A FLOATING CIRCULAR FUTURE

Utilizing the changing landscape as a driving force to a circular economy

AR2U086 R & D Studio
Spatial Strategies for
the Global Metropolis

AR2U088 Research and Design
Methodology for Urbanism

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Lem, K. (2020)

Acknowledgements

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“One day, we will give this land up to the waves with a sigh of relief.”

“Eens zullen we dit land met een zucht van verlichting aan de golven prijsgeven.“

- Johan van Veen (1893 - 1959)

‘vader van het Deltaplan’

Quote: Bregman, R. (2020)
Image by author

ABSTRACT

While attempting to find an answer to the question of how we could become sustainable and circular by 2050, we discovered that it was quite difficult to even imagine what South Holland, the Netherlands or the world, for that matter, would look like. The questions that arose quite quickly were, among others: how many people will live here then? How will we have dealt and continue to deal with the challenge of sustainability? How will the climate have changed? This resulted in the question that guided the rest of the research: will we still be able to live here? The process starts with the acknowledgment that climate change is a serious threat to us and the way we live. Then there is the realization that it does not make sense to imagine a future in which the economic structures have changed, but the landscape and the way we deal with this threat has not. From this, we continue to envision South Holland in 2100, to see what the landscape could look like and how the circular economy and its activities could exist within it.

While drawing up this image, the answers to the questions of flood risk and circularity are not found separately, but sought in the creation of synergies between different sectors and layers. The idea is that the transforming landscape can be a generator of change within the agricultural sector and energy production as well. If the environment changes, the ways in which we use, inhabit or move through it will shift, too. The resulting strategy is about protecting what is crucial, using what is possible and letting go of what we can. This is all strived for in order to reach our goals of having South Holland protected from floods and sea level rise, a circular and sustainable agri-food sector, 100% clean and renewable energy and increased environmental health, all while taking into account the (societal) challenges of the century.

key words: circularity, flooding, climate change, resilience, delta

Image by author
with input from Google (n.d.)

ASSIGNMENT

The brief we received for this project is focused on the creation of a spatial vision and development strategy for the province of South Holland. More specifically, the strategy and vision should be dealing with the question of how to become circular by 2050. Which processes need to change in order to do so and what are the spatial implications of these changes? In this envisioned future, there should be a better balance of economic, social and environmental gains as opposed to the linear model of economic growth that has been predominant thus far.

As regional design concerns a large group of diverse parties, the vision and strategy should also touch upon how other matters will change in the transition to a circular economy. Therefore, the proposal also touches upon material flows, makers industries, the role of the port, urbanisation and development of delta landscapes. In doing so, there should not only be a focus on *what* needs to be done, but also on *how* this should be reached and for *when* these things should be planned.

To be able to steer the research more into one particular direction, some possible thematic focus subjects were given at the outset. Despite the aspect of circularity already guiding the work, there are many ways and sectors in which this principle is applicable. The thematic focus subjects were therefore composed of a circular construction- and demolition sector, a circular agri-food sector and a bio-based chemical sector. To safeguard the beforementioned balance of economic, social and environmental gains, there was also a focus on socio-spatial justice within the project.

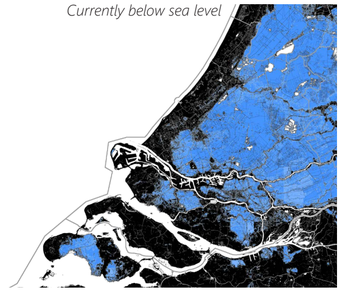
Image by author

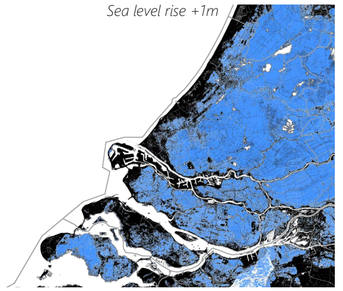
PROBLEM STATEMENT

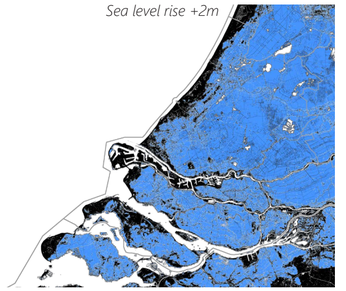
Flooding is an inevitable future and we need to develop solutions and systems to tackle this upcoming challenge.

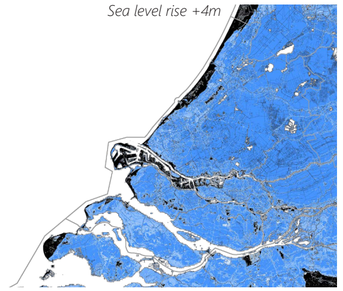
The collage opposite presents a sneak peak of the future if we don't make any plans to deal with it.

Adaptation is not the solution, we need to envision









Images by author
with input from AHN (2014)

Does it make sense to think about a circular system when we know the landscape will not be the same in less than a century ?

Let's envision 2100 as a flooded landscape...

What will the circular economy - and its activities and flows - look like in the upcoming flooded landscape ?

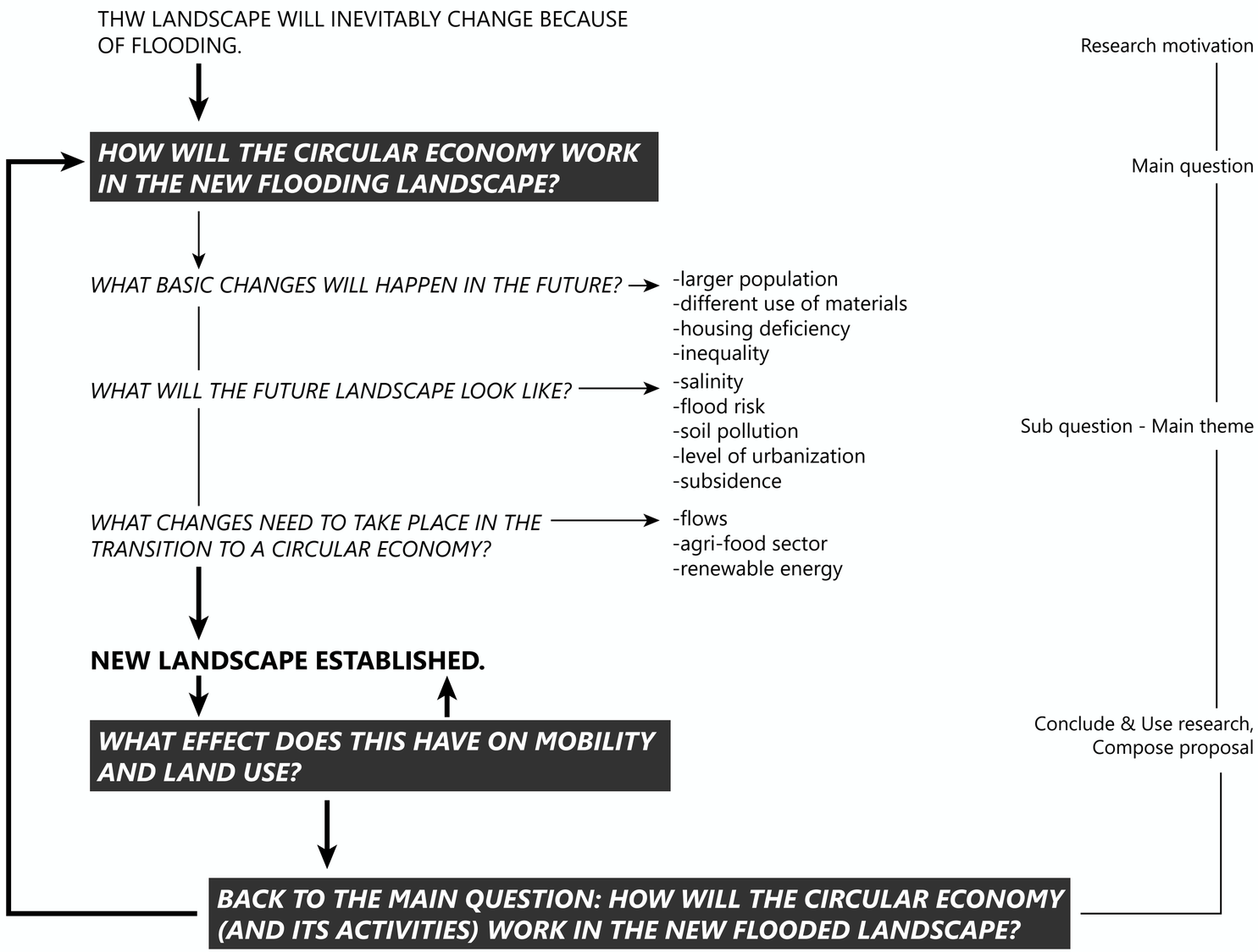
Image by author

THEORETICAL FRAMEWORK

This research is based on the inevitable problem of flooding in the future. The Netherlands has been fighting with the flood for a long time, but during recent years, more and more evidence has shown that sea levels will not stop rising for next century. To avoid the fight which man are going to lose, we try to work with the flood and accept them to a certain extent. Based on this, we tried to figure out what opportunities this new landscape can bring to the circular economy. That leads to our first main question: How will the circular economy work in the new flooding landscape?

To get the answer to this main question, several sub-questions need to be answered first. We started form bottom to top: What basic changes will happen in the future? This question is mainly focused on the human sector and societal changes. Larger population, housing deficiency, people's awareness of sustainable life are some basic changes that will happen. Secondly, the future landscape needs to be defined more clearly. Sure we will accept flood to some extend, but it needs to be decided carefully where it should be flooded. To minimize the loss, land that has fewer value and is already low-quality will be flooded. Last but not last, the circular economy is also taken into account for the future plan. We selected two sectors that we thought are most closely to the future landscape and circular economy, that are: energy sector and agriculture sector. Flows of economy are definitely going to change with new established network.

To conclude, this research is aimed at figuring out how the mobility and land use will be effected by the new landscape. If we focus on the synergy between the new landscape and circular economy, then we may find a new way for the future.



APPROACH

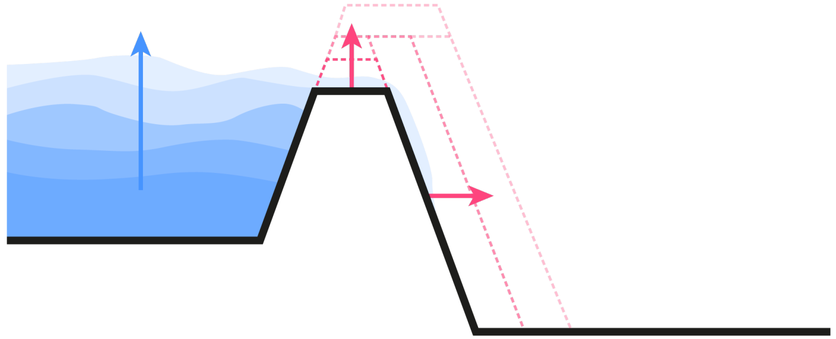
Why don't we move everything to East? There is more than enough to fight for in the West part of Netherlands!

We need the space as it is already scarce, we cannot just make a new Randstad.
However, we have to do it in a balanced way, so that it does not turn a blind eye to sea level rise and the risks that come with it. This project is a project of acceptance. Accepting the fact that the sea level is rising and will continue to do so, and try to develop a flooded circular.

For people to understand that we will not be able to keep the landscape as it is forever, there is going to be a turning point either way. We want to be able to control this turning point by designing it ourselves, instead of putting it off until it will become a destroying crisis in the future. This is a transition towards a more healthy relationship with the water.

The new flooded landscape will still be valuable and because of our plan, a lot of the risks that are there now will actually be averted. It will also have a new and exciting characteristic that will attract future inhabitants and investors.

Image by author



Raising the dykes will bring ever-raising financial costs, just to be able to keep doing what we are doing. This will secure us for sometime, but it is not a very durable solution, as there will come a time in which our current way of living is not maintainable anymore.

We could also work with the water instead of trying to fight it. As we know this is a fight we would eventually loose, it is worth investing in a long-lasting solution.

By inviting the water in and creating new types of productive landscapes, we are given the opportunity to innovate and pioneer in new forms of agriculture and energy production. This will not only accelerate the needed change in becoming circular, but could be the solution to other societal problems as well.

We cannot build dykes forever, therefore we should invest in a long-lasting solution that could benefit the circular economy, to tend towards a sustainable future.

The new emerging landscape can be a catalyst to develop innovative structures in the economy and pioneer in the agri-food and energy sector.

