **(C4)**.

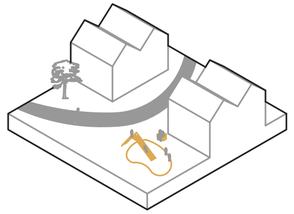
Neighborhood Types



B4 - Design & Build Circular

Definition;
Circularity principles should be applied from the design phase to the construction and use phase of a building. Material passports for all products used in construction should be produced and strategies for the eventual re-use of materials should be devised at product inception. Building permission should be contingent on this plan being sufficient. Innovative building practices such as open building could also be explored and encouraged

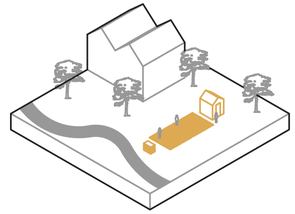
Proposal of how it could be used;
Financial levers **(T1)** should be used to encourage the different actors in the housing market to adopt circularity principles and models such as open building, use of material passports and so on. Providing incentives for research and development **(T5)** can be used as a way to encourage innovations in circularity such as; promoting urban mining initiatives **(S2)** and building high quality up-cycling hubs **(N6)** hence creating circular jobs **(T4)**.



N1 - Introduce New Public Spaces

Definition;
Increasing the housing stock in South Holland will have the entirely predictable outcome of increasing the population, accordingly, ensuring there are quality outdoor spaces that residents can enjoy is essential to ensure that quality of life is maintained.

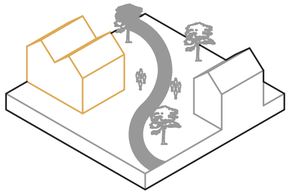
Proposal of how it could be used;
New public spaces could either be implemented on land that is currently private-owned and undeveloped, or be brought about by the dedication of an area at the junction of different land uses, in effect acting as a buffer zone **(C2)**. A key component of these new public spaces could be productive green areas **(N2)** such as allotments, orchards or wildflower meadows.



N2 - Promote Productive Green Space

Definition;
Adding Green roofs and fruit-producing trees to public spaces can have beneficial effects for ecology and quality of life.

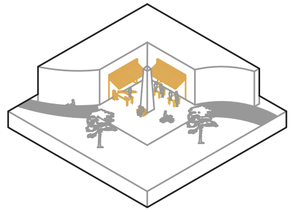
Proposal of how it could be used;
Productive greenery could be added to new public spaces **(N1)** or used as a means to improve the experience of dilapidated neighborhoods **(N4)**.



N3 - Design with Existing & Future Residents

Definition;
When new dwellings are constructed special attention should be paid to ensuring that future residents and existing residents are jointly involved in design so that innovative solutions to specific problems might be simultaneously resolved.

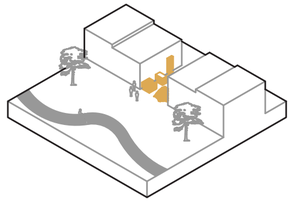
Proposal of how it could be used;
Designing new houses or adapting existing ones should be done in collaboration with existing residents, future residents, neighbors and existing conditions **(T3)** discussions with these groups, moderated by an organizer **(T2),** might reveal a specific solution that was not immediately foreseen, such as: proposing co-living solutions **(P4),** Adapting existing buildings into housing **(P5)** or converting family homes **(P6).** Of course, a key aspect of design going forwards should be a circularity agenda **(B4).**



N4 - Renovate Dilapidated Neighborhoods

Definition;
General neighborhood appearance can have dramatic effects on feelings of community cohesion and subsequently quality of Life. It is therefore key to ensure people are happy to be out in their neighborhood and proud of its appearance.

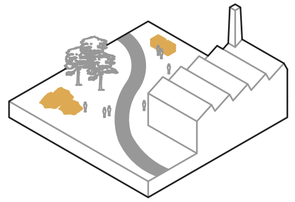
Proposal of how it could be used;
Improving dilapidated neighborhoods can be done in conjunction with the implementation of new green spaces **(N1)**, improving the appearance and condition of housing **(B1)** and introducing new shops and workspaces **(B3)**. The hope is that by setting up community exchanges **(N7)** we can enable people to keep up the maintenance of these places and spaces in a circular manner.



N5 - Introduce Material Storage Spaces

Definition;
Areas within the city for the meanwhile storage of materials and products are essential as without them products would have to go straight from one building into another or be inefficiently moved far away to be stored.

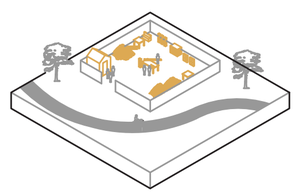
Proposal of how it could be used;
Storage spaces within the city are useful to reduce the distance material needs to travel between construction and demolition sites, they could form part of a community exchange **(N7)** space or be located within a centralized logistics zone **(N8)**. A network of these locations should be supported by a materials database **(T7).**



N6 - Build Upcycling Hubs

Definition;
Physical infrastructure where high quality upcycling can occur needs to be created. Currently, the lack of this infrastructure is the primary missing link in the Circular Construction Sector.

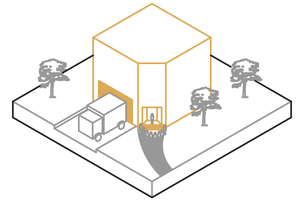
Proposal of how it could be used;
High Quality Upcycling Hubs are key in the new economy which allows circular design and construction (B4). The hubs could be located on the opposite side of buffer zones **(C2)** to areas with a poorer socio-economic profile and thus, provide skills training for that area's local residents **(P2)** accessible and circular jobs for the unemployed **(T4)** can be created. Materials for upcycling can be acquired through urban mining **(S2)** and cataloged once upcycled within the materials database **(T7)**, then possibly transported to the central logistics zone **(N8)**.



N7 - Community Commons & Exchange Markets

Definition;
Physical locations for material drop-off and collection are essential components of the public-connected Circular Construction Sector. Additionally a physical location for the purchase of upcycled household furniture and appliances is essential.

Proposal of how it could be used;
The Community Commons/Exchange Markets should be located in accessible central **(N8)** locations for all residents and companies. These facilities could be spaces for education **(P2),** accordingly they will contribute to giving people the skills they need to acquire circular jobs **(T4)** and will give companies the workforce and material resources they need to build and design circular **(B4).**

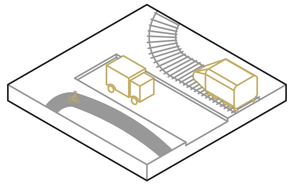


N8 - Organise Centralised Logistics Zones

Definition;
A series of accessibly-located logistics zones need to be created for the efficient movement and storage of material flows across the region.

Proposal of how it could be used;
Centralized logistics zones are the physical manifestation of the Materials Database **(T7)** and a focal point for the construction industry to share knowledge **(T8).** The flows in and out of the logistics zones are facilitated by an organizer **(T2).** Co-Location of Logistics Zones with High Quality Upcycling Facilities **(N6)** is logical and as such they will contribute to creating circular economy employment opportunities **(T4).**

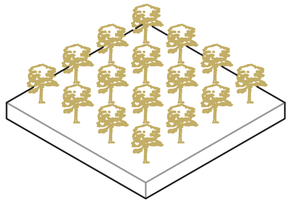
City Region Types



C1 - Access to Transport

Definition;
Connectivity to reliable and various modes of transport is essential in determining the locations of the key facilities that support the transition to a circular construction sector. It also affects the quality of life in the new neighborhoods. New infrastructure may need to be built or existing services may need to be enhanced.

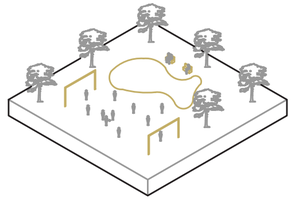
Proposal of how it could be used;
New housing developments should take into consideration the accessibility of the sites to multi-modal transport **(S1).** In addition all key facilities, spaces and activities that offer employment opportunities **(T4)** should be located within close proximity to reliable public transport to ensure that workers can commute easily.



C2 - Cultivate Buffer Zones

Definition;
The space between industry-dedicated areas and predominantly residential areas should be designed in a way that maintains high air quality and low noise pollution in the residential areas.

Proposal of how it could be used;
The buffer zones are possible locations for new public spaces **(N1),** and light industry; for instance the upcycling hubs **(N6).** In specific areas, these zones can also be used for tree planting controlled harvesting of biobased raw materials for construction **(S4).**

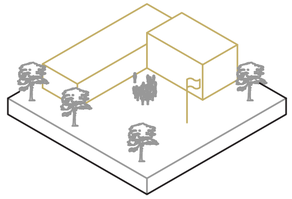


C3 - Design High Quality Public Spaces

Definition;
Ensuring that public spaces are well designed and have ample facilities to encourage exercise and good mental well-being is very important.

Proposal of how it could be used;
High quality public spaces can be achieved by upgrading existing public spaces e.g by adding productive green spaces **(N2).** High quality standards should be achieved in the new public spaces **(N1)** as well, which spaces could also become socio-cultural focal points **(C4).**

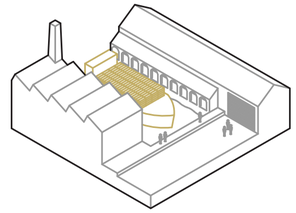
Spatial Policy Types



C4 - Create Social Focal Points

Definition;
Social infrastructure such as schools, hospitals, public spaces etc, play a key role in the functioning of neighborhoods and should therefore be included as essential parts of new housing developments .

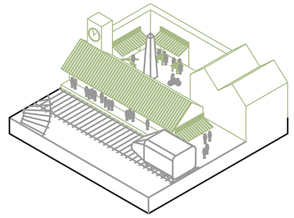
Proposal of how it could be used;
Creating socio cultural focal points such as community hubs **(P1)** could be part of renovating and improving dilapidated neighborhoods **(N4).** Policy should guide that new housing developments consist of social infrastructure **(S1).**



C5 - Transition to a Waste-to-Value Port

Definition;
The Port of Rotterdam has identified the transition to a waste-to-value port as the third step in its circularity strategy. In that endeavor they must be supported through collaboration with the C&D Sector.

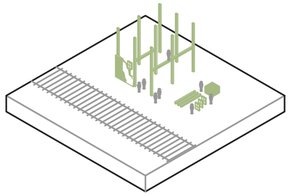
Proposal of how it could be used;
The port of Rotterdam can play a key role in the transition to biobased raw materials for the C&D sector **(S4),** and can also be used to encourage the co-location of C&D sector companies **(S3).**



S1 - Build Well, Varied & Dense

Definition;
New housing developments should be built efficiently and sustainably with a focus on varied functions within neighborhoods and dwelling variety.

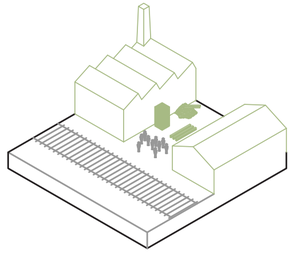
Proposal of how it could be used;
The use of public financial levers **(T1)** can urge developers to build more varied and mixed housing models with a requirement of high quality public space **(C3).** New neighborhoods should be co-designed and built with future residents **(N3)** and should also include areas that accommodate circular construction activities for example; Local waste collection points **(N7).** Such spaces can become socio-cultural focal points **(C4).**



S2 - Promote Material Recovery

Definition;
Until such a time as Materials passports allow us to see at a glance exactly what resources are to be found within a given building, initiatives to obtain valuable products from demolished buildings must be facilitated and supported.

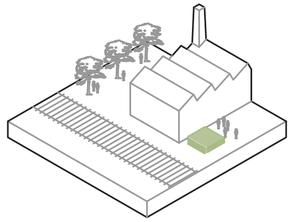
Proposal of how it could be used;
During the renovation and improvement of neighborhoods **(N4),** waste materials could be taken to the community commons **(N7)** where they can be exchanged for other materials. A community organizer **(T2)** can be in charge of co ordinating these activities through creating a neighborhood materials database **(T7)** and keeping a record of all available material storage spaces **(N5).**



S3 - Encourage Company Co-Location

Definition;
Co-Locating C&D Companies allows for the more efficient flow of materials between them and for more effective buffer zones to be established. This can be encouraged through reduced business rates in some areas.

Proposal of how it could be used;
Tools such as use of public financial levers **(T1)** and Incentives for research and development **(T5)** can create spatial and economic conditions that make co-location of related C&D companies beneficial to the businesses. This then leads to the creation of C&D clusters which would benefit from a centralized logistics zone **(N8)**, a common knowledge sharing network **(T6)** and a common materials database **(T7)**. These locations would then be ideal for the building of high quality up cycling hubs **(N6)** and would inevitably create more circular jobs **(T4)**.

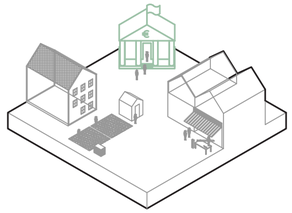


S4 - Manufacture Biobased Materials

Definition;
The population of South Holland looks set to continue growing well beyond 2030 when the first 200.000 new homes have been delivered. It is therefore necessary for steps to be taken to ensure this future development is sustainable and circular, through a shift to biobased construction materials in addition to upcycled products. These products need not be grown in South Holland but value-added manufacturing should be accommodated here and the existing port infrastructure utilized.

Proposal of how it could be used;
New biobased materials grown and harvested in the province will be added to the materials database **(T7)** and can be grown to suit construction demand. Buffer Zones **(C2)** between areas of industrial and residential uses will be integral components of this new material system. The province should utilize the concentration of material flows through the port **(C5)** as justification for the siting of added-value bio-materials manufacturing, creating many circular jobs **(T4)** in the process.

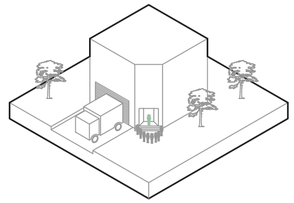
Institutional Policy Types



T1 - Use Public Financial Levers

Definition;
Financial levers can be both incentives (tax cuts, financing opportunities) or disincentives (fines, taxes). Their main goal is to nudge the C&D sector companies into complying with Circular economy principles. They can also be place based in order to target a specific neighborhood or City.

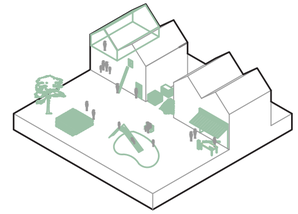
Proposal of how it could be used;
The use of public financial levers such as tax cuts can encourage housing developers to; build well, build varied and build dense **(S1)** in low income neighborhoods, create high quality public spaces **(C3),** Improve energy efficiency **(B2),** and re adapt existing buildings into housing **(P5)**. Financial levers can also be used to encourage the co-location of C&D sector companies **(S3).**



T2 - Employ Organizers

Definition;
An organizer can either be a community coordinator, city planner or facilitator whose main roles are; to align the interests of all actors, build partnerships and identify community needs. This role can exist at multiple scales.

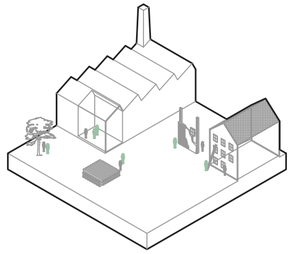
Proposal of how it could be used;
Some of the activities that would benefit from the role of an organizer at the neighborhood scale include; overseeing and managing the spaces for skills training and development **(P2),** coordinating the activities in the community hubs **(P1),** keeping record of the workspaces and shops **(B3)** and so on. An organizer at the city or provincial scale would be responsible for synchronizing various activities such as the urban mining initiatives **(S2)** etc.



T3 - Build on Existing Initiatives

Definition;
A thorough analysis of existing initiatives should be done and recorded such that any and all new interventions/ proposals build on whats already on ground. In this way, resources are used more efficiently across the sector and there's a better coordination of activities

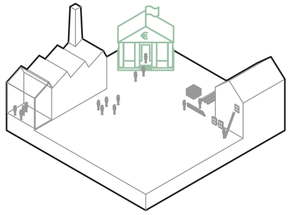
Proposal of how it could be used;
The analysis and recording of existing initiatives could be done by creating a role for an organizer **(T1)** who could manage this process at the different scales. Existing conditions such as the current housing stock of a neighborhood could be a basis for deciding where to propose co-living solutions **(P4),** and how to convert family homes to accommodate more relatives **(P6).** Existing education activities and initiatives could guide where to locate spaces for skills training and development **(P2)** as well.



T4 - Create Circular Jobs

Definition;
Circular jobs refer to job opportunities that arise from circular economy initiatives. These jobs should be fairly distributed across neighborhoods and target both the low skilled laborer and the highly skilled technician.

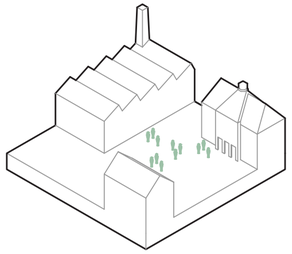
Proposal of how it could be used;
Circular activities such as up cycling **(N6)**, repairing of homes **(B1)** etc, create job opportunities within the neighborhoods where they happen. In addition, new initiatives like the community hubs **(P1)** and the spaces for skills training and development **(P2)** also offer opportunities for employment. It's important that such spaces have access to multi-modal mobility **(C1)** to ensure that workers can travel to and from work efficiently.



T5 - Incentivise R&D

Definition;
Incentives for research and development can include public financing, offering space and technical support. These can push forward innovation in circular economy principles, leading to the development of new products that can address local problems.

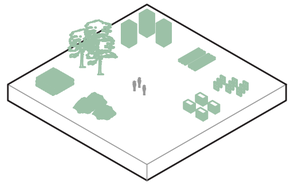
Proposal of how it could be used;
Incentives could come in the form of offering spaces for skills training and development **(P2)** or availing funds for research in how to design and build circular **(B4)**. Incentives could also be used to encourage certain CE oriented activities like co-location of C&D companies **(S3)** and re-adaptation of existing buildings into housing **(P5)**.



T6 - Create a Knowledge Network

Definition;
A platform that facilitates exchange of information and knowledge between C&D companies. Such a platform is vital in the transition to a circular economy because it facilitates the collaboration of various stakeholders and allows for them to align along CE principles.

Proposal of how it could be used;
The possibility of a knowledge sharing network is an incentive for the co-location of C&D sector companies **(S3)**. A knowledge network is a virtual platform that could also be embedded within a centralised logistics zone **(N8)**, or within the spaces for skills training and development **(P2)**.



T7 - Create a Materials Database

Definition;
A materials database is a centralized system that records, tracks and monitors material & waste flows within an area. It facilitates the optimal use of resources and minimizes waste.

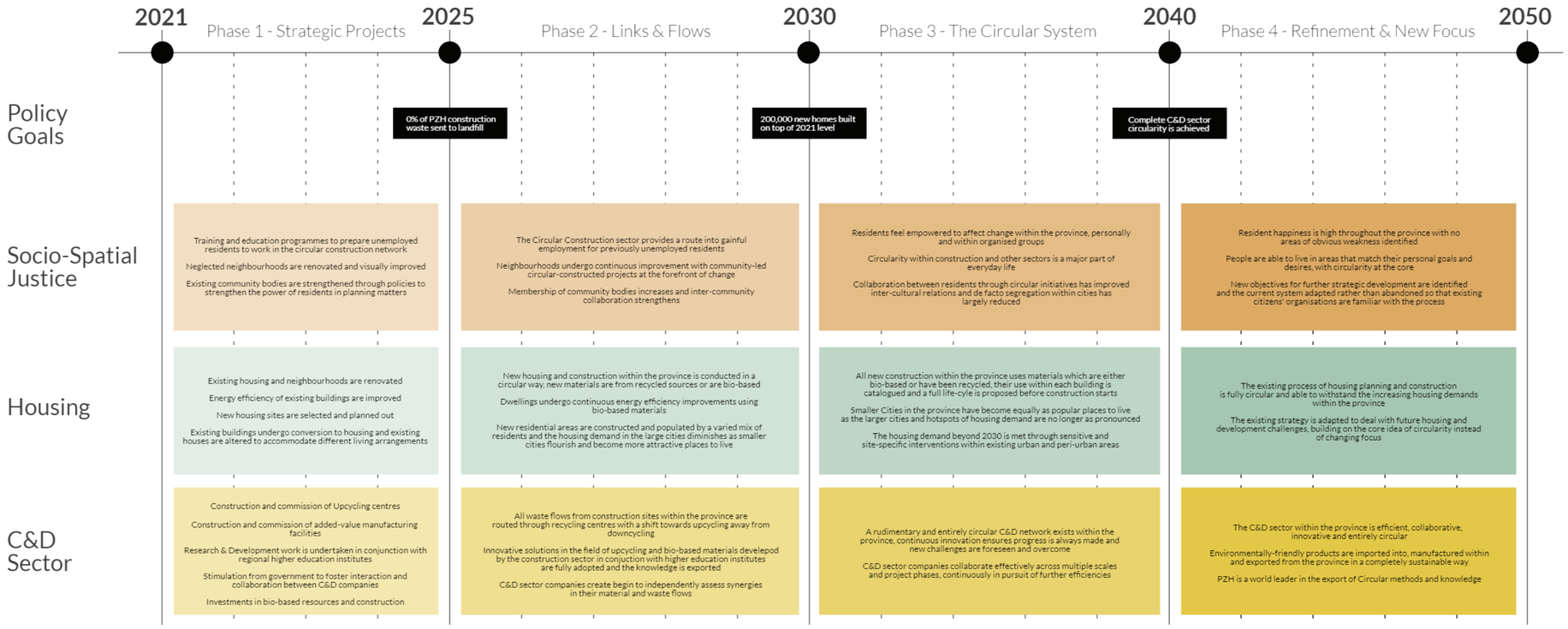
Proposal of how it could be used;
Activities such as urban mining **(S2)** become a source of waste material which is then up cycled in the high quality up cycling hubs **(N6)**. A materials database would be facilitated through the availability of material storage spaces **(N5)** and centralized logistics zones **(N8)**which would ease the process of tracking, transporting and storing materials.

Phasing

The Project Phasing is split into four sections which aim to reflect the general progression of the vision over time, as well as its eventual achievement of construction sector circularity and a shift towards other goals and objectives. It is important to note however that the special focus of the project is achieving a soft transition, as such, prescriptive top-down targets sit uncomfortably alongside the project's main aim. Accordingly, the phasing is left intentionally open to interpretation for unique cases.