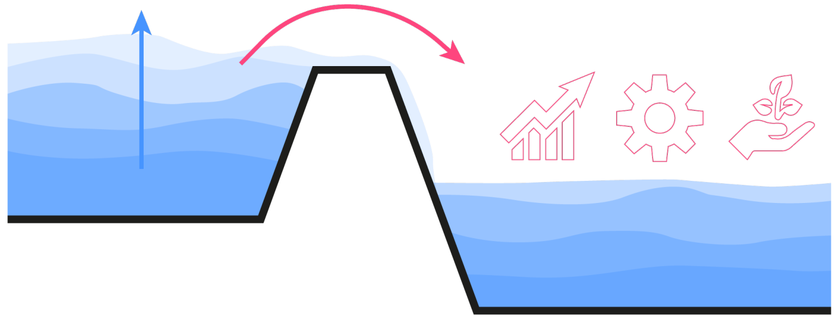


Image by author

GOALS

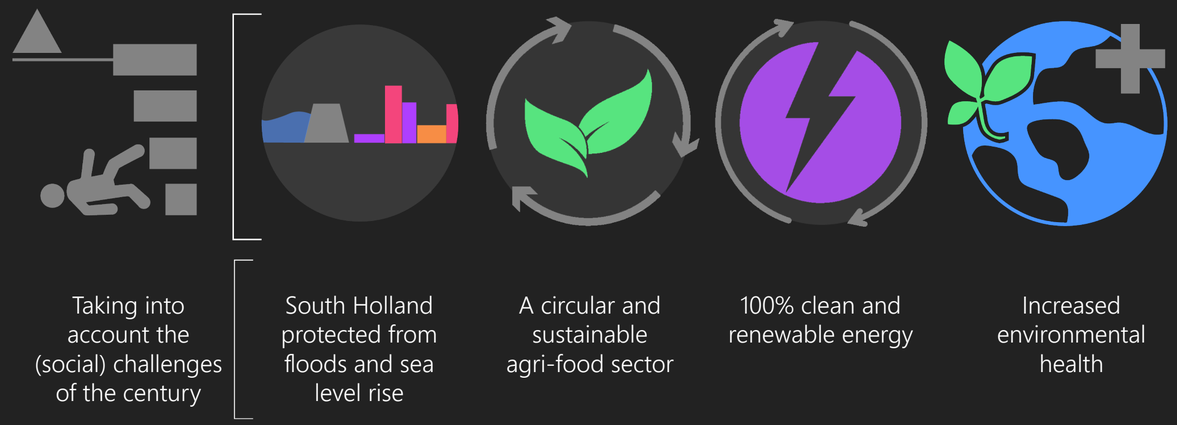


Image by author

South Holland protected from floods and sea level rise

As we acknowledge as sea level rise as one of the biggest threats for South Holland in the coming decades, we feel that it is of the utmost importance to set this as one of the main goals within the strategy. Of course, this is not a goal of which the possible solutions stand on itself, therefore this goal should be answered to in all aspects of the plan one way or the other. Only if we can protect South Holland from floods and sea level rise, will it make sense to alter our ways of living on the land.

100% clean and renewable energy

Though the use of 100% clean and renewable energy already is almost seen and described as a self-evident future, the way in which this is accomplished is important. As we need energy to make transitions too, it is wise to explore where and how synergies could be formed between the changing current (infra)structures and landscapes and energy production. Setting this as a goal ensures that there will be an uninterrupted search for ever-innovating ways of producing energy.

A circular and sustainable agri-food sector

With such a large part of the land in South Holland dedicated to the agricultural sector, there are great opportunities for rethinking the structure and processes that exist within this sector. It might also be one of the most challenging sectors to change, as it involves all types of stakeholders changing their habits and ways of thinking. It will probably take radical change to get things done in this sector, which is why it perfectly accompanies the concern of climate change and flooding.

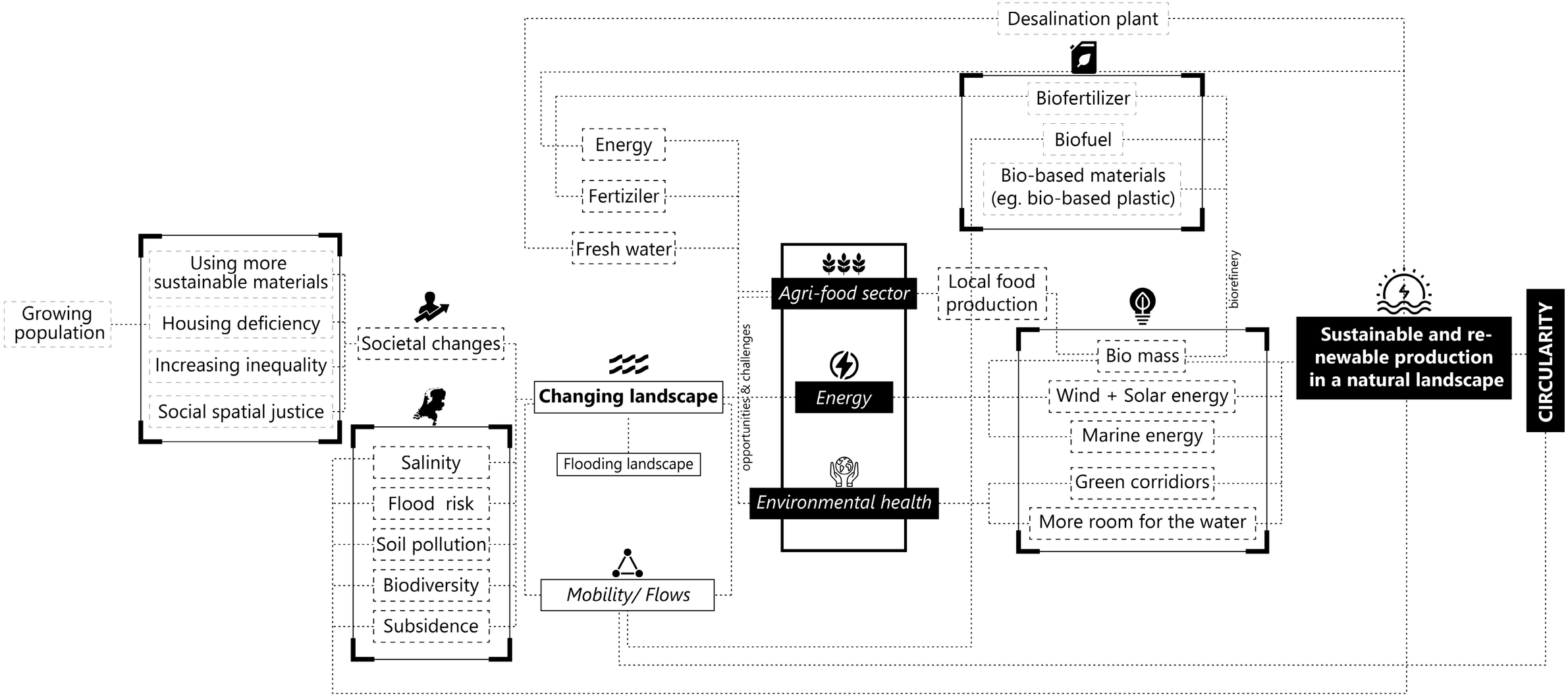
Increased environmental health

As the problems this challenge addresses are all closely linked to sustainability and climate change, it is important to not only seek solutions to the arising problems, but also to find ways in which we can diminish future problems arising. If we want to diminish the harm climate change can do us, we have to safeguard environmental health and value it as important as our own health.

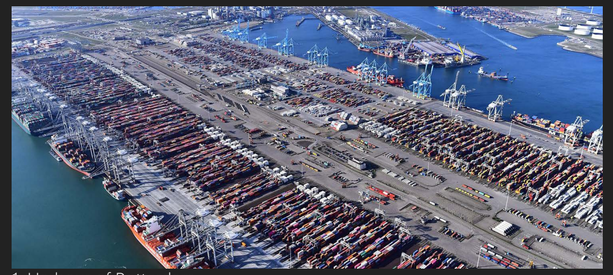
Taking into account the (social) challenges of the century

Besides the goals as set above, there of course are other factors of importance while trying to accomplish them. This is why we investigate the interplay between societal processes and flood risk, the agri-food sector, energy production and environmental health, too. After all, the transition will only ever be able to happen if the (societal) circumstances allow for it.

CONCEPTUAL FRAMEWORK



ANALYSIS // SOUTH HOLLAND

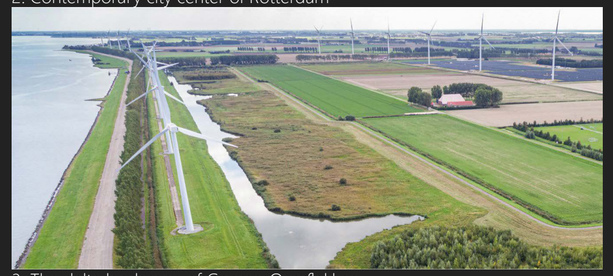


1. Harbour of Rotterdam

5. Greenhouse landscape of Westland

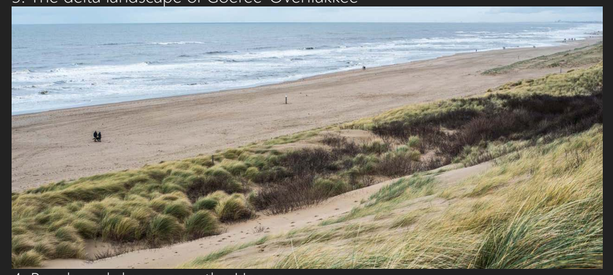
2. Contemporary city center of Rotterdam

6. Historic city center of the Hague



3. The delta landscape of Goeree-Overflakkee

7. Reeuwijkse plassen near Gouda



4. Beach and dunes near the Hague

8. Windmills at Kinderdijk

The project location is the province of South Holland, but what does the province actually look like? By compiling photos of several places within the province, an overall view of the diversity in landscapes becomes apparent. The province is not defined by one characteristic, instead, it is an amalgamation of various kinds of historic, natural and industrial landscapes that co-exist next to each other.

Image by author
with input from PDOK (2012)

1. Cornelissen (2019)
2. Springer Real Estate (2020)
3. Gemeente Goeree Overflakkee (2018)
4. Herrebrugh (2017)
5. Hortipoint (2017)
6. World Travel Images (2013)
7. HollandLuchtfoto (2019)
8. Rotterdam Experience (2016)

ANALYSIS // LAND USE

To be able to state anything about the way in which the province of South Holland works, it is important to identify some basic composing elements first, starting with the land use. As can be seen on the map, the land within the province is most of all used for agricultural purposes. The map also shows very clearly that there is a distinction between urban environments, which are all closely interconnected, and the outskirts / farmland.

Legend

- Forest
- Natural landscape
- Agricultural land
- Dry natural landscape
- Industrial
- Greenhouses
- Infrastructure & Semi-built
- Built / Urban

Image by author
with input from PDOK (2012)

ANALYSIS // CHANCE OF FLOOD

As one of our goals is to protect South Holland from flood risk, we researched thecurrent risk of flood at first. Though these risks are currently small, the map draws a clear picture of which areas could become problematic while the sea level rises and which areas would be safe.

Legend

- Extremely small chance: 1/30.000 per year
- Very small chance: 1/3.000 to 1/30.000 per year
- Small chance: 1/300 to 1/3.000 per year

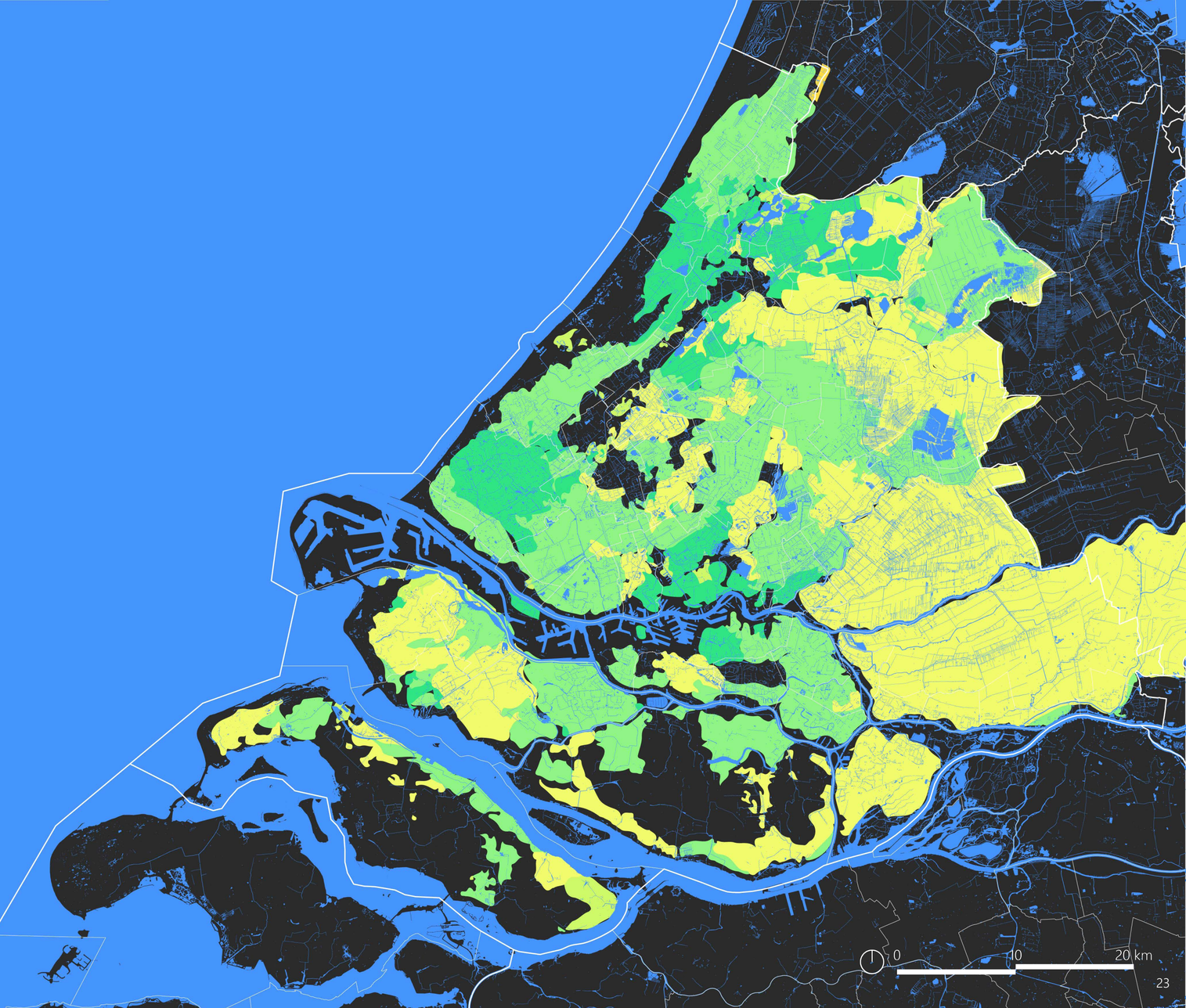


Image by author
with input from PDOK (2012), Lizard & Openstreetmap Contributors (2019)

ANALYSIS // SALINITY

As problems with salinity will only become bigger with climate change, sea level rise and subsidence, we see it as a threat, too. Salinity causes problems for the industry, drinking water, electricity production and agriculture (Boer & Radersma, 2011). Also, the landscape will inevitably change, so it could be of harm to biodiversity as well. We should therefore explore solutions to deal with salinity, if we want to preserve these different sectors and landscapes.