Each theme has a set of specific objectives to achieve within each phase of the project but the ultimate desired outcome is that the process itself is refined, for this reason frequent moments of reflection on the success and weaknesses of the current process should be facilitated within the phases of the project. The process consists of the analysis, the methods of stakeholder engagement and the use of the set of patterns. Continual refinement and adaptation of the soft transition process will allow residents, companies and planners to become familiar with its workings and permit the more efficient resolution of future challenges by adaptation of the existing process rather than replacement by a new system.

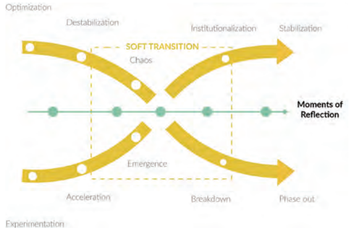
Fig. 66
Phasing timeline



Stakeholder Engagement

For the vision of this project, an active participation of the stakeholders is required. This is to ensure that they are more aware of each other, thus making the sector more transparent and circularity more accessible. In the stakeholder analysis it appeared that the problems between stakeholders mainly arise from not having enough information about the work field in which to operate.

Fig. 67
Moments of reflection in the transition
Adapted from Drift & Metabolic, 2018



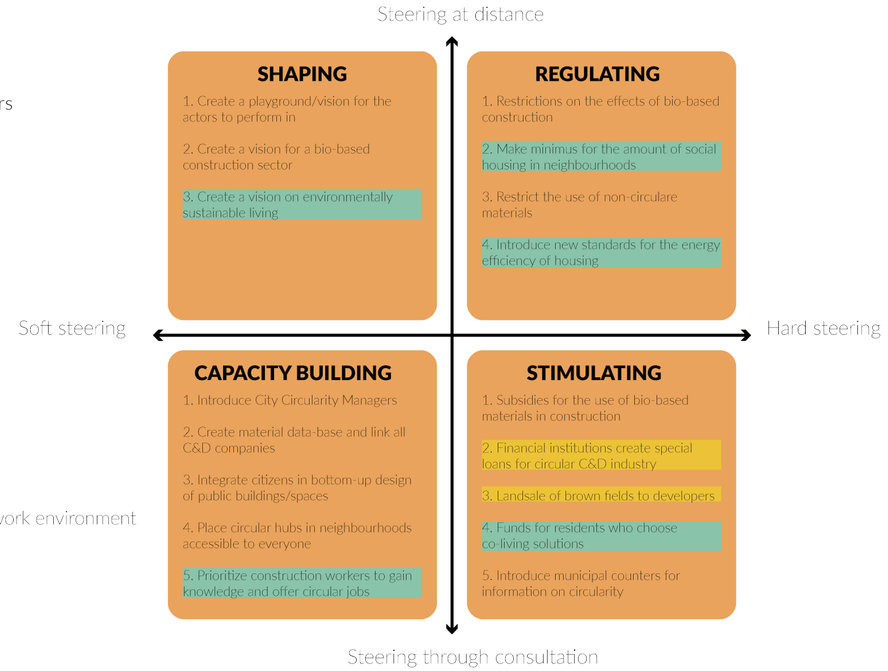
In order to structure the stakeholders, the main stakeholders have been divided into three groups: Offer better living/working environment, gain profit and better life. These groups correspond with the goal this project has to achieve for them. For example, the educational institutions are important in the strategy to better educate residents and thus create a better working environment for circularity in the C&D sector. For the C&D companies, a better work field is created by another stakeholder, whereas they are the ones who can perform better in that field and thus benefit from it.

Stakeholders have their own planning instruments that they can implement to achieve their goals. The figure shows these planning instruments highlighted in the goal of that instrument as well as the group of stakeholders that will implement it or on which it will have a direct impact. In addition, the instruments are placed in the type of planning market they address: shaping, regulating, capacity building and stimulating. As the vision of this project is to achieve a Soft transition, hard steering instruments are only applied to scope a field of activity and to activate stakeholders through stimulating instruments. Restrict the use of non-circular materials is a regulatory instrument that can be implemented by the government to steer stakeholders in the direction of biobased materials. An example of a financial instrument that has an stimulating effect is financial institutions that can provide special loans to players in the C&D industry.

For the development of the applicability of the patterns, a number of tools are essential. As before stakeholders can start looking at how to apply sets of patterns, it is important that the work field is shaped. At present, there are goals for achieving a circular construction sector, but there are no clear plans for reaching them. This can be done by creating a vision for the use of biobased materials, to steer the sector in a circular

Fig. 68
Key stakeholders

Fig. 69
Planning instruments
related to the stakeholders



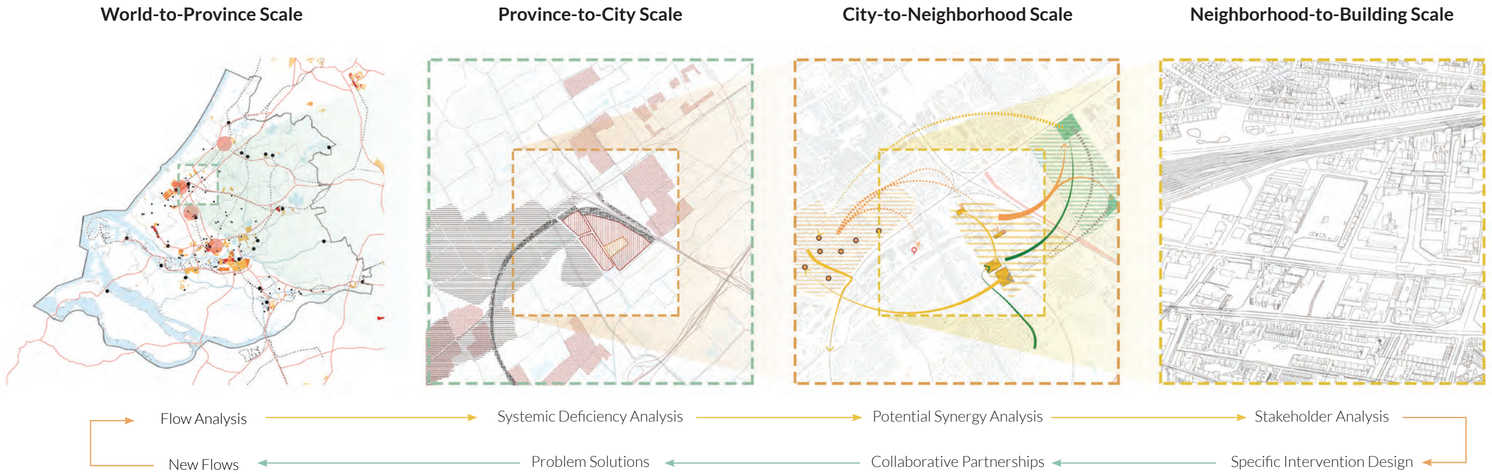
direction. This, together with the regulatory instruments on biobased construction, creates a field for the market to transition to a circular sector.

Furthermore, for capacity building, introducing the role of circularity managers is key. They ensure that stakeholders enter into dialogue with each other, that residents are involved in design processes and that information about circularity is clear and accessible to all parties.

Finally, there is a planning tool that is just as crucial for the soft transition, which is the moment of reflection. The matrix shows Drift's Planning framework, which was used earlier in the report to show the soft transition, and now where these moments of reflection occur. These moments are of great importance in bringing the stakeholders together to see how the transition process is going, and what the next steps are that need to be taken.

The Multi-Scalar Approach

Fig. 70
The multi-scalar approach scheme



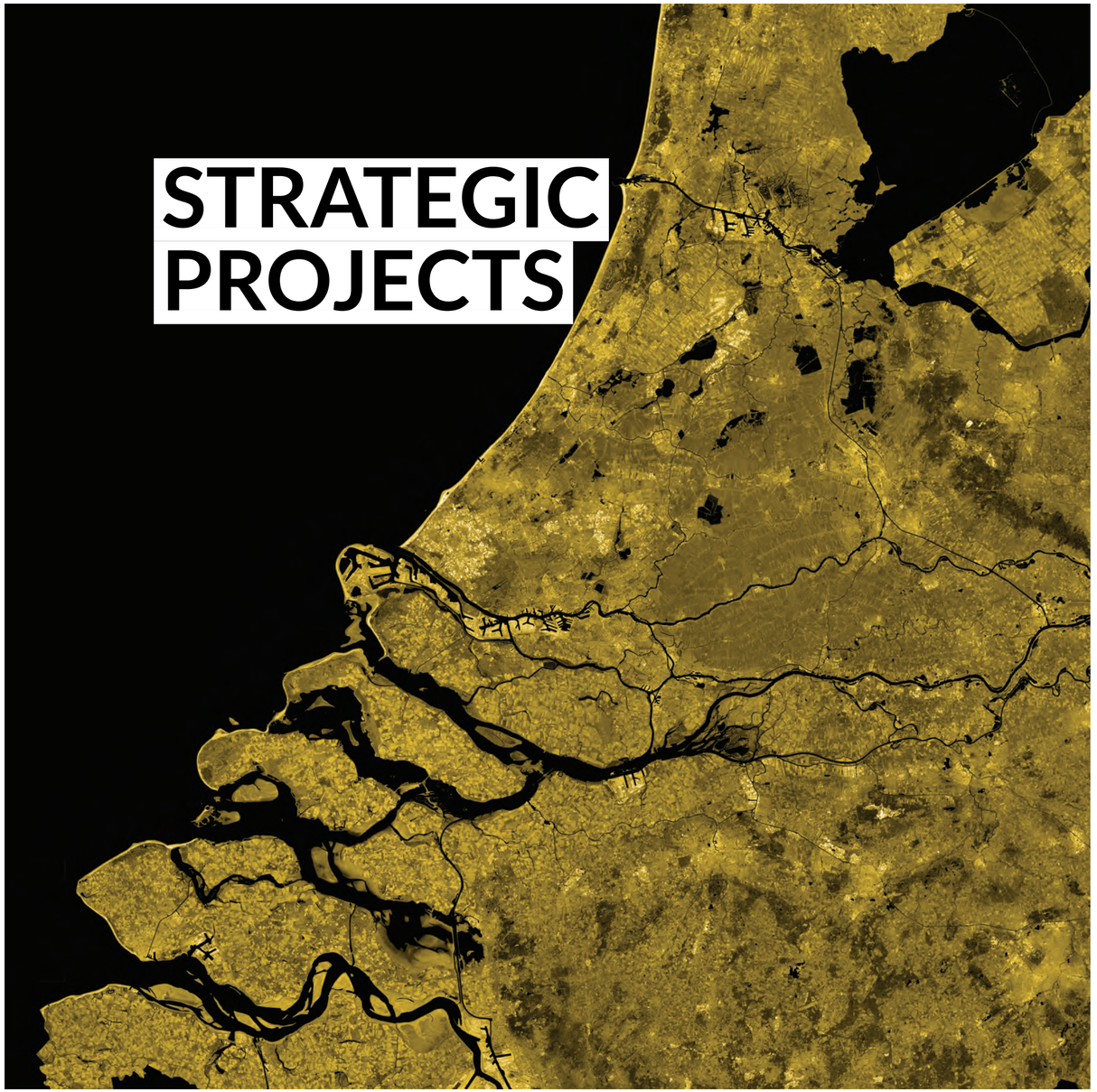
An understanding of how interventions at one scale affect other scales is essential when transitioning towards a circular economy, especially with respect to construction sector circularity which relies entirely on tracking material flows within neighborhoods, cities, the province and the world, so that these materials can quickly find a new purpose.

The first, and largest, scale we consider within our strategy is the world-to-province scale encompassing the flows of materials and people into, through and out of the province. Trends observed at this scale inform more detailed research into particular areas of interest at a Province-to-City scale.

At this second scale systemic problems, such as high unemployment or poor building energy efficiency, can be identified and spatialised. Once neighborhoods of interest are recorded we are able to identify how synergies can be created between multiple neighborhoods at the City-to-Neighborhood scale.

After recognizing opportunities to simultaneously alleviate issues within multiple neighborhoods we are able to zoom into the scale of a single neighborhood and, by working with local stakeholders and the patterns, propose concrete interventions.

Once implemented at the smallest scale the repercussions of the interventions will transfer up the scales with support from policy changes and effective collaboration.
After the vision has been implemented a process of reflection can begin leading towards another process of analysis and new improvements based on the outcomes from that research.



STRATEGIC PROJECTS

In order to showcase our strategic process two case studies have been selected.
The first is situated in the province's second largest settlement, the dense city of Den Haag, with particular focus being given to the former industrial area of Nieuw Binckhorst.

The second is situated in the much smaller, less dense city of Dordrecht, with particular focus given to the neighborhood of Wielwijk, which has great potential for densification, and the nearby Dordrecht Inland Seaport, an area of the Port of Rotterdam.

Key project locations

In order to showcase the strategy, two case studies have been selected to explore the applicability of the patterns. The first key project is situated in the province's second largest settlement, the dense city of The Hague, with particular focus being given to the former industrial area of Nieuw Binckhorst.

The second key project is situated in the much smaller, less dense city of Dordrecht, with its focus given to the neighborhood of Wielwijk. This neighborhood has a great potential for densification and the area of the Port of Rotterdam.
In this exploration of implementing the patterns, Binckhorst represents a larger city in the province and Dordrecht is an example of a satellite city.

Fig. 71
Location of cities with key projects

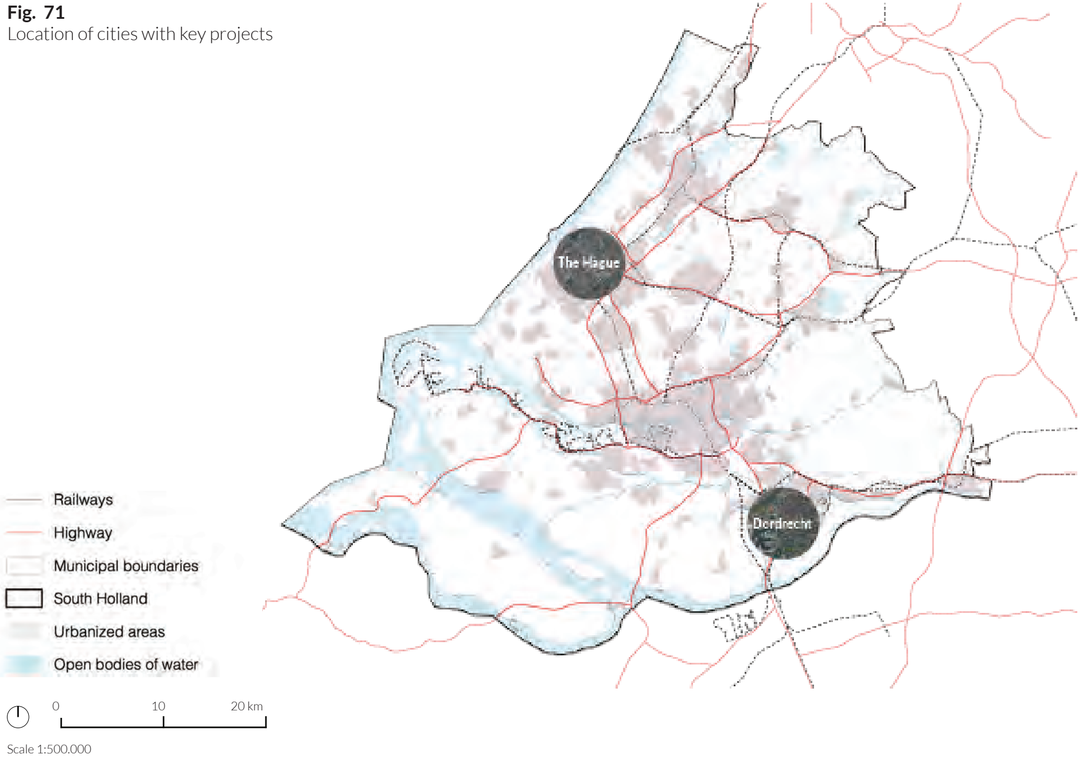


Fig. 72
View of Binckhorst, in The Hague
Google Earth, 2021

Fig. 73
View of Dordrecht
Google Earth, 2021

Large sized city, The Hague

The Hague is one of the two big cities in the province, with about half a million inhabitants. Close to The Hague's city center and the three train station is the Binckhorst located. In the second half of the 20th century, it has functioned as an industrial site, but it has shifted to office spaces and car companies over the years. The only industry left is the concrete factory. Its central location and unorganized use have led to the conclusion that the area needed to be transformed. Therefore, OMA was asked to make a master plan for the area in 2006. Back then, it was already clear that it would become a mixed-use area, which would house people. Since the Binckhorst is the only industrial location in the cities with access to water, it could become a big loss if housing would become predominant in the area.

The Binckhorst is an interesting location since it has the space to densify, something the city desperately needs. Still, at the same time, it has a high potential to serve the circular economy and maker industry. If the city decides to build houses, it will define how circularity can or cannot land in the city.

Medium sized city, Dordrecht

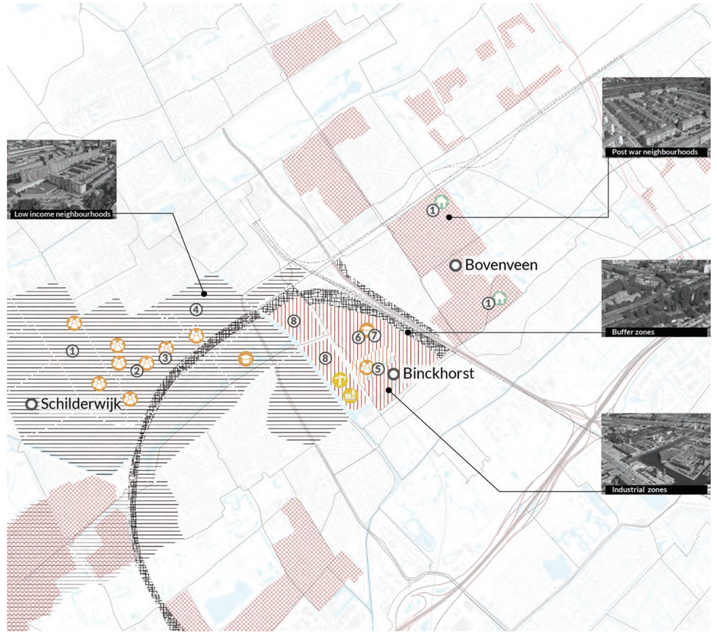
Dordrecht is an example of a satellite city in the province with a historic center and many post-war expansion districts. Dordrecht's location directly alongside the water and the proximity of the Biesbosch nature reserve, as well as its accessibility by train to the larger cities in the province, make it an attractive city for residential purposes. At the present time, the municipality of Dordrecht is working on a new vision for the railway zone of the area including a plan for 6000 dwellings (Mecanoo, 2021).

Moreover, because of its location on the Oude Maas river, it is directly connected to the port of Rotterdam. There is currently a plan by the Port of Rotterdam to work towards a more sustainable and future-proof port area. The main focus is on mass and bulk goods, logistics services and the maritime manufacturing industry (Port of Rotterdam, 2019).

Dordrecht is a suitable location for a C&D cluster with the presence of construction companies and the proximity to waterways, railways and highways. In addition, the area holds several potential neighborhoods for renovation and densification.

Strategic projects - Den Haag

Fig. 74
Neighborhoods of interest adjacent to the Binckhorst.



Neighborhoods

The scenario taken for Den Haag shows how the set of patterns can be applied in three neighborhoods; Schilderwijk, Binckhorst and Bovenveen

Schilderwijk is one of the poorest neighborhoods in the Netherlands with 70% of its residents being low income earners. In consistence with the earlier analysis, the majority of these residents are of non-western origin.

Binckhorst is a former industrial area that is in the process of being transformed into a mixed-use development. Multiple plans have been developed for the area but none has been fully adopted, leaving a lot of room for experimentation.

Bovenveen is a post war neighborhood in urgent need of renovation.

Stake holders present;

Schilderwijk and Bovenveen

① Haag Wonen- Housing cooperation
② OMA- Community center
③ De Mussen- Community center
④ VeE De Hobbeven – Residents initiative

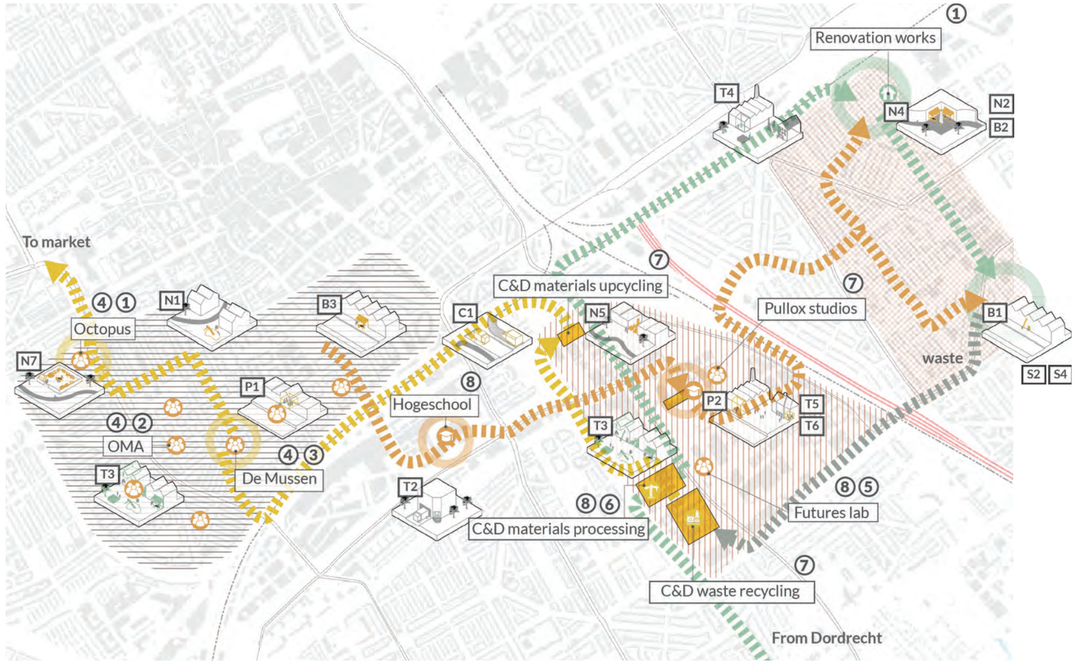
Binckhorst

⑤ Kenniswerkplaats (KIP) - Knowledge partnership
⑥ I'm Binck – Investments company
⑦ We think Binck – Market parties and private developers
⑧ ACCEZ- Researchers on circularity

Buffer zones
Neglected neighborhoods
Low income neighborhoods
Densification zones
Industrial zones/ harbour
Industrial zones

0 500 1000 m
Scale 1:30.000

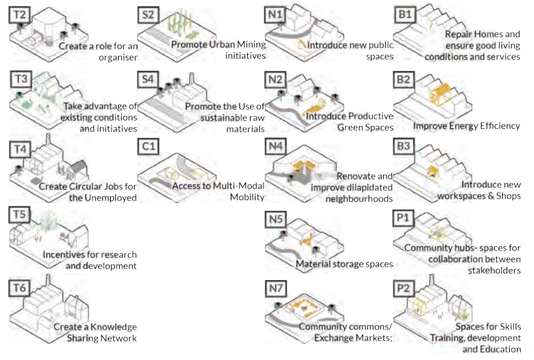
Fig. 75
Key projects in Binckhorst and the new flows of materials and people.