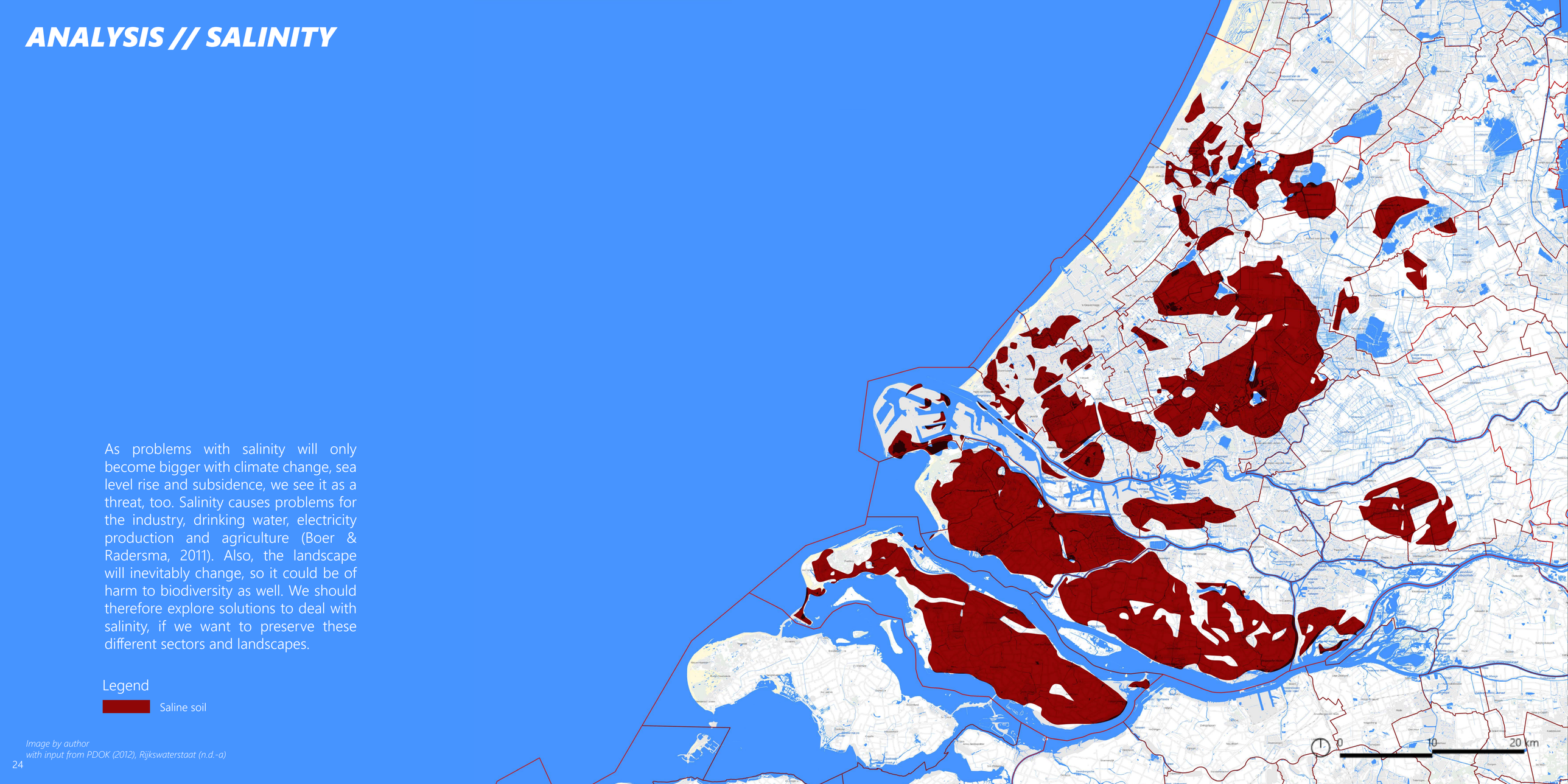


Image by author
with input from PDOK (2012), Rijkswaterstaat (n.d.-a)

ANALYSIS // POLLUTION

Soil pollution caused by heavy metal in South Holland is mainly concentrated along with coastal areas, including major cities such as Westland and Leiden. The pollution level in the port of Rotterdam is relatively low.

Legend

The percentage that soil polluted but heavy metal

- >50%
- 50% - 25%
- 25% - 0%

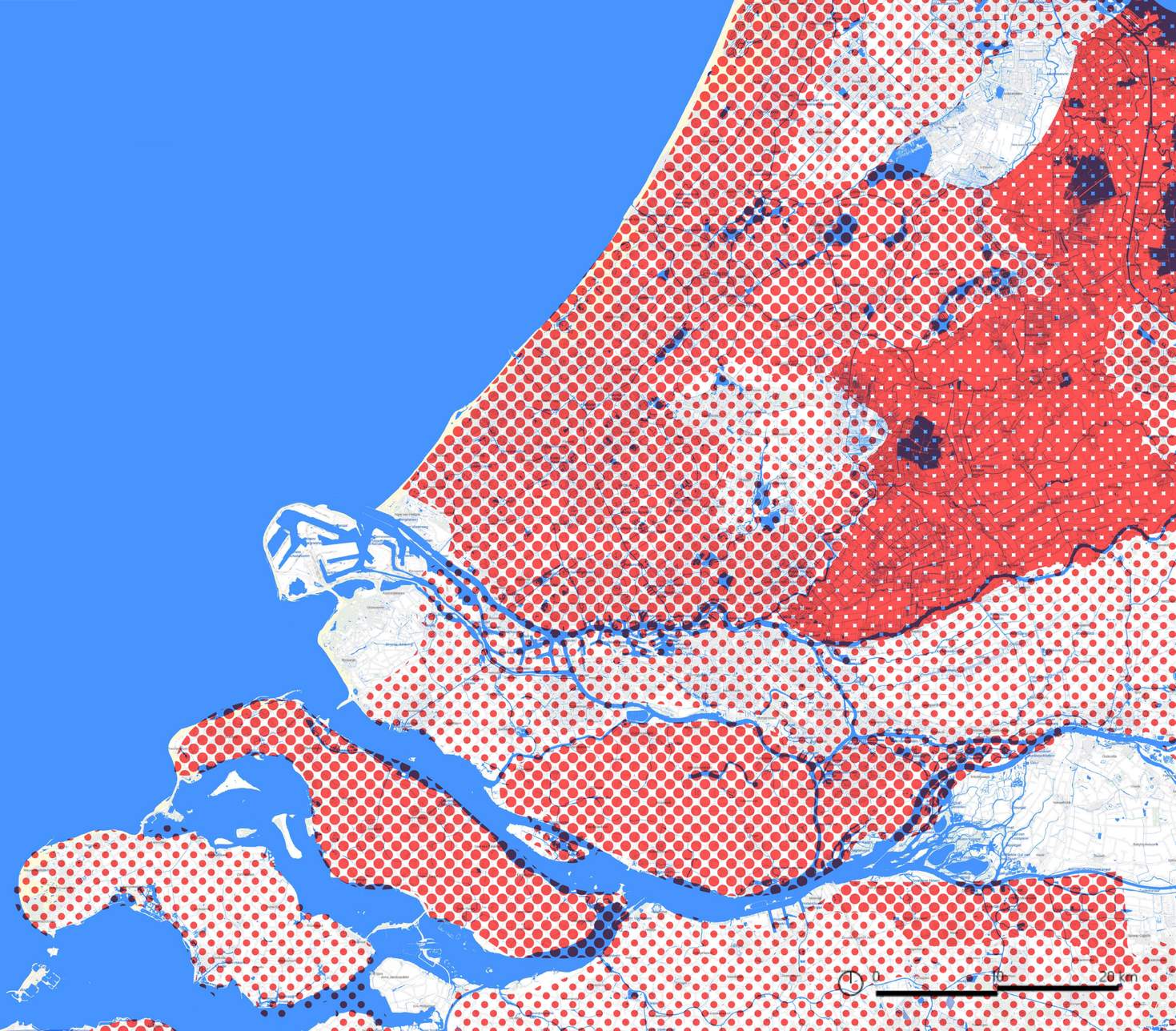
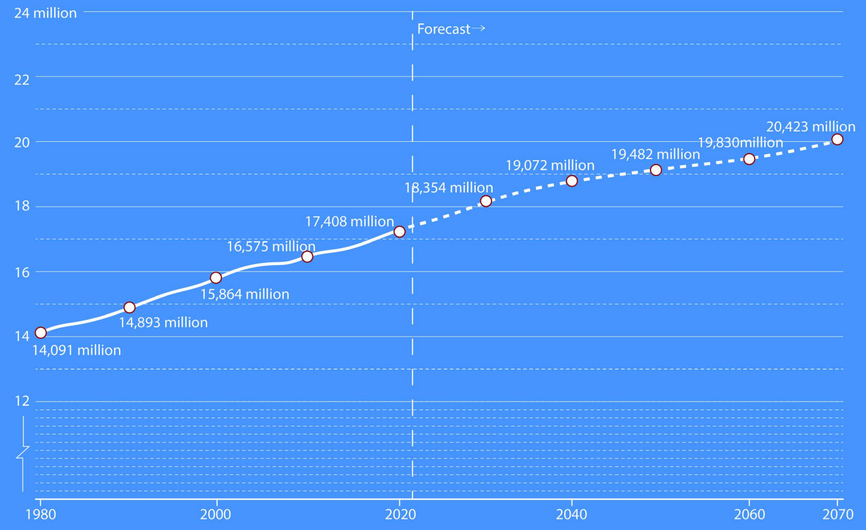


Image by author
with input from PDOK (2012), Rijkswaterstaat (n.d.-a)

ANALYSIS // DEMOGRAPHY



From the diagram on the left, the total population of the Netherlands is on the rise, and this trend will continue to the future. If we zoom in to the province of South Holland, almost all cities with a population of more than 100,000 have also maintained an upward trend. One possible challenge that may come in the future is to increase the urban capacity under the new landscape conditions and rationally resettle urban and rural residents.

Image by author
with input from PDOK (2012), Rijkswaterstaat (n.d.-a)

ANALYSIS // DENSITY & BUILT

Besides the demographic changes that will take place the coming decades, we also looked at which places are currently densly built and/or inhabited. As it is quite difficult to make radical (spatial) change in places that have already been built, and therefore defined, it is necessary to identify which areas could be more problematic than others.

Legend

Urbanization level of neighbourhood

Urban / Industrial / Greenhouses / Built

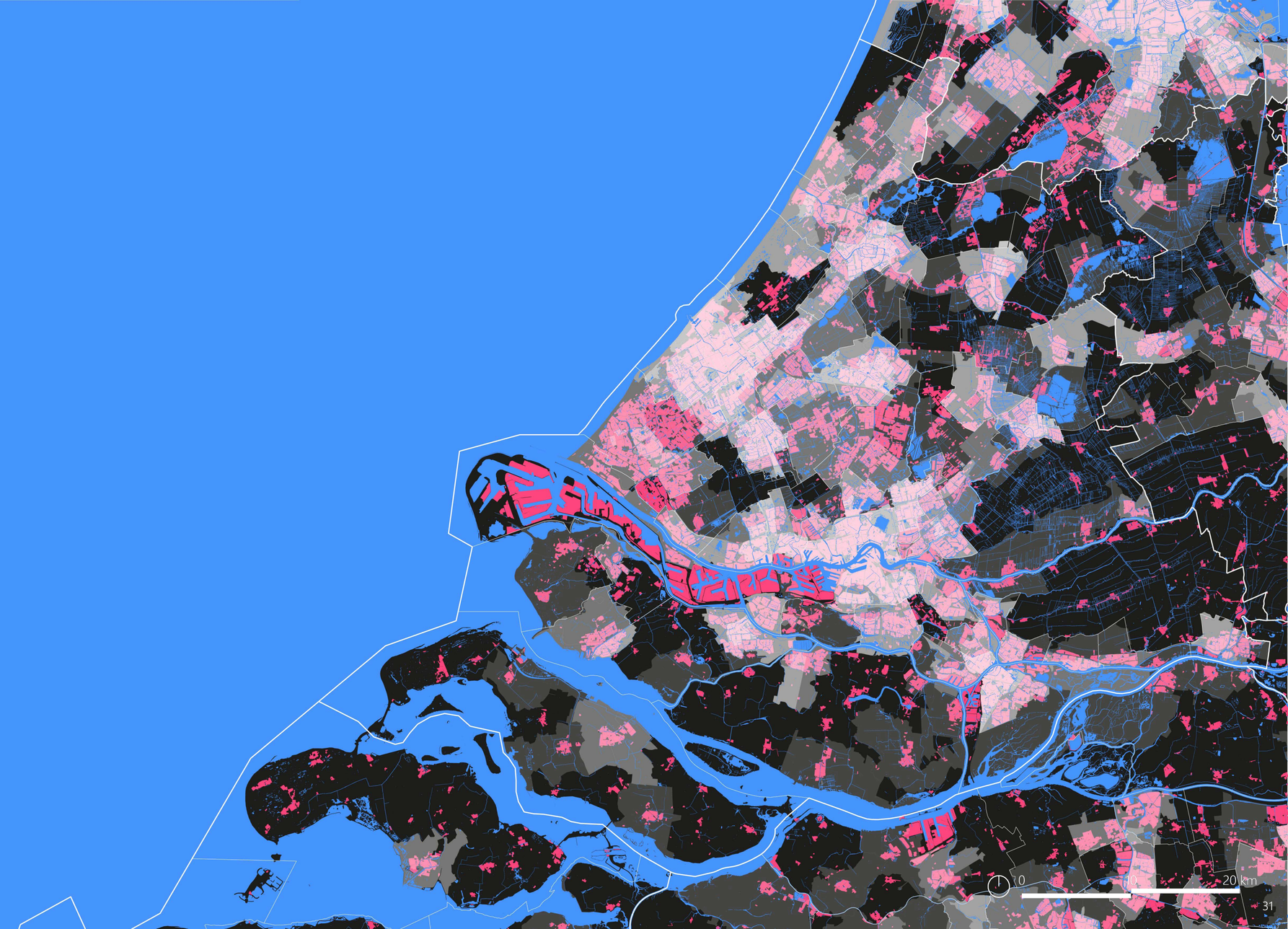


Image by author
with input from PDOK (2012)

ANALYSIS // DELTA STRUCTURE

How the landscape might be able to change has everything to do with its structure and infrastructural elements. As one could argue that there is no such thing as a natural landscape anymore in the province, because it is all man-made, it is important to base the way in which the landscape could and should change on the way it has been built so far.