Railways
Highway
Municipal boundaries
South Holland
Urbanized areas
Open bodies of water

0 500 1000m
Scale 1:20.000

Set of Patterns applied



Inflow of biobased construction materials from Dordrecht
C&D waste from renovation sites
Products from upcycled C&D waste to market
Low income residents acquiring skills and gaining employment

Fig. 76
Key projects in Binckhorst

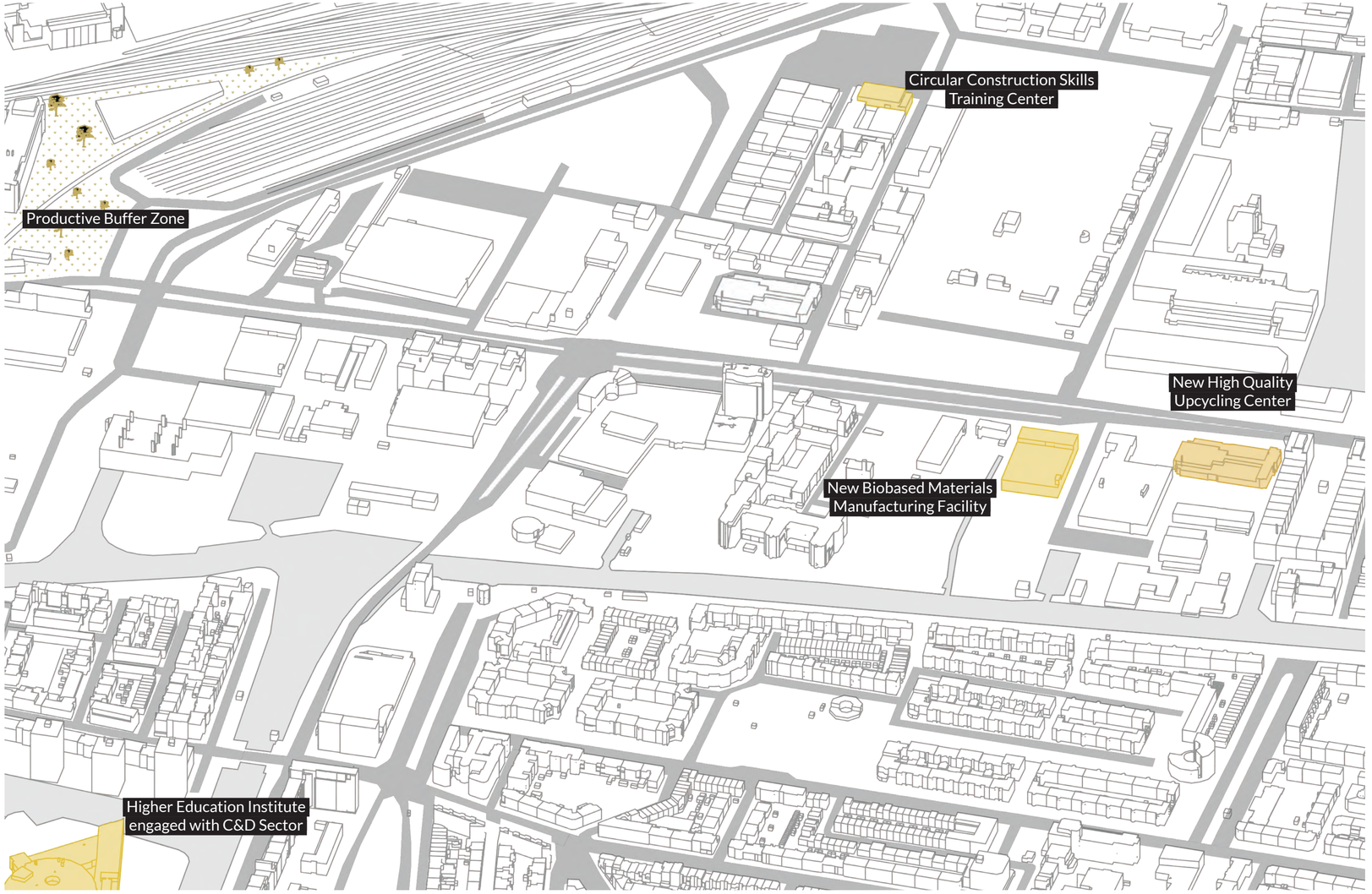
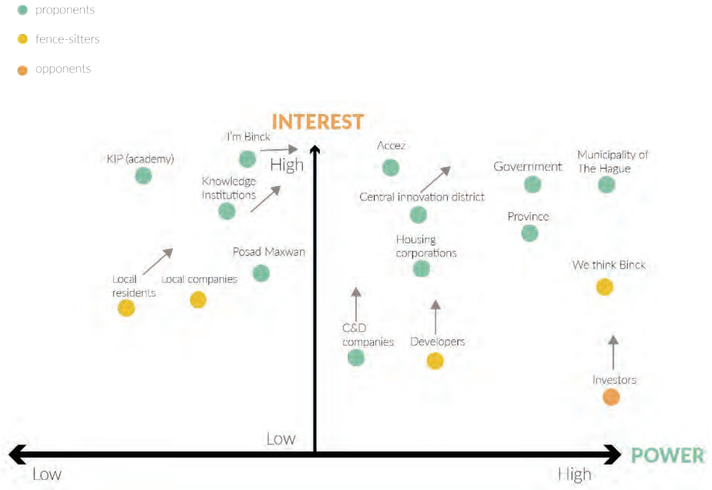


Fig. 77
Power X Interest Matrix for stakeholders

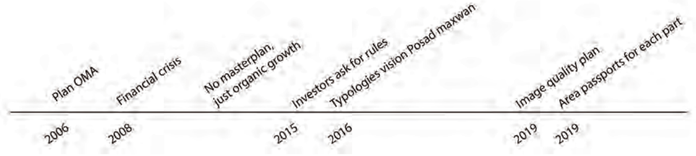


Municipality and Province	Keep informed	Offer better living/work environment
Central innovation district	Activate and inform	Offer better living/work environment
C&D Companies	Activate and inform	Gain profit
Investors/developers	Balance relation	Offer better living/work environment
Housing cooperations	Show consideration	Offer better living/work enironment
Local residents	Monitor, activate & protect	Better life
I'm Binck	Protect & inform	Better life
Knowledge institutions	Activate & protect	Offer better living/work enironment

What interest and power the stakeholders in the Binckhorst have and how this may change by applying the patterns, is shown in the power-interest matrix in the figure. At the moment, the stakeholders consists of a varied mix of public and private groups, nevertheless, have the investors the control about what is happening in the end. With the patterns, less strong stakeholders are given protection. These are the local residents, but also I'm Binck, an organised bottom-up movement in the Binckhorst. By informing and activating these public stakeholders, the will be better able to counter the private groups. As for the private stakeholders, it's important to balance the relation with them and try to raise their interest by showing the opportunities of the circular economy. The patterns are tangible enough to communicate with the private sector.

In total, we arranged one interview and one publication event with the essential stakeholders related to the Binckhorst in The Hague. These gave us a new layer of information, a more realistic layer. Both took long and were very interesting; we'll talk about it in highlights.

Fig. 78
Timeline of developments in the Binckhorst



POSAD MAXWAN
strategy x design

24-03-2021

Introduction

Posad Maxwan is an urban design office that made a typological vision for the Binckhorst in 2015/2016. We talked with Elbert Arens, a project leader, urban designer and architect of the company.

Interview

Elbert walked us through the different phases of the Binckhorst, which all started back in 2006 with the master plan of OMA. He explains that the plan became somewhat of a trauma for the area, mainly due to the financial crisis. Therefore, the Binckhorst became a place that would organically grow, "a philosophy that translated to doing nothing, at least for the municipality," as Elbert says with a smile on his face.

During this organic phase, multiple makers located themselves in the area, which is still one of the area's drivers. However, investors wanted to have more structure from the municipality. Therefore, Posad Maxwan was asked to come with a vision, which mainly came down to thinking about the typologies.

There is a plan for 5000 houses in the area, but Elbert explains that this is the only place where the city can expand. In other words, perhaps many more homes should be built here. Maybe 20, 25 thousand?

After talking with him for a while, one think becomes clearer for us; industry will make space for living. The industry is just too nuisance or smelly. The waste plant is going to be re-located, just like the concrete factory.

For us, it sounds like that "industrial living", that the area is promoted with, is a bit of a marketing tool since there will be little to no industry in 20 years if no one acts now.

As for the power relations between stakeholders, he says that they only come with an idea. He stresses that the other stakeholders need to believe in it and use it.
At the moment, the stakeholders are using area passports for each part of the area, in which they have visions on smaller scales. It's a pity since an overarching idea is apparently missing at this point, which translated into a divide on different levels.

Elbert does not exclude the chance that there will come a point that they will be asked for a bigger plan.

The second interview that we tried to arrange was with Accez, a research group that pushes the circular economy in South-Holland. They have an interesting position in this situation since they partner with private and civil stakeholders.

Instead of having an interview with them, they invited us for a so-called parade through a circular Binckhorst. It was a special occasion for us since almost every stakeholder that we identified was present.

ACCEZ
Accelerating
Circular Economy
Zuid-Holland

26-03-2021

The parade starts around 10 AM. We're welcomed and told that we'll attend four different approaches to interpreting the Binckhorst in the coming two hours. They want to make circularity in the Binckhorst something tangible.

In the first 30 minutes, we're told about the "Binckhorst beings"; direction posts out of circular materials pointing at all the different companies and places one can find in the Binckhorst.

In an interesting conversation, we try to find the deeper meaning of it. We talk about how the posts make people aware of each other and that the posts themselves had been a small example of collaboration, which is essential for circularity.

The next half hour, we listen to all the sounds one can hear in the area, carefully selected and mixed by a sounds designer. Everyone has their eyes closed. It's a mix of contrasting elements, nature and industry, big and small movements. Simply lively and beautiful.
An approach like this opens your world and gives you new ways to look at a problem. It was fascinating to see that they "dared" to show something so sensitive in a group full of "busy" people. I think it was exactly what most of us needed, after hearing the reactions of everyone.