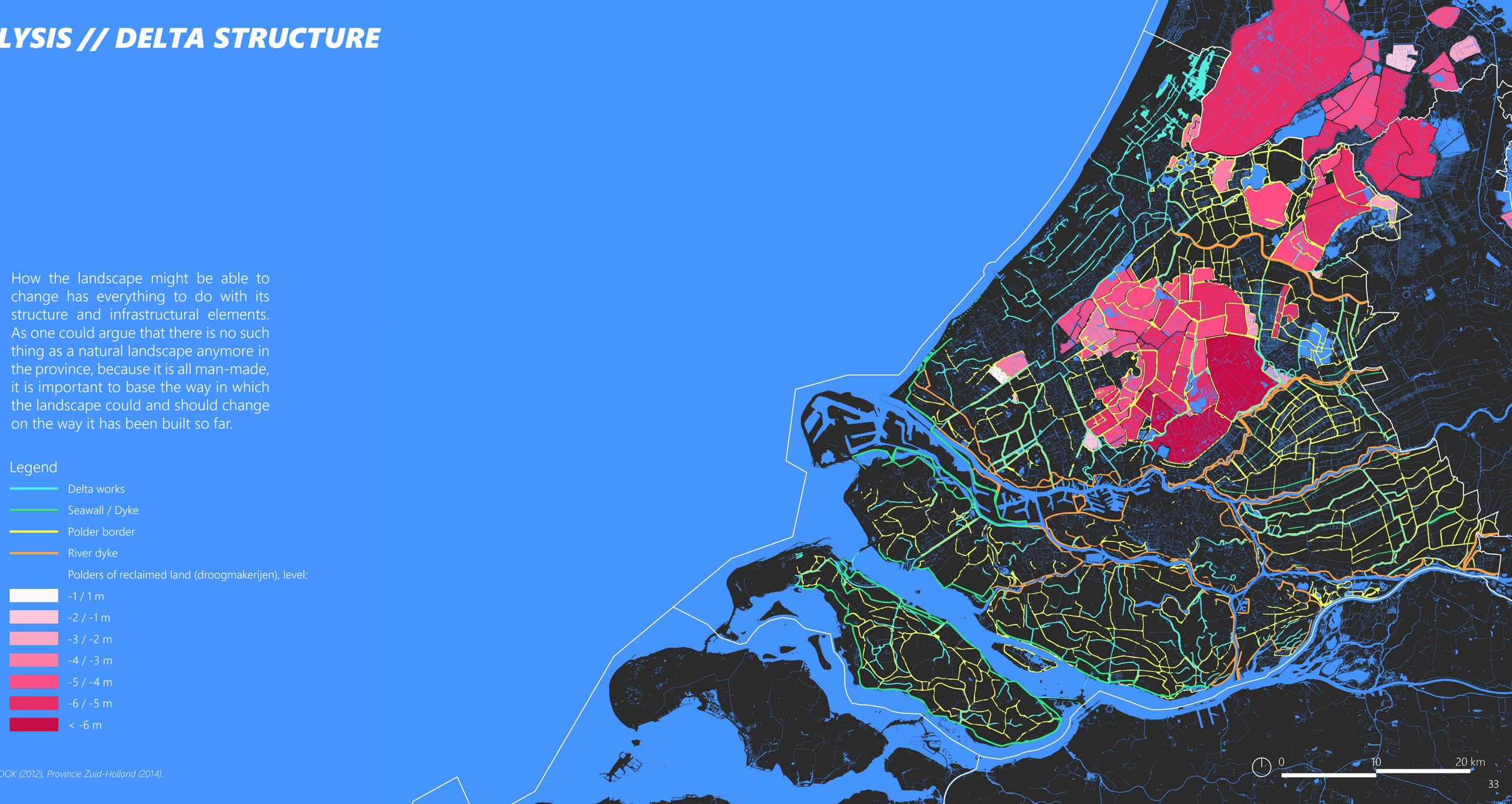


Image by author
with input from PDOK (2012), Provincie Zuid-Holland (2014).

ANALYSIS // LANDSCAPE

Though on a land use map, it may seem like a very monotonous landscape, there actually are many different landscape types present in the province. The variations in height and soil have manifested in different natural environments, but they have become smaller and scarcer. The approach in this could be to look at where specific types are prevailing and see how and where to they could expand, enlarging the natural habitat of the animals it shelters. If we want to improve environmental health, it is important to look at the landscape in discovering where changes could have the most postive impact.

Legend

- Residential / Industrial
- Recreational
- Grennhouses
- Agricultural
- Floriculture
- Dry forest
- Humid forest
- Mesotrophic meadow
- Dunes
- Swamo
- Briny landscape
- Grassland, bank and watervegetation (lesser quality)
- Grassland, bank and watervegetation (good quality)
- Grassland, bank and watervegetation (very good quality)
- Water

Images from Google (2019), Kennisnetwerk OBN (n.d.), Rijkswaterstaat & van Reeken, H. (2008)

Image by author with input from PDOK (2012)

0 10 20 km

ANALYSIS // CONCLUSION

As some analyses need to be combined in order to draw any conclusions from it, we overlayed the flood risk, salinity, soil pollution and density on a map in order to see which locations could be either most needed to change or suitable to change. The combination of these specific maps can begin to provide an answer of the general areas in which we could do something about flood risk, though the other maps are necessary as well in the next step: when we define more specific locations and/or ways in which they will transform.

Legend

- Higher chance of flood
- Higher chance of flood & polluted soil
- Smaller chance of flood & polluted soil
- Densely built area
- Salinity

Image by author
with input from PDOK (2012)

POTENTIALS & CHALLENGES

From overlaying the analyses we established, we specified multiple areas and interventions that could guide the further design and formulation of the vision and strategy. A relatively large part of the landscape would be suitable for flooding, though there of course are great challenges that would come with this decision, too. As the natural environments of a high quality are scarce in this landscape, we value them as potentials too, as they should be preserved, protected and enlarged in order to fulfill our goal of improving environmental health. To be able to support the human activity and needs too, however, there is also room needed for industrial and productive activity. This is where the Port and Greenport were identified as being of importance and having great potential.

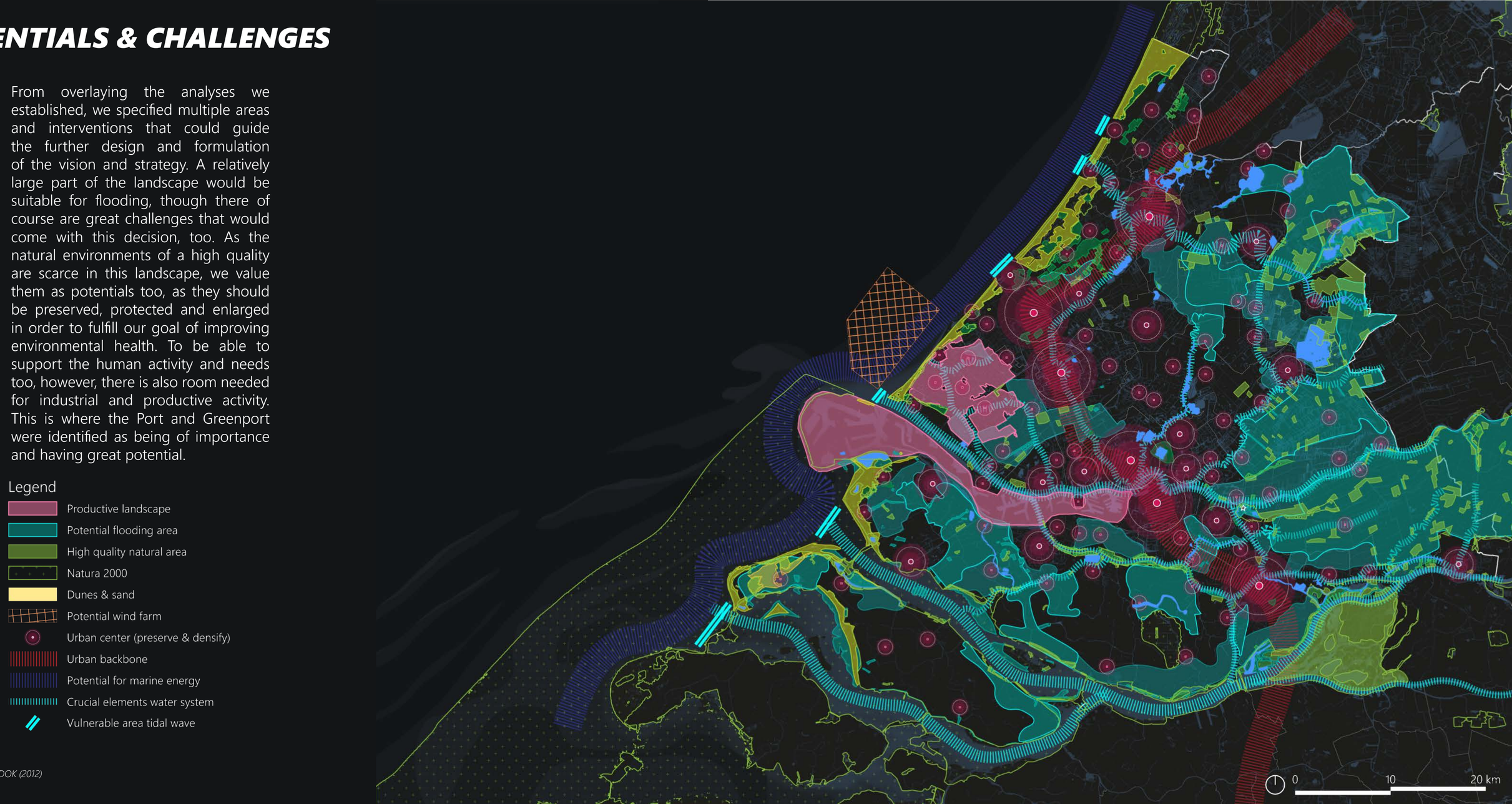


Image by author
with input from PDOK (2012)

VISION // THEMES

Image by author

WATER

Within the vision, the interventions relating to water are directly linked to strategies to decrease the flood risk by giving parts of the land back to the water in different ways.

LANDSCAPE

The landscape will change as a result of the changing relationship with the water, but there will also be a larger focus on the return and protection of natural landscapes.

HOUSING

Within the theme housing, we focus on urban environments, the infrastructure that links them and the way in which they will change.

ENERGY

As the energy networks are such a large supporting force within the transition to a circular economy, we analyse, design and strategize for this subject specifically, too.

INDUSTRY

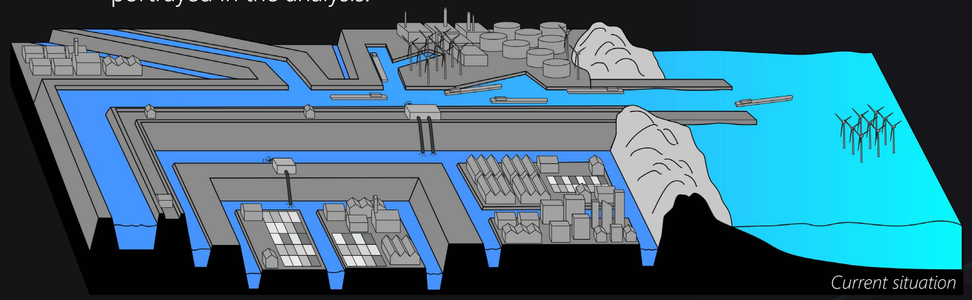
With the transition to a circular economy, it is all about materials. How and where they are produced, distributed and stored matters, which is why we focus on industry as an integral element in the vision.

AGRICULTURE

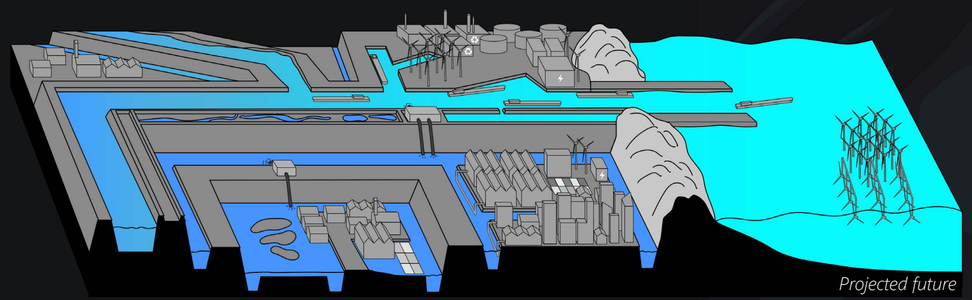
As we strive for a circular agricultural sector and want to make a distinct division between natural landscapes and agricultural land, we look at agriculture as a seperate layer in the vision.

VISION // WATER

The risk of rising sea level and overflowing rivers is partly mitigated by allowing the water into the landscape more freely, while doing so in a controlled way. This will alleviate the pressure on other areas. The use of wisselpolders will protect vulnerable areas while providing a natural way to raise land, as well as create a more natural environment over mere dykes alone. The wisselpolder in itself also provides more room for the rivers to (over)flow. Areas to be flooded are low-intensity agricultural landscapes that have one or more risk factors as portrayed in the analysis.



Current situation



Projected future

Images by author

Legend

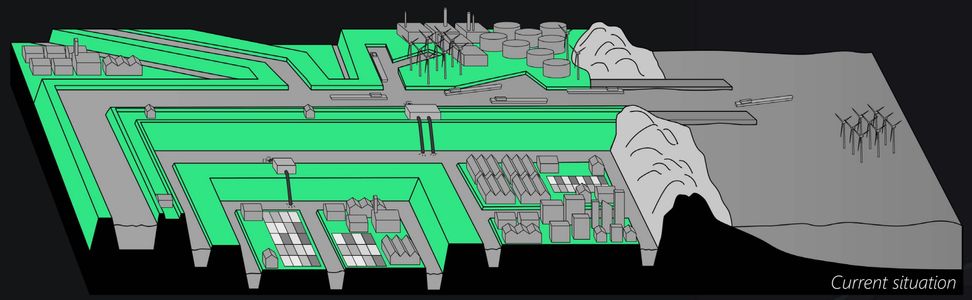
Flooded landscape

Wisselpolder

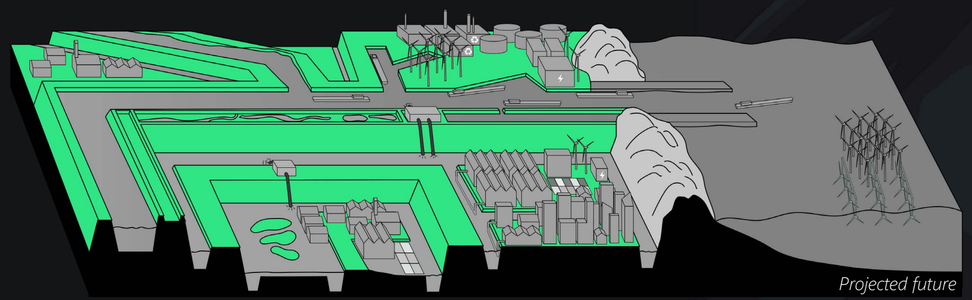
0 10 20 km

VISION // LANDSCAPE

There is more room for the natural landscape, which is organised in such a way that it introduces more diverse environments than the current monotonous grass fields that dominate the landscape. The desired environments are similar to the currently existing different nature types, and these are linked through the Green Corridor, increasing biodiversity and creating a more mixed landscape. The natural environments should be cherished more, so that it serves the overall environmental health.

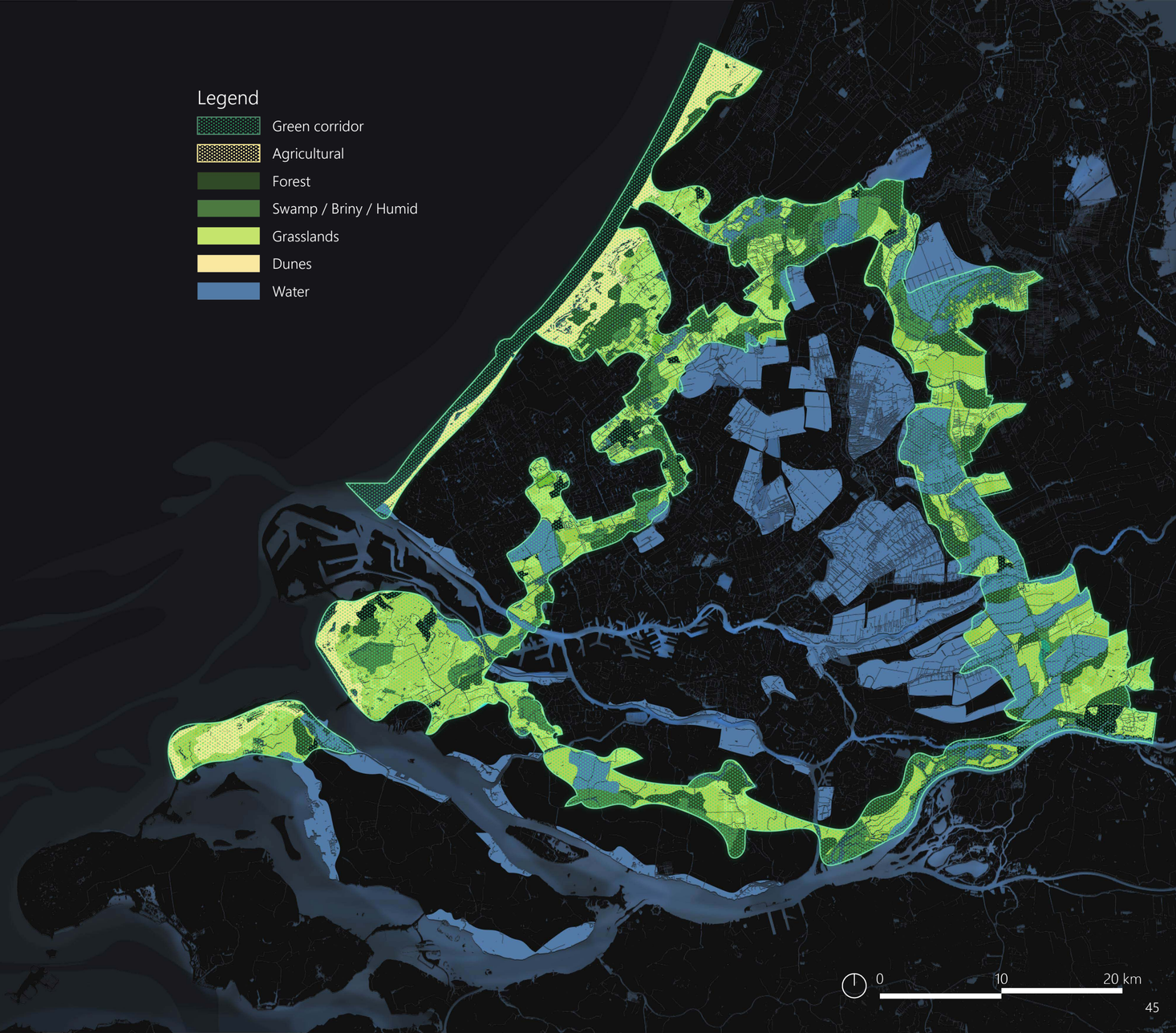


Current situation



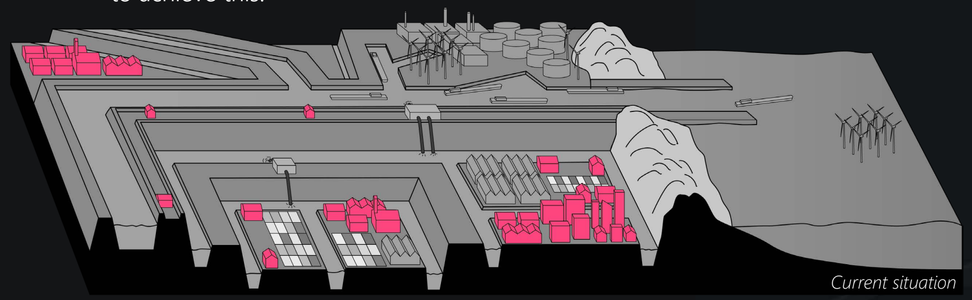
Projected future

Images by author

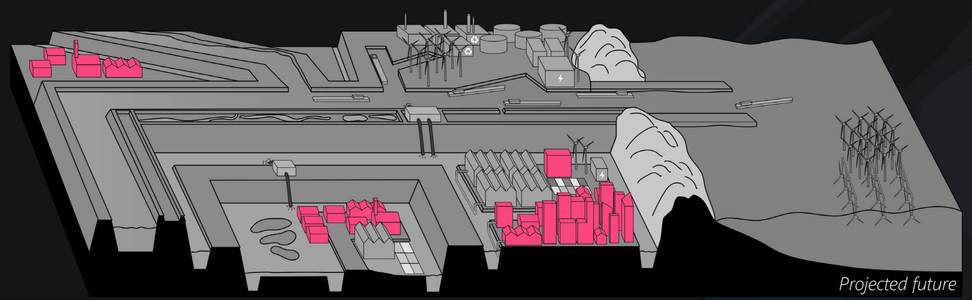


VISION // HOUSING

An Urban Backbone is defined, with the intention of further densifying along this corridor as well as improving infrastructure. Smaller towns and villages outside of this backbone will be met with more regulations, wherein proposals for new ways of living are given. New types of constructions will need to become the norm, which are more resilient to living on water. There exists the intent for the smallest towns, which are at risk of flooding, to be given back to the water. By stating this early on, a more gradual and slow process may be set in motion to achieve this.

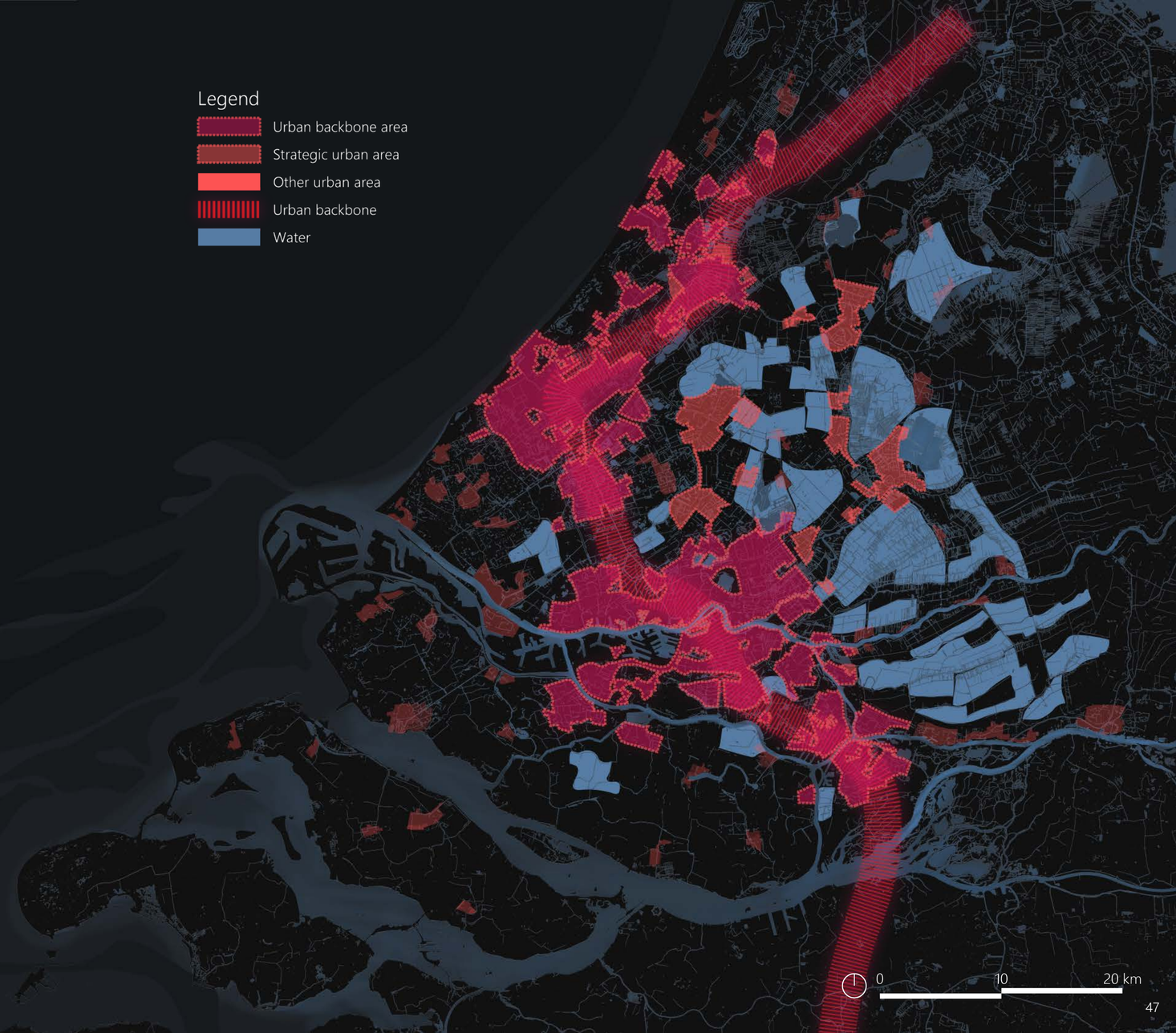


Current situation



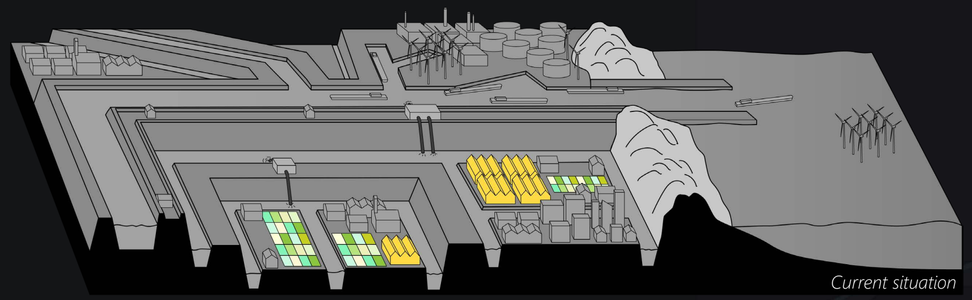
Projected future

Images by author

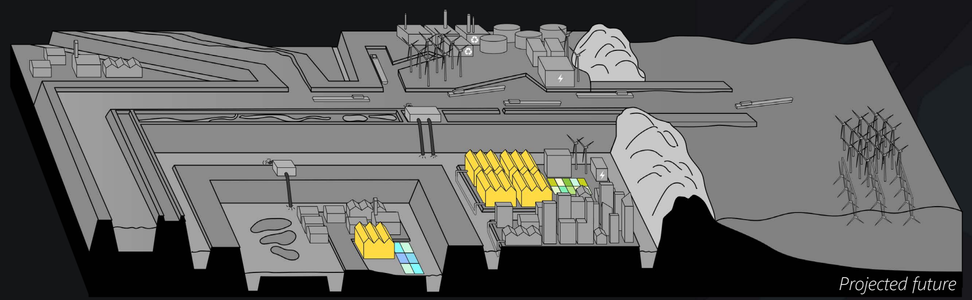


VISION // AGRICULTURE

The agricultural industry plays a vital role in the landscape. By increasing efficiency of land use, increasing density and embracing new technologies, new ways of growing food may be introduced. An increase in flooded, often brackish, land may seem as a loss for agricultural space, but it is also an opportunity to adjust production into a more sustainable and more diverse industry in terms of produce. Innovation and technological investment are crucial for this, but this may in itself bear fruit as knowledge export in the future.