In the next quarter, we see a visual artistic representation of the area. I think that everyone understood very well at this point what the organizers were trying to do; giving some human perspective on a problem that was technically approached 99% of the time.

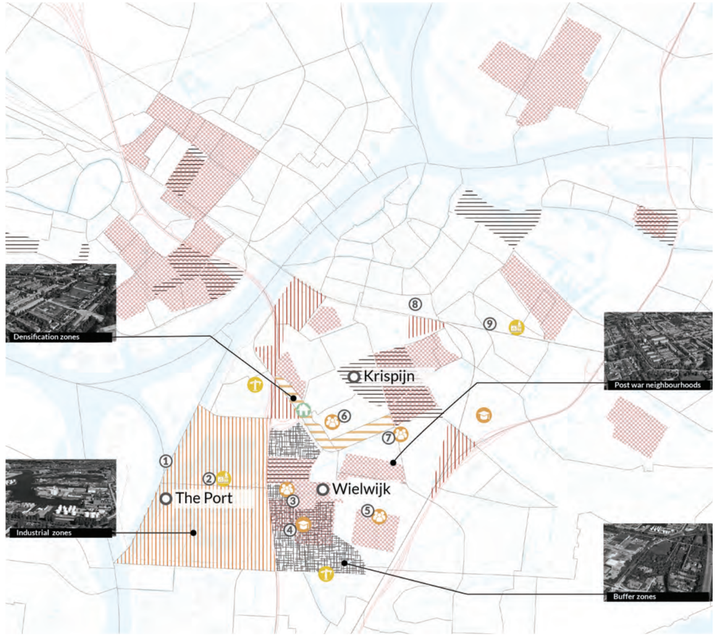
After the visual show, we are told about a more serious development. The makers currently in the Binckhorst, the ones who shaped the character of the location in the last 10 years, cannot stay under the current circumstances. That's due to the affordability of the place; the rent is getting too expensive for these people.

All and all, the Binckhorst is creative, raw, unique and beautiful, but all of it is fragile. If no one takes action, investors will take the lead, and the beloved character will slowly disappear.

On this day, we saw ten years of work and stakeholders together. We were not sure if we should be optimistic that the stakeholders have such lovely gatherings or worried that these motivating gathers still take place after so many years...

Strategic projects - Dordrecht

Fig. 79
Neighborhoods of interest adjacent to the Port



Neighborhoods

The scenario taken for Dordrecht shows how the set of patterns can be applied in three neighborhoods; Krispijn, Wielwijk and the Port.

Krispijn is inhabited by the working class, residing in low income & post war neighborhoods characterized by poor quality housing, low livability and relatively high unemployment.

Wielwijk district was built in the 1950's period and therefore has quite a number of old neighborhoods in need of renovation.

The Dordrecht inland sea port hosts and offers space for companies working in logistics and manufacturing due to its ideal location. The availability of plots for lease and ready infrastructure make in a breeding ground for innovation.

Stake holders present:

The port and Wielwijk

1. The port of Rotterdam
2. Julianahaven recycling - C&D recycling company
3. Wijkcentrum Admiraal - Community center Wielwijk
4. Stichting 't Bouwhuys - Educational institute for construction
5. Trefpunt de Nieuwe Stoof - Community center Crabbehof

Krispijn

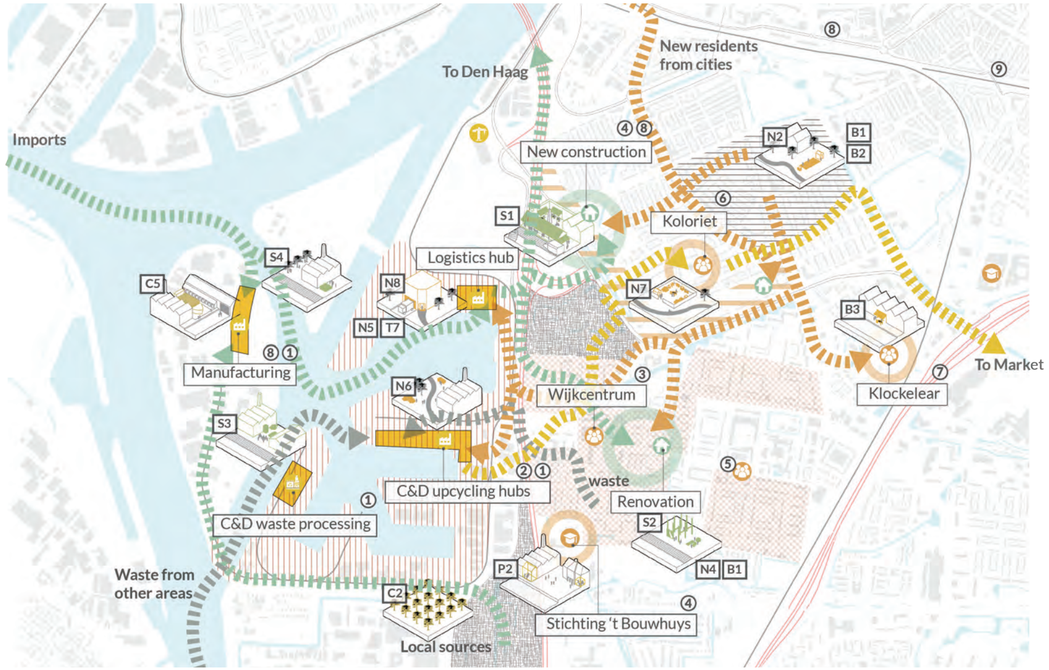
6. Wijkcentrum- Koloriet/kleurrijk - community center Oud-Krispijn
7. Wijkcentrum de Klockelear - community center
8. Stichting Ecoshape - Building with nature Initiative/ foundation
9. Stichting Spoorzone - Foundation and promoter of urban art & tech culture

- Buffer zones
- Neglected neighborhoods
- Low income neighborhoods
- Densification zones
- Industrial zones/ harbour
- Industrial zones

0 500 1000m

Scale 1:30.000

Fig. 80
Key projects in the Port and the new flows of materials and people.



- Railways
- Highway
- Municipal boundaries
- South Holland
- Urbanized areas
- Open bodies of water

0 500 1000m

Scale 1:20.000

Set of Patterns applied

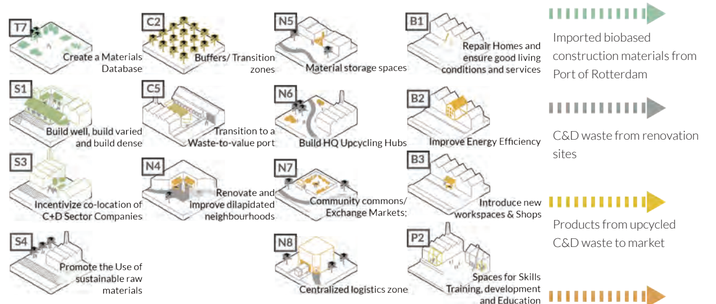


Fig. 81
Key projects in the Port

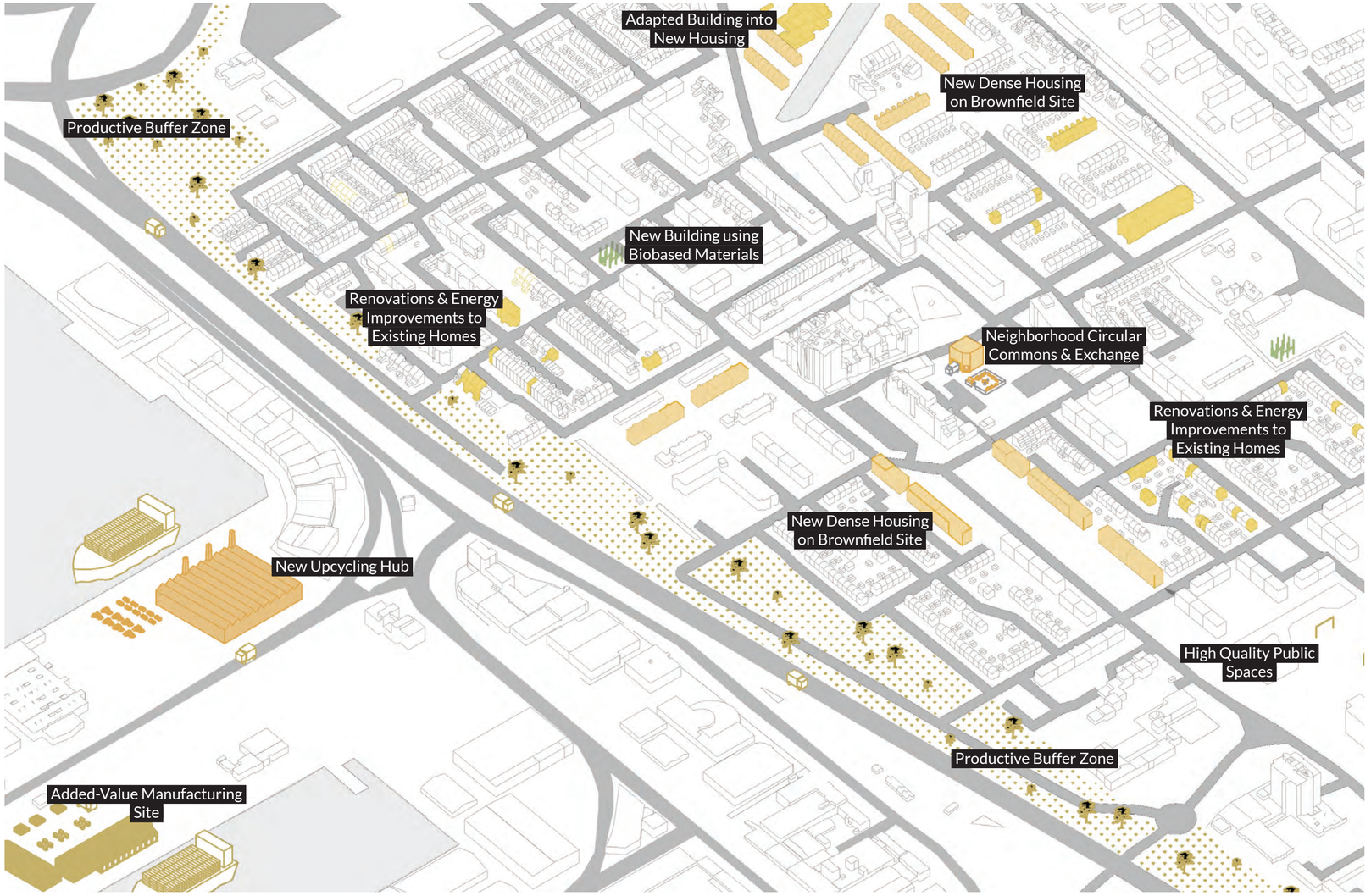
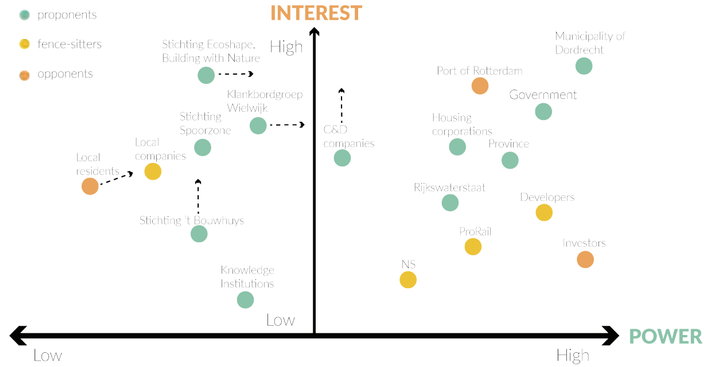