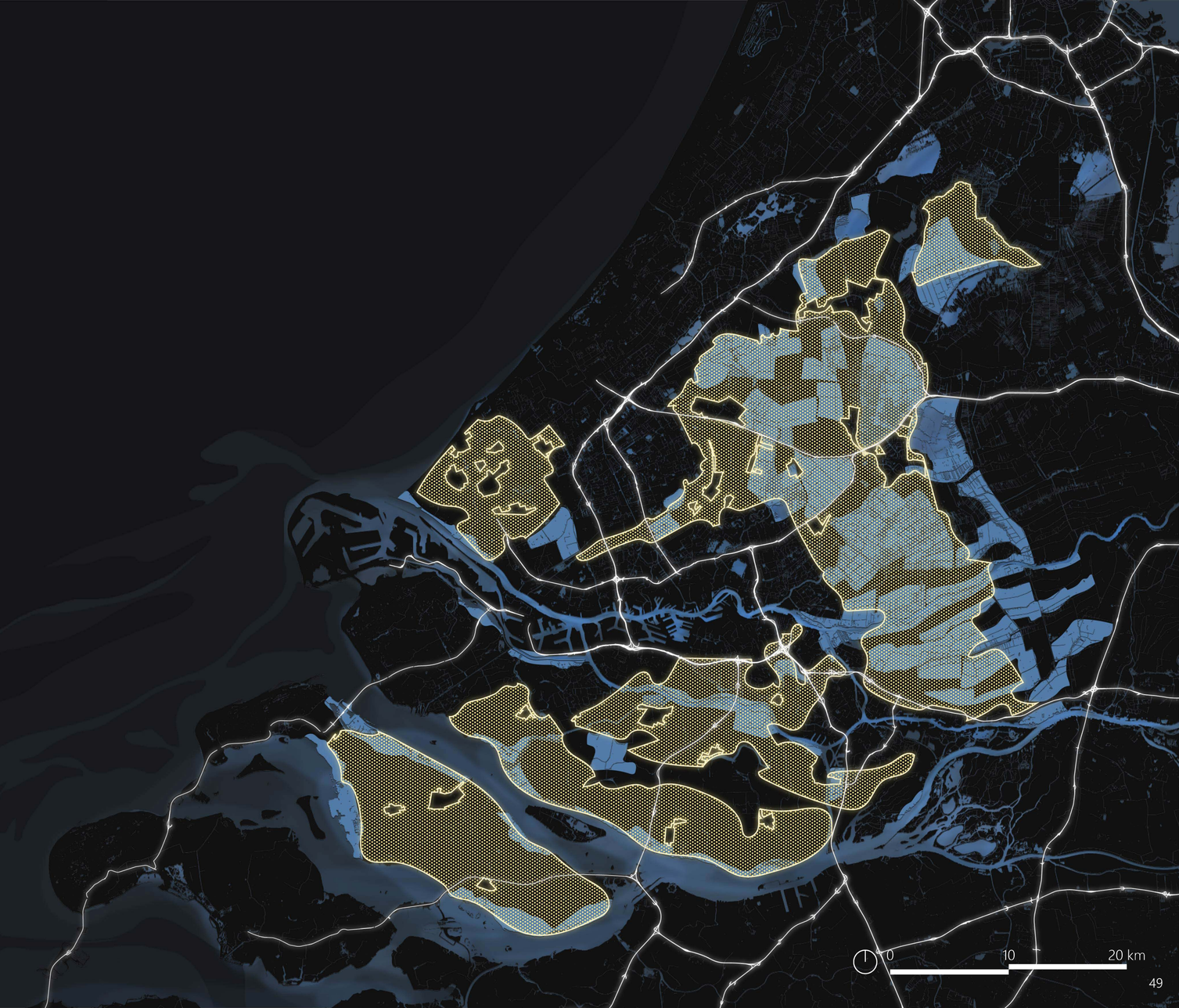


Current situation



Projected future

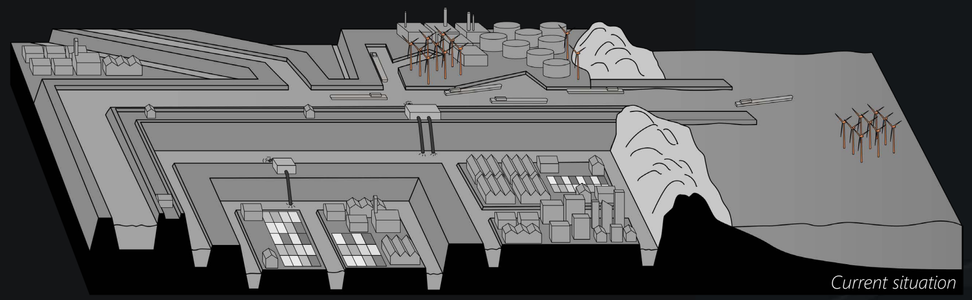
Images by author



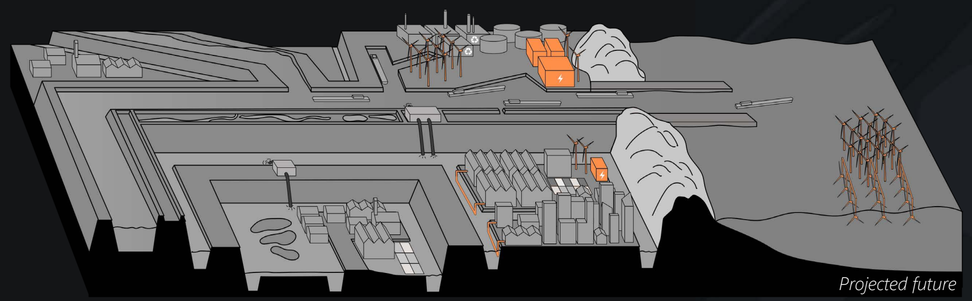
VISION // ENERGY

The changing landscape brings forth new opportunities for energy production. This includes both electricity as well as heat. Constructing new and expanding existing wind energy parks at sea, and investing in marine energy technologies will contribute to the production of clean energy. Using and more effectively collecting biomass, in combination with biorefineries, will add to the electricity production, as well as provide heat and raw biomaterials.

Combining aforementioned sources with catching rest streams of heat from industry and greenhouses, a total network of connections is established between different sectors wherein muutal benefits are unlocked.



Current situation

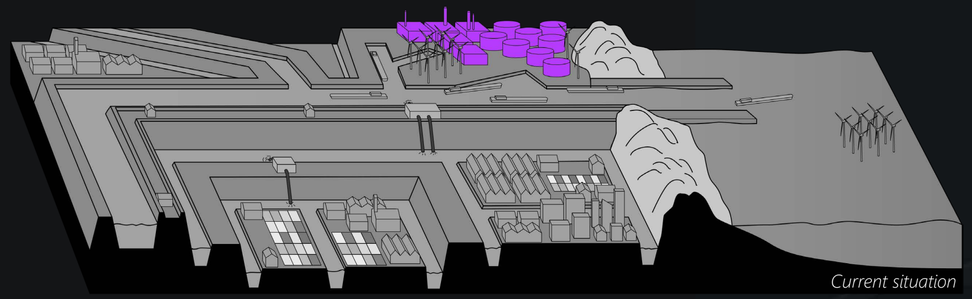


Projected future

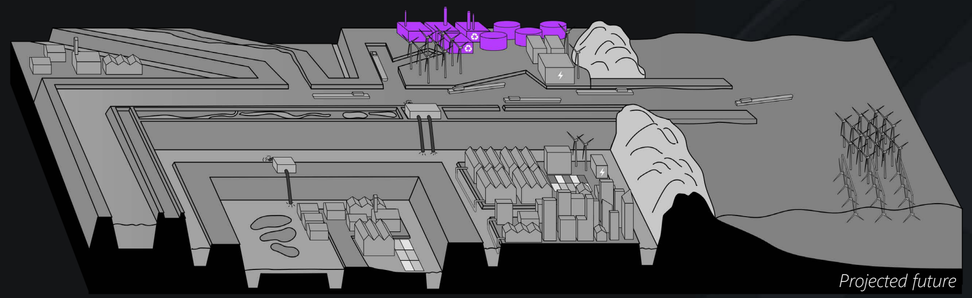
Images by author

VISION // INDUSTRY

A concentration and intensification of industrial functions will take place in the productive landscape - defined as the port and Westland. Nearer the city, the port will provide crucial city-services which are less desirable to mix with housing programme, as the port in its entirity is a low risk area in terms of flooding. Giving the productive landscape this status also shows how important the port and Westland are currently to the Netherlands and beyond, the industrial and green ports of the Amsterdam-Brussels-Cologne euregion, as well as the rest of the world. Besides the port area, every city has their own industrial area, only filled with industry that directly services the city itself, and as much mixed with housing program as possible. Industrial programme that does not service the adjacent city will relocate to the port area. Special importance is given to the industrial/technical knowledge centers such as in Leiden (Biotech campus) and Delft (TU Delft).



Current situation



Projected future

Images by author

VISION // OVERALL SYSTEMS

The “overall systems” is defined as the combination of elements related to energy, urban, industrial and agriculture. A complex web of interconnections becomes visible, wherein the productive landscape - the port and Westland come together with new structures at sea as the productive backbone of South Holland. Providing a concentration of industrial and agricultural functions while producing renewable energy and heat for itself and servicing the urban backbone.

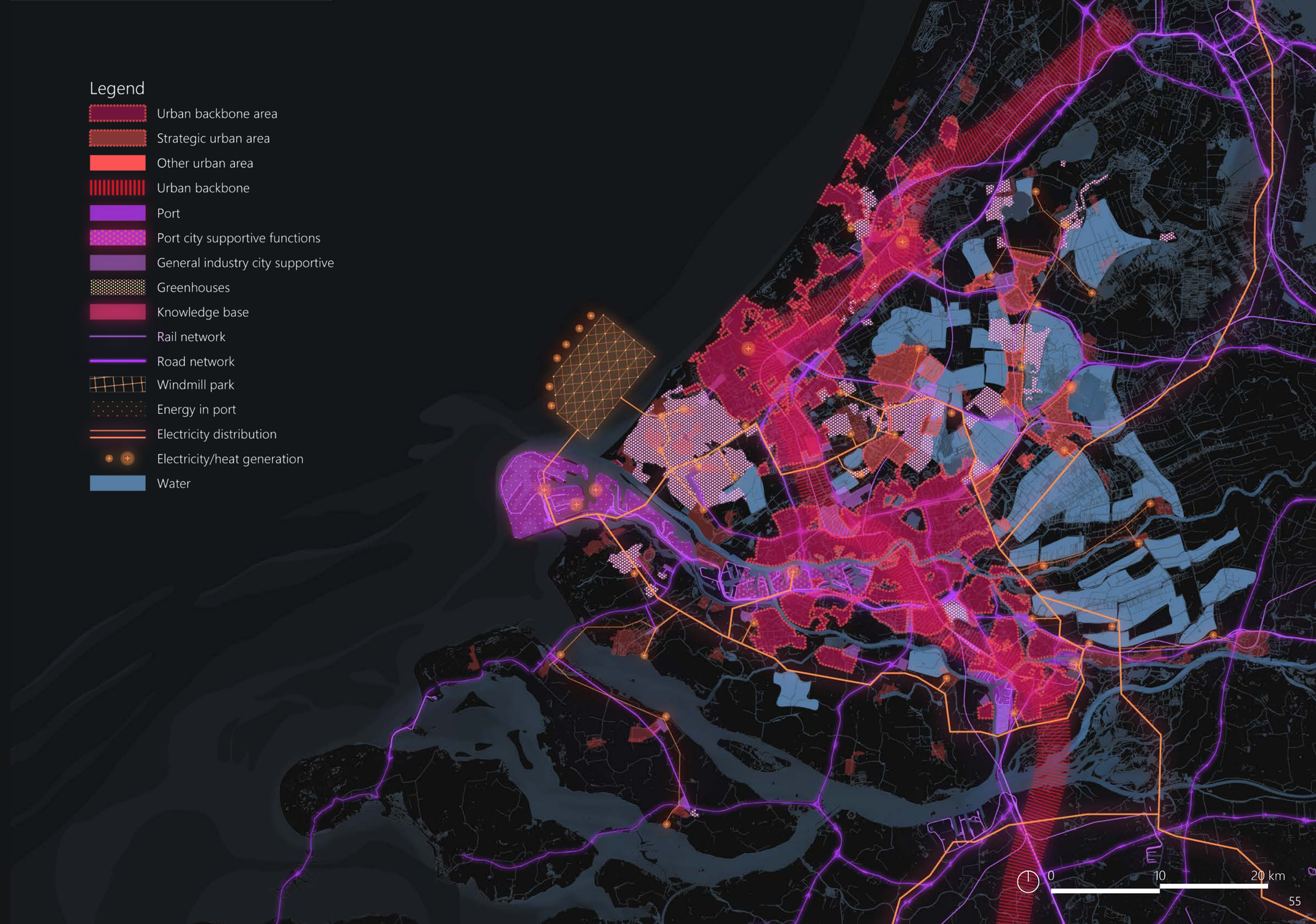


Image by author

VISION // OVERALL LANDSCAPE

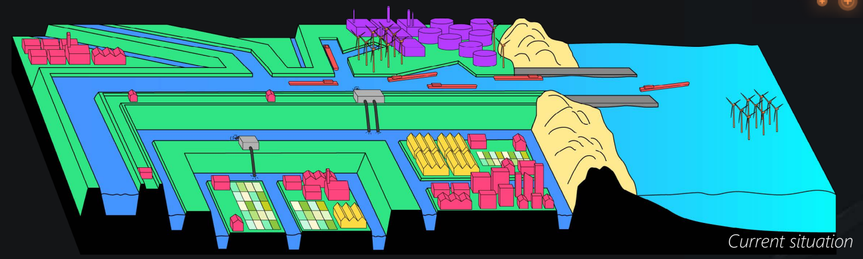
The green corridor is organized as a ribbon creating an outer circle around the urban cores, with the agricultural land lying in between functioning as a transitional zone. By lacing the natural environments together, they are enlarged and become a larger whole, rather than being fragmented, individual patches of nature.

The combination of these environments with the transitional zone improves the quality of animal habitats and therefore increases biodiversity, and provides relief for the rising water pressure by giving more land to the water.

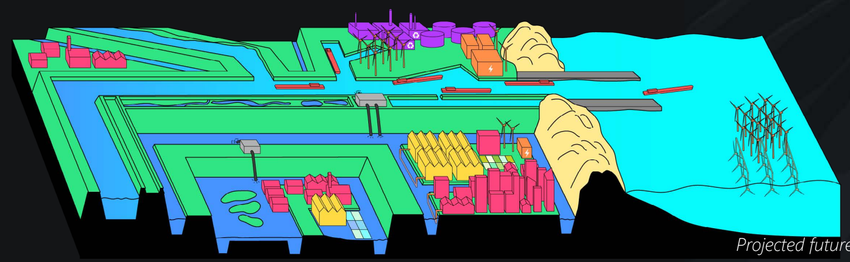
Image by author

VISION

The vision is composed of all previously mentioned themes and combines them into one map wherein the overall vision becomes apparent. The bigger elements; the urban backbone, green corridor, agricultural lands and productive landscape all come together seamlessly into the new flooded landscape of South Holland.



Current situation



Projected future

Image by author

Legend

- Urban backbone area
- Strategic urban area
- Other urban area
- Urban backbone
- Port
- Port city supportive functions
- General industry city supportive
- Greenhouses
- Knowledge base
- Rail network
- Road network
- Windmill park
- Energy in port
- Electricity distribution
- Electricity/heat generation

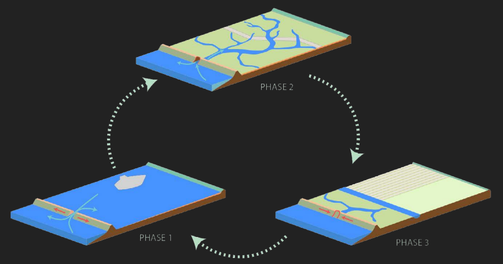
Legend

- Green corridor
- Agricultural
- Forest
- Swamp / Briny / Humid
- Grasslands
- Dunes
- Flooded landscape
- Wisselpolder

0 10 20 km

POSSIBLE SOLUTIONS

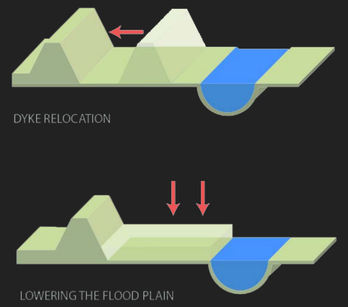
Landscape



WisselPolder

A natural alternative for raising the dykes is the wisselpolder concept. This uses the sediment that the sea leaves behind to raise the land for.

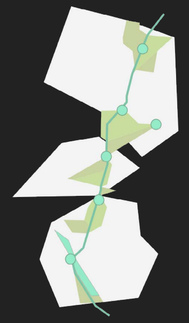
Deltares (2019), Naturetoday.com (2021), Omroep Zeeland (2021)



Room for the water

With more room for the river to flow, the natural environment will be enlarged and risks of overflowing will be diminished.

Busscher (2019), Recubenis (2020)



Green corridor

We want to implement a green corridor to expand animal habitats in a clever way, so biodiversity will be increased.

Agri-Food Sector

Limiting food exports

- *Only grow what we need = land saved*

Tech advancements & Solutions

- *Stacked LED farms - closed systems reduce need for pesticides / perfect conditions / water cycle*
- *Hydroponics/aeroponics - save space / "Aerofarms"*
- *GMOs could make more types of plants grow in saline water*

Goedde et al. (2020), de Clercq (2018), Sundrop Farms (2020)

Working with new -water- nature

- *Algae as a base for cattle feed*
- *Seaweed as replacement for lettuce*
- *Can be biomass too - sequester 30x more carbon than rainforests*

Cassaniti (2013), Abdal (2003), Euronews (2020)

Recycling food waste

- *1/3 of food is thrown away*
- *Refine food waste for bio products*

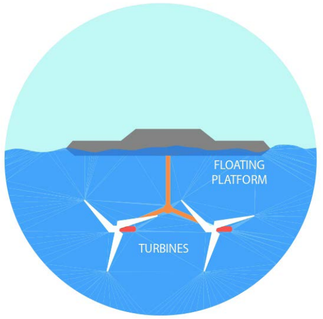
Food and Agriculture Organization of the United Nations (2013).

Marine Energy

With a focus on water as one of the prominent elements of the landscape, marine energy could prove to be a great source of energy.

Tidal Current

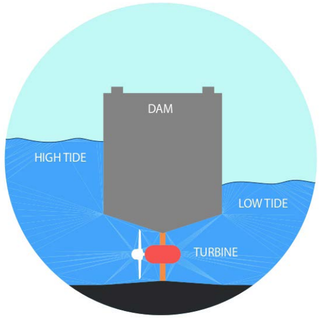
Turbines capture kinetic energy of the currents



Laguna, TU Delft (2015)

Tidal Range

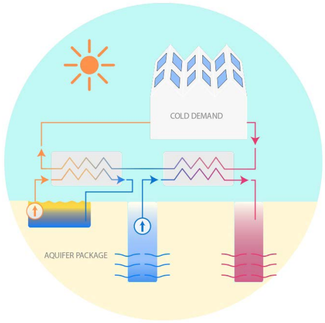
Using difference in sea level between high and low tide



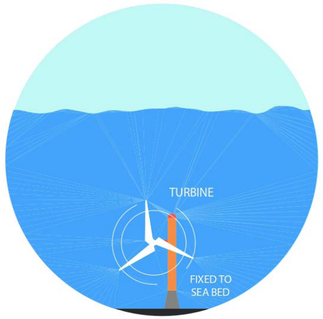
Laguna, TU Delft (2015)

Surface Water

Generating thermal energy from surface water.



Deltares (2015), CE Delft (2021)



Laguna, TU Delft (2015)

TIDAL ENERGY

Tidal energy is effective at low speeds: Water has a density 1,000 times greater than air, making it possible to generate electricity at low speeds.

STRATEGIC INTERVENTIONS

GOALS

Taking into account the (social) challenges of the century

South Holland protected from floods and sea level rise

A circular and sustainable agri-food sector

100% clean and renewable energy

Increased environmental health

To have the strategy answer to the goals we set within the vision, we divide the strategy and policies into different subjects relating to the goals. Though they are undoubtedly interdependent, they are easier to be read, managed and carried out while subdivided.

Going circular
To be able to recognize and establish synergies between different sectors to reach circularity, we merged goals into the topic 'going circular'.

Protecting from flood risk
As there are very specific strategic and practical measures to be taken when it comes to flood risk, it is defined as one of the focus topics in the strategy.

Improving environmental health
Even though improving the environmental health could mostly be achieved by changing processes in the different sectors, we feel a holistic approach is needed for this topic too. So, besides incorporating sustainability in all parts of the vision, we define environmental health as a seperate topic in the policy as well.

Decrease housing deficiency
Because there currently is a need of housing in all types and price ranges, it is defined as a main topic within the strategy. Making sure there is sufficient housing is something that should be safeguarded, especially if land becomes more scarce.

Use land efficiently
In giving land back to the water, the only way we could continue to live in a similar way is making use of the land left in a manner that is a lot more efficient than what we are doing now.

Safeguarding Spatial Justice
With so many spatial changes taking place, it is important to not only look at how the changing of the current structure might impact social justice, but to also think ahead of ways in which this might actually improve.

STRATEGIC INTERVENTIONS

GOAL

Going circular

STRATEGY

- Fostering synergies between different sectors
- Innovating the agricultural sector
- Using the changing landscape as a generator of energy

POLICY

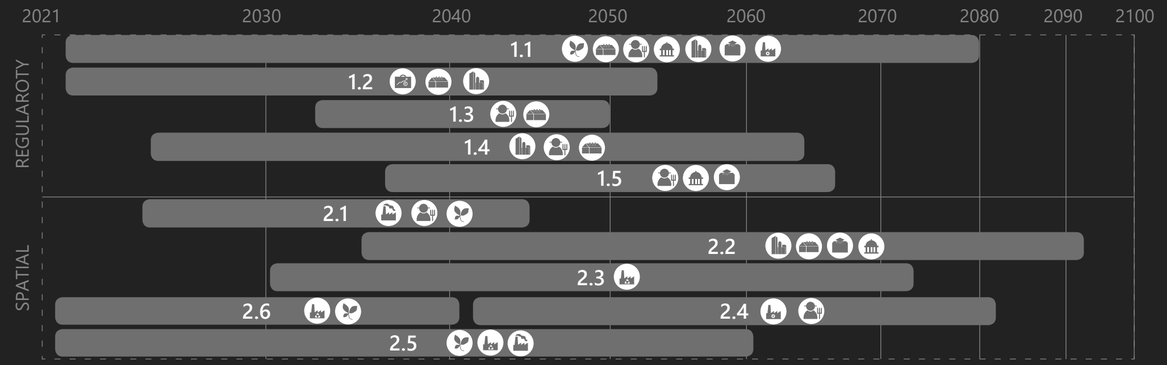
1 - REGULATORY

1.1 Giving subsidies for R&D on related sectors
1.2 Invest in types of agriculture, industry and housing that go a long way
1.3 Heavily reduced cattle industry (both for environmental health, safety (against viruses) and land use)
1.4 Increase awareness among consumers, steering towards a more plant based diet
1.5 Introduce programs in which farmers are encouraged to become more sustainable

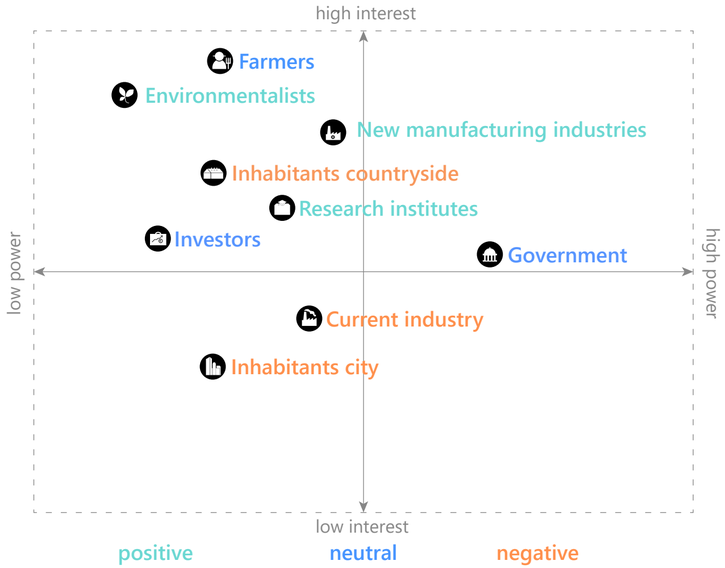
2 - PRACTICAL & SPATIAL

2.1 Improve infrastructure within and between productive landscapes (to close material cycles)
2.2 Promote resilient housing and new ways of living
2.3 Sustainable (re- and de-)construction
2.4 New ways of cultivation (floating, saline, high-efficiency)
2.5 Processing of (organic) waste
2.6 Recycling of materials

PHASING



STAKEHOLDERS

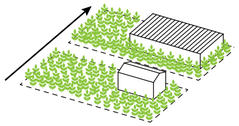


Stakeholders to focus on

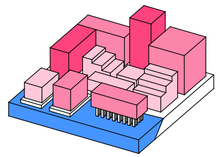
Farmers & Inhabitants countryside

The promotion of new kinds of agriculture might be a huge impact on traditional agriculture. It would be hard to ask farmers who have been doing traditional agriculture for decades to give up their familiar ways of living. On the other hand, more efficient cultivaton can bring more profit and more stable production to farmers. To ensure the implementation of the policies, certain subsidies and other policy support would help.