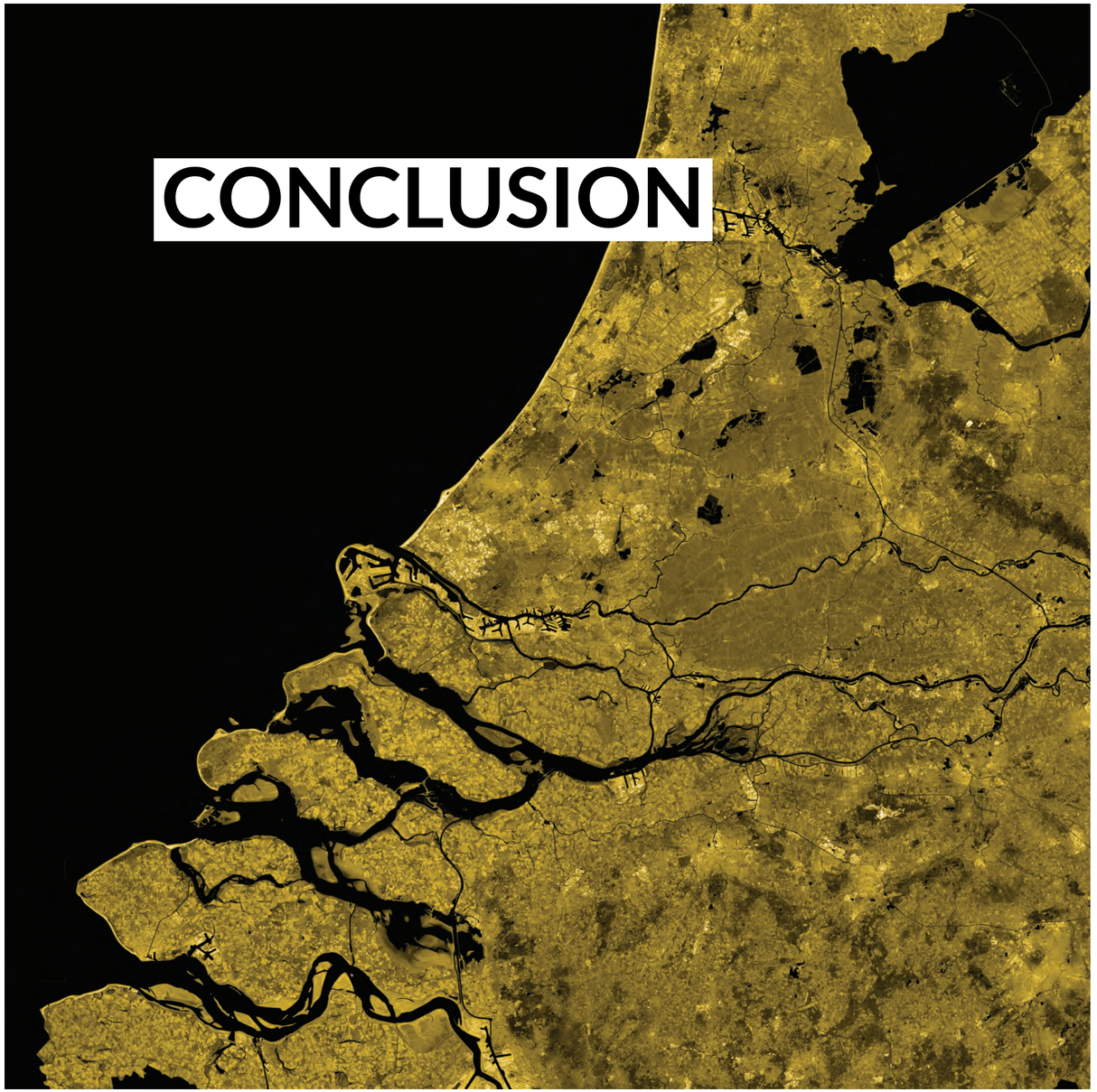
Fig. 82
Power X Interest Matrix for stakeholders



STAKEKHOLDER	TREATMENT	GOAL
Municipality of Dordrecht	Keep informed	Offer better living/work environment
Port of Rotterdam	Activate and inform	Offer better living/work environment
Developers/investors	Balance relation	Offer better living/work environment
C&D companies	Activate and inform	Gain profit
Stichting Ecoshape	Monitor, activate and protect	Offer better living/work environment
Stichting 't Bouwhuys	Monitor, activate and protect	Better life
Local residents	Monitor, activate and protect	Better life

What interest and power the stakeholders in Dordrecht have and how this may change by applying the patterns, is shown in the power-interest matrix in the figure. In addition, the table shows what the key stakeholders are, how they are dealt with and the goal that is pursued on their behalf. For example, it is important that the Port of Rotterdam is activated as a stakeholder and will allow C&D companies, such as the upcycling Hub, to establish themselves on their land. C&D companies can profit from this newly created working environment and this will increase their interest in the project. Furthermore, the Ecoshape Foundation will be activated to make circularity accessible to everyone. By involving residents more in the circular design processes, their power and interest will increase. And also a stakeholder such as Stichting 't Bouwhuys will get more power by the provision of subsidies for education, to enable employees in the C&D sector to acquire new knowledge and suitable skills.

CONCLUSION



To conclude, it's essential that stakeholders in the C&D sector become more aware of each other. It needs to be clear where materials become available and which new technologies are on the market. Circularity must be visible and tangible. The sector can develop into something transparent, which can be done by creating material passports, mapping flows, creating circular recycle hubs and provide open-source information for everyone. Gaps will become visible, which others can fill. With the provided patterns, it is possible to create a playground for society to act in and see what is lacking. The problems that the province currently faces are significant, but by playing open card and creating a guiding playground, there's a good chance of overcoming these problems.

Conclusion

The main question of this report: "How can The demand for affordable housing be met whilst facilitating a soft transition to a circular construction sector in South-Holland?" has been answered by three sub-questions. Each sub-questions was divided into sub-questions as well, which has been answered in this report in different ways. Each sub-questions will now be concluded, one by one, after which the main questions is answered.

1. What does the housing shortage in South-Holland look like, and how can it be answered?

Currently, there are 1.7 million houses in the South-Holland. Before 2030, 200.000 needed to be added to counter the demand. The current trend is that there is a high demand in the city centers of the biggest cities, leading to problems on the market and the city itself. Investors can make the most significant profit by buildings in these cities, which means that other facilities need to make space for living.

For the circular economy, that is a problem as well, since it's crucial that it becomes something tangible and visual. To stop companies being pushed out of the city and avoid cities becoming housing environments purely, densification needs to shift to smaller cities as well. With even better public transit connections, places like Gouda, Alphen aan den Rijn and Zoetermeer, need to become alternatives to the city.

2. How can you make sure low-income and uneducated groups have a place in the city?

As the demand in the cities rises, money plays a big role in whether someone can find a house in the city. People with a low income are pushed out of the central parts of the city. This trend divides our society, a division based upon income, which is often connected to someone's ethnic background and education.

To make sure that the city, society, and economy don't become something for the rich, this vision combines the circular economy with these deprived areas. That's done for a few reasons; by locating elements of the circular economy in these areas, new jobs will be available in the area, people without education can practically educate themselves in their own surrounding, but most of all, these areas will not be pushed away, instead looked towards to since the new economy is happening right there.

What does the current linear C&D sector look like, and how can it be transformed into a circular sector?

The current sector has been based upon linear thinking, which can be seen in almost every aspect of the process. Although waste is 95% recycled, it has not decreased the demand for new materials. One of the barriers is that companies are not aware of each other's waste, making it hard to use second-hand materials that would have been perfectly usable by others. Of crucial importance is it that the companies in the C&D sector become connected. This can be done by creating high-quality sorting and recycling centers and markets to buy it. If this is done well, at least 41% of the demand in the construction can be answered.

This means that about half of the problem is answered. The other half needs to come from biobased materials. Biobased has much potential since it could provide in this other half and at the same time capture co2, which would counter the climate problems. Another great benefit is that it endlessly grows; it will never run out in theory. One can think of wood, weeds and agricultural waste, which all can be transformed into usable insulations and constructions. It would mean that the way architects and builders think will drastically change, which is a big task.

Something that needs to be taken into account is the amount of space that these biobased materials take. When looking in isolation at the C&D sector, there is enough space, but other sectors need space as well. To avoid conflicts, space distribution needs to be carefully thought of.

Lastly, the main question: How can the demand for affordable housing be met whilst facilitating a soft transition to a circular construction sector in South-Holland?

The starting point of answering the demand is based on a socially just city and enough space for the circular C&D sector to exist. This means that within the big cities, like Rotterdam and The Hague, mostly renovations and transformations will occur. The space left is used for centralised logistic zones, upcycling hubs, construction and demolition companies and education and information centers. Cities like Gouda, Zoetermeer and Alphe aan de Rijn will be used for expansion.

The importance will, therefore, shift to the smaller cities. Within the big cities, the importance will shift towards the deprived neighborhoods, which will boost people's purpose in these areas. Jobs and other opportunities will come available now circularity is located in and around the lives of people. Circularity will be something people breathe when walking through their neighborhood.

All of this will be done in a so-called soft manner. In practice, it means that the current linear market will be the starting point of this transition. All stakeholder will be taken into account, and those with a weaker position defended. There's no master plan towards circularity in the strategy, rather boundaries for people to act in. With a soft strategy, there is space for people to take the initiative and do more than expected.

Ethical reflection

In the Soft transition's vision, the importance of becoming aware of each other and collaborating is stressed. Not only is this important for the sector in technical terms, but for us as human beings as well. Ignorance breeds intolerance. By bringing stakeholders in all ranges together, the tolerance for each other has a chance to grow.

Some stakeholders need to be protected in this process. As currently visible, fall many groups victim to the market and the companies greedy attitude towards money and profit. Therefore, the groups that need to be protected are economically weak and low educated. The vision connects deprived areas with the circular economy. It gives groups without education opportunities, in order words, hope, meaning, purpose and most of all, something to be proud of, which is critical for the balance in our society.

Besides, from the start has soft planning been the premise. In times where climate catastrophe is on its way, time is a precious thing. Giving people time, in the form of a relatively slow transition, is a difficult decision. There is a chance that the society will not change fast enough, and we'll have to deal with flooding, extreme weather and all sorts of other problems.

Maybe the government should come with more extreme measurements, but the fact is that our society is just not ready for it. Giving people too short time will not change that situation. Besides, you exclude people that don't adapt. All and all, do we believe that it's better to keep calm, include everyone and make the best out of what we have. Therefore, the Soft Transition.

Group reflection

With this vision, we have provided a playground for stakeholders to act in. It's an approach that puts trust in stakeholders and gives space for initiatives. Due to the current circumstances, this is somewhat of a gamble since the consequences will be major if the sector doesn't adapt fast enough.

Whether the sector is changing fast enough is difficult to control either way, especially since there is no direct climate danger. At least, not in the Netherlands. The government can decide to come with more restricting rules, but for now, we believe that it's better to put trust in people.

There will be a point that the soft approach suggested is not appropriate anymore. Therefore, the phasing in this report is important. In the phasing are multiple reflection moments integrated. In combination with the phasing for each pattern, it can be checked to what extend the approach is functioning. If checkpoints are not achieved, we suggest moving to a more controlled environment, where the playground is smaller.

As for the patterns, the ones suggested at this point resembled the expected needs in this moment of time. The reflection moments are there to see whether patterns became redundant or new ones need to be added.

Limitations and recommendations

There are three elements that need to be investigated as a follow-up of this vision; the upscaling of biobased materials, the shift in thinking and the consequences of keeping light industry in the cities

The implementation of biobased materials on a large scale, as mentioned before, is space demanding. That means that there is a chance that not enough space will be available in the Netherlands once every sector has taken its fair share of land. This would imply that the materials need to be imported from other countries, which could lead to unwanted externalities. Besides, the whole sector uses different materials at this moment, people need to be retrained, and new ways of working need to be thoughts to everyone involved.

The latter also applies to the presented vision for circularity. The sector needs to be entirely reshaped, and companies might need to re-locate. Research needs to be done on which locations would be most suitable for clustering.

As light-industry will remain in the city, new rules to be made regarding noise and pollution. In some areas, there will be more disturbance than others, which should be allowed to a greater extent than is currently is the case. This asks for a shift in how we think of the city.

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APPENDIX

Individual reflection

Isabel van Ommen

The ‘Soft Transition’ attempts to make a soft transition in the construction and demolition sector towards circularity. It is constantly looking for the balance between leaving room for changes in the planning of urban development and, on the other hand, clearly defining the boundaries of the work field. The project is now relevant for the province of South Holland, because after various analyses of the policy documents, it became clear that the targets for Circular South Holland in 2050 are set, but concrete plans on how to achieve this are still lacking. At the same time, the province is faced with the huge task of adding 200,000 houses.

Merging our vision for a soft transition with the goals for the province was done by forming a development strategy. In the lecture ‘From Vision to Strategy’ by Balz (2020), she explains: “A spatial vision for the region and its vicinity promotes a desirable future and guiding principles for development strategies. This associated development strategy consists of a series of spatial interventions, key projects and spatial policies” (Balz,2020). It is also important that the strategy can be implemented at all scales, be it the scale of the province, the city, a neighborhood or a building.

In order to apply this multiple scales strategy, we have composed patterns in the project that are ordered by the different scales. From the Cities of Making report, we learned that a set of patterns is an attempt to generate tools for urban development that can be understood by everyone.

We also discovered that for both the Soft transition and the patterns, it is important to build on what is already present in a location. This applies to spatial objects such as locations and buildings, but also to any civil society groups. By building on what already exists in our key projects, the chances of the project being successfully implemented in real life are increased.

Nevertheless, there are areas for further improvement that could be the subject of further research. For example, more research could be done on the local production and use of biobased materials in the province. Further exploration of the flows that would then change in the C&D sector would be valuable. Also, the economic feasibility of this project could be explored more, as much is still flexible this would be difficult to estimate, but an investigation into the possibilities of mapping this would make our project stronger.

As a conclusion, this project for the province of South Holland has given me an insight into the complexity of regional design. Forming a strong coherent vision is key and while building on the vision to strategy, you constantly have to switch between scales. It was also very interesting to go deeper into stakeholders, how do they really relate to each other and on how to use planning instruments to engage them in the project. These are all skills that can be used not only in regional design, but in all scales of design.

Luiz Felipe do Nascimento

The following paragraphs intend to reflect on the role of spatial planning in designing complex economical and societal aspects that can be translated to spatial dimensions.

The transition to a circular economy predicts the existence of a network of actions that are multi-scalar. On a larger perspective, from the scale of the entire world (considering the strategic position of the Province in the exchange of capital and materials due to the relevance of the Port of Rotterdam) to the scale of the EU and other European countries (distributing goods that arrive and leave the continent via the Port) and of the Netherlands (managing the exchange of flows, capital and residents between the Province and the rest of the country, considering the strategic location of its main cities in the Randstad). Lastly, on a smaller perspective, from the scale of the Province to Cities (identifying and proposing networks of cities and institutions that can work on an intercity basis) and the spatial implications in the form of strategic projects that operate on the scale of neighborhoods.

As the brief of the task was presented at the start of the quarter, the number of different actors involved and spatial consequences of the transition towards a circular economy were still to be revealed. As weeks went by, it became clear that to achieve a fully circular province in 2050, profound change needed to happen in all sectors. This entails not only shifts in economic and trade policies, at the provincial, national and European levels but also an enormous impact on the way land is currently used and managed in the Province.

It was important to acknowledge the objectives and goals that the Province has to comply with to become fully circular while keeping possibilities open and adaptable due to the uncertainty that surrounds every aspect of the transition. Such a large change in production and consumption in such a short time is unprecedented: there is no how-to-do guide on the road towards a construction future.

Our proposal, The Soft Transition, emerges precisely from this uncertainty. How could we plan for the future, if we do not know what it holds? How not leave anyone behind in this process? How to guarantee that the transition is done properly, balancing social inequalities, avoiding possible profound impacts on groups of citizens and nature that already profit little from the gains of the capital of the Dutch economy, disproportionately carrying the burdens of economic prosperity?

Those questions led us to design an open-ended proposal, capable of adapting the specific contexts and times, avoiding being generic at the same time. Alongside the implementation of the sets of patterns on the Province or specific locations, coordination, management of expectations and dialogue are key for the successful transition. This is put forward by the idea that in the Circular Economy gains and losses are not only measured in GDP but also prosperity, equality, and justice to humans and nature alike. No stakeholder can operate the transition alone. Especially the Government, which should go soft on imposing policies and proposals that emerge from the top to the bottom, but hard on complying with common and shared goals that are beneficial for all.

Concluding, this proposal is defined by the innovative view in which it proposes spatial transformations. No final blueprints, but lots of room for discussion and reflection between stakeholders.

Matthew Roberts

A circular construction sector now appears inevitable. Over recent years government and civic organisations alike have made huge strides by declaring their intentions to tackle climate change and go circular before the end of this century (and in many cases well before that). Thankfully, they have also backed up their words with concrete targets and actions, in this respect the Netherlands, a nation unable to escape the dangers of climate change, is leading the way.

Those targets and actions have begun to materialise into initiatives and policies which will ultimately lead the nation to circularity, from a technical standpoint at least. However, detailed ideas appear to be lacking on how exactly the circular transition can be mobilised to solve problems beyond the obvious boundaries of climate change, particularly those problems of a socio-spatial nature.

Our team established early within the process that linking socio-spatial justice to the circular construction transition might allow us to simultaneously resolve aspects of both challenges, and by including the challenge of housing within that formula we might achieve greater success and more holistically effective responses than we would have done through resolving any of those issues individually.

Once these links had been made the issue of designing a strategy came to the fore and perhaps an anecdotal summary of this process from our research could be that "designing a regional development strategy is easy, but implementing one is hard".

This realisation ultimately led us down the path to conclude that a circular revolution was not what was required, in fact a softer touch and a circular evolution would be the approach most likely to deliver meaningful changes.

The Soft Transition sought to design a process for development more than a comprehensive development strategy, the key tenet of the idea being stakeholder engagement within an organizer-led forum of deliberation and reconciliation at the scale of a personally-understandable neighborhood or area.

The recognition of the functional connectivity between neighborhoods, companies and actors across space and scales is made tangible by the use of a set of patterns. They are intentionally simple enough in nature to engage the individual resident as much as the multi-national corporation, and remind them that they occupy and affect the same space, each having the ability to mold its development and share in the potential benefits of an effective and collaboratively-built neighborhood, city, province and world.

Priscilla Namwanje

Through the Spatial strategies for the global metropolis studio, I have gained a new appreciation for planning as an iterative process. I suspected that the process of this design task would follow a logical sequence; analysis, vision then strategy. However, the Soft transition project adopted a different route; beginning with the vision, defining the key themes then working on the analysis and strategy back and forth till completion. . Additionally, working in a group of five this closely yet virtually exposed me to the reality of the urbanists profession; teamwork. I now realize that a successful design process requires as much collaboration and networking as is possible between the project team.

From the onset, the soft transition project focused on how the province of South Holland could implement circularity within the construction and demolition sector. In line with the European green deal of a just and inclusive transition that leaves no one behind (European Commision, 2019), our project took the stance of basing our analysis through the lens of socio-spatial justice.

A virtual site visit, simulated the real world experience of a planner, in that the opportunity to physically visit the site is not guaranteed. A key observation during the visits were the projects and initiatives that seemed to be pioneering change in a different direction, albeit unnoticeably. An occurrence we termed as 'a soft transition'. The task that lay ahead was to uncover what a soft transition would entail.

Understanding it as the in- between processes between the desired future and less desirable present meant an in depth analysis of the current situation; which in this case is the linear construction and demolition sector. It also meant a definition of the best possible outcomes, packaged as a vision. We discovered that in order to facilitate a soft transition to a circular C&D sector, we have to build on existing initiatives. As a result, the dynamic of managing stakeholders became central to our discussion. We explored the power dynamics between different stakeholders and which strategies to engage them with, a process that helped us learn how to identify what tools a planner has at their disposal. We also gained an appreciation of the market forces at play and how they can affect the project implementation. An investigation of the governance structures, especially those in metropolitan regions exposed the existing loopholes that present as an opportunity to introduce new bottom-up approaches within the planning confines.

The strength of this project is that it centers socio-spatial justice in the discussion of circularity, and proposes innovative ways in which urban and regional planning as whole can evolve to become more adaptive and flexible. Our project proposal is by no means a solution, but rather and exploration and discussion on how to include soft and adaptive planning principles within the mainstream discussion on regional planning and design.

Robert van Overveld

Starting with the regional design felt like stepping into the unknown. The complexity that comes with thinking about this scale in relation to peoples' daily lives has often left me in awe. It's a scale that demands a broad understanding of the functioning of our society. It's a crucial scale for an urbanist since it lays the boundaries for the smaller scales.

When starting this project, it took us a while to understand what the current situation was. We didn't know which scale to find the answers that would help us understand our basis. This, therefore, has been a trial and error process, where we tried to find links between the information and theories that we stumbled upon.

This resulted in believing in one thing for few days, after which our whole course would change in a new direction when someone would find a new piece of information. At some point, I came across "Foundries of the Future", which uses patterns and a pattern language to organise the circular economy that we were striving for. At the time, we were trying to find such a system ourselves. It was a game-changer in our work to find these patterns and to see how they were used. We were able to link this information with the work that we had been doing so far.

Over time our vision shifted from giving answers to asking questions and creating a zone for people to act in. I experienced this as a major relief for me personally as well. Trying to find answers to complex questions for weeks had left me often clueless about what would be the best thing to do. Loosening our approach and moving to soft thinking created the space we needed to work towards the final product.

The lectures and workshops of the spatial development strategies (SDS) have genuinely helped us understand how we could interpret our work. Besides, seeing others' work has also let us realise that there were many elements that we were spatially not including. This became especially visible when thinking about the space biobased materials would need.

In conclusion, working on this scale has made me conclude that one should not seek answers but rather be curious about what one can observe and combine. Besides, leaving space for others to act and think brings new perspectives to what you're doing yourself.