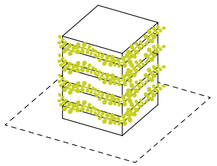
SPATIAL IMPLEMENTATION



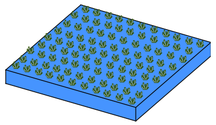
2.1 Improved infrastructure within productve landscape



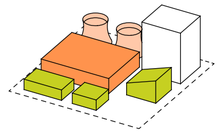
2.2 New resilient ways of living



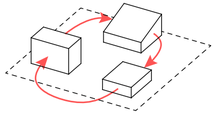
2.3 Sustainable construction



2.4 New ways of cultivation



2.5 Processing of waste



2.6 Recycling of materials

STRATEGIC INTERVENTIONS

GOAL

Going circular

STRATEGY

- Fostering synergies between different sectors
- Innovating the agricultural sector
- Using the changing landscape as a generator of energy

POLICY

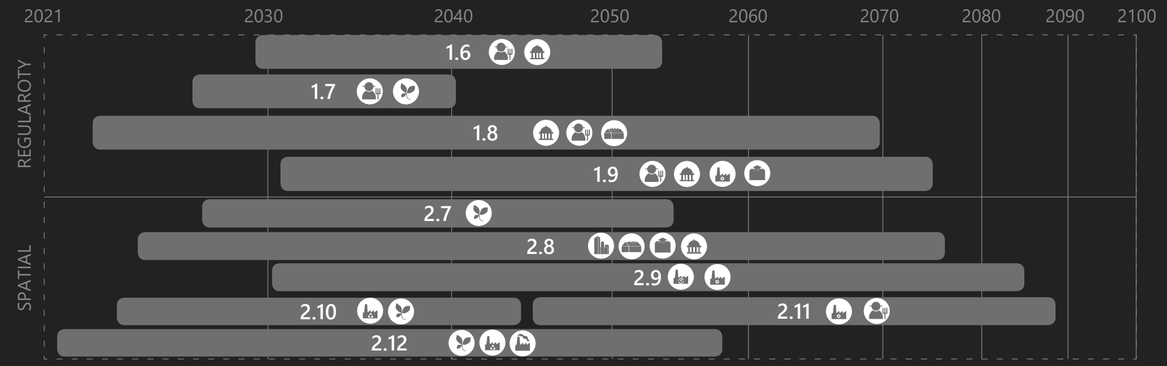
1 - REGULATORY

1.6 Subsidies for (cattle) farmers to switch to a different type of agriculture
1.7 Farmers have to give a plan showing how they are planning to become more sustainable transition
1.8 Close communication between the national & regional government and farmers union.
1.9 Farmers will be given subsidies for building floating farm and house if they choose to keep the plot where is going to be flooded

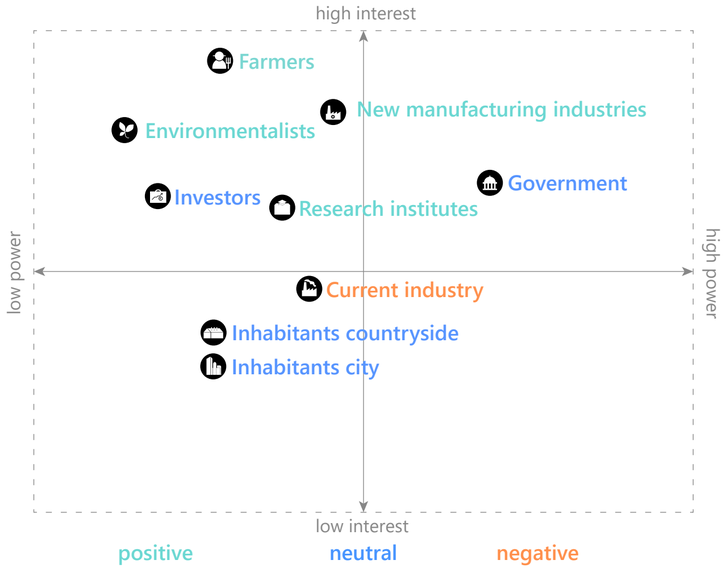
2 - PRACTICAL & SPATIAL

2.7 Wider river beds & soft borders
2.8 More efficient in agriculture: stalked/ floating/ LED farms
2.9 Build plants related to tidal energy & thermal energy from surface water
2.10 Build wind farms
2.11 Establish a network using residue heat from industry & greenhouse (for heating buildings in urban cores)
2.12 More biorefineries

PHASING



STAKEHOLDERS

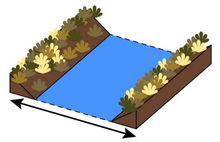


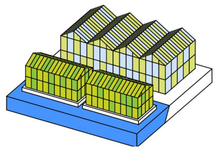
Stakeholders to focus on

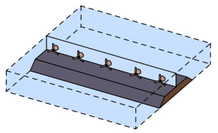
New manufacturing industries

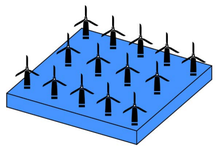
With the subdies for new tech development on energy sector, many new ways to get clean energy will emerge. On one hand, it will benefit our future generation for long term, on the other hand, it can be a double-edged sword for manufacturing industries. That new tech would be a huge impact on traditional industry. Meanwhile, many new industries may emerge to fulfill the needs for equipments. What's more, they are not like a one shot thing because these equipments need maintenance, and that will bring long tem benefit for these industries. So to conculde, the policies can help the transition from traditional manufacturing industries to the new ones.

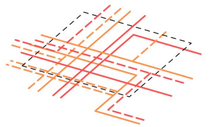
SPATIAL IMPLEMENTATION

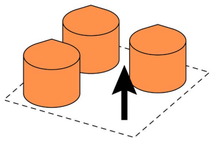

2.7 Wider river beds


2.8 High-tech agriculture


2.9 Marine energy plant


2.10 Wind farm


2.11 New energy network


2.12 More biorefineries

STRATEGIC INTERVENTIONS

GOAL

Protecting from flood risk

STRATEGY

- Flooding certain high-risk area or low-lying areas to take the pressure off other areas, thereby protecting cities
- Avoid evicting people from their land and

POLICY

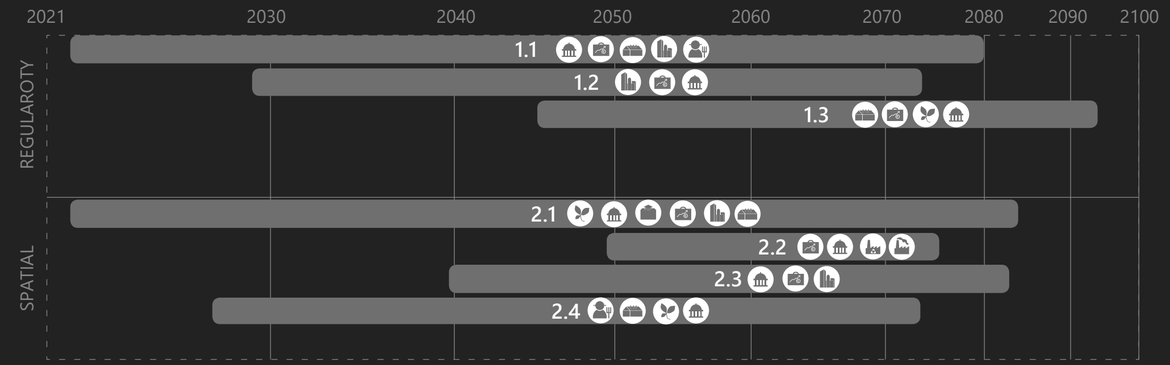
1 - REGULATORY

1.10 The government buys a plot when it comes up for sale. Until the plot is later on flooded, the government can put this land up for rent/lease.
1.11 In towns with less than 10.000 people in areas that have a relatively high risk of flooding and/ or problems with subsidence, only floating homes can be built.
1.12 Everything outside city centres and newly built in smaller towns needs to be resilient to the water (if high-risk or low).

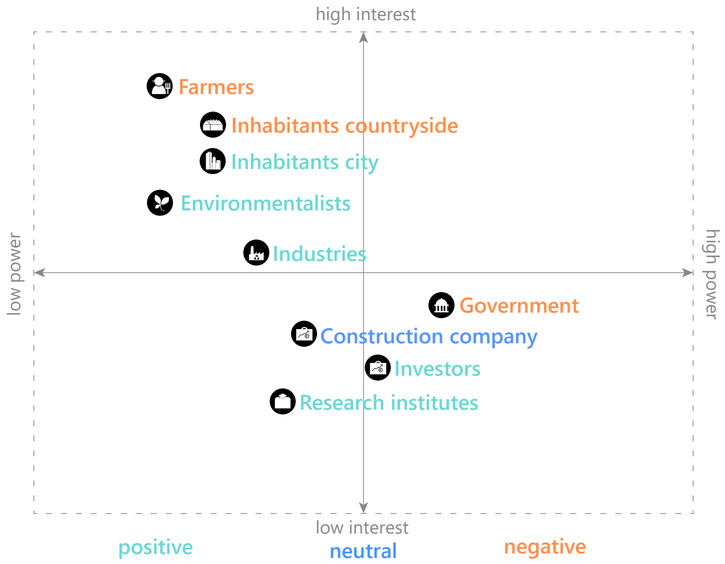
2 - PRACTICAL & SPATIAL

2.13 Wisselpolders as a natural alternative for raising dikes
2.14 Raising dikes in some critical areas
2.15 Relocating certain crucial functions to low risk areas or make them resilient
2.16 Making more room for rivers to (over)flow

PHASING



STAKEHOLDERS

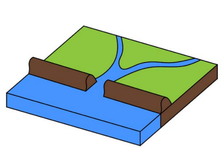


Stakeholders to focus on

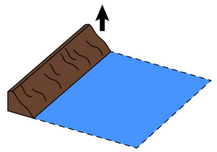
Research institutes & construction companies

As it is quite unclear yet what the magnitude of problems caused by climate change will be in the coming years, it is very important that research institutes are focused on this subject. Knowing whether the sea level rises less than a meter or up to three meters by 2100 is crucial in our understanding of how we could deal with these changes. With that, close communication and information exchange between research institutes and construction companies could lead to a more effective response and innovative solutions.

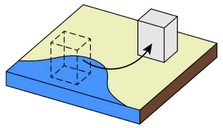
SPATIAL IMPLEMENTATION



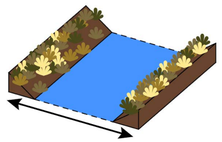
2.13 Wisselpolder



2.14 Raising dikes



2.15 Relocating



2.16 Room for the water

STRATEGIC INTERVENTIONS

GOAL

Improving environmental health

STRATEGY

- More room for nature
- Improving quality of natural habitats
- Focus on sustainable production & consumption

POLICY

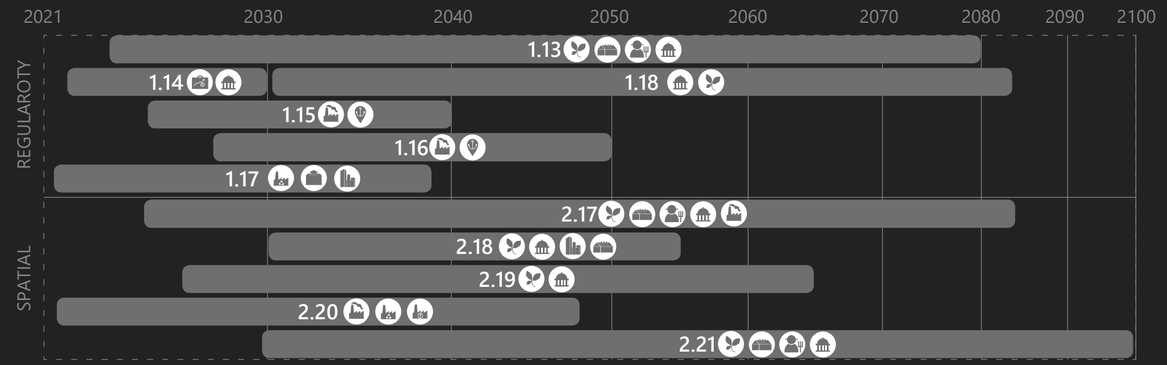
1 - REGULATORY

1.13 Buying and disowning land to be given back to nature within green corridor and along rivers
1.14 No permits for building in green corridor & natura2000 areas
1.15 Subsidies for companies to transition from fossil fuels to clean / renewable energy
1.16 (Higher) tax on fossil fuels
1.17 Investments in research and development of sustainable technology
1.18 Investments in maintaining & protecting natural landscapes

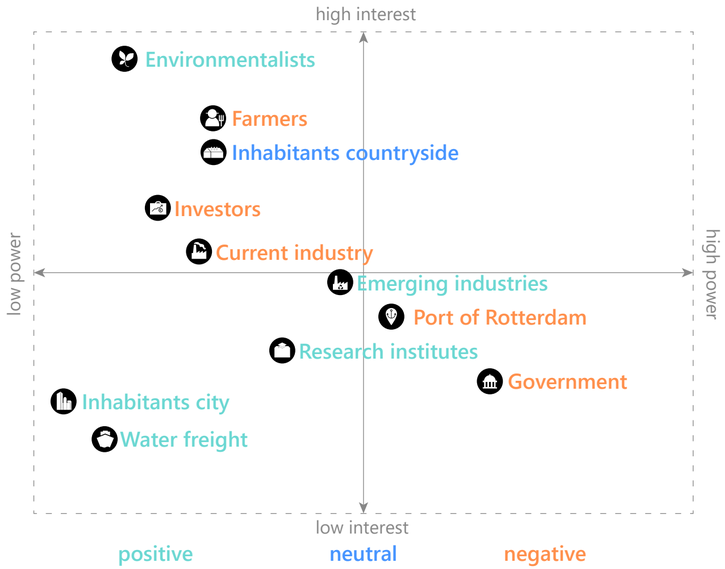
2 - PRACTICAL & SPATIAL

2.17 Wisselpolders as a natural alternative for raising dikes
2.18 Diversifying the landscape (within the Green Corridor)
2.19 Widening river beds & creating soft borders
2.20 Transition from industry based on fossil fuels to renewable energy production and bio-refineries
2.21 Flooding suitable polders

PHASING



STAKEHOLDERS



Stakeholders to focus on

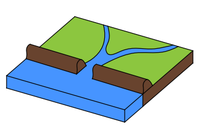
Inhabitants countryside

People now living on the countryside could, because of these policies, possibly lose their home or be forced to sell it. The rest of the residents, however, will be rewarded with an improved living environment. This should be stressed in conversations with residents, so their position towards the transition could become more positive.

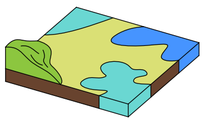
Port of Rotterdam & Current industry

As the port and industry currently still revolve around fossil fuels, the transition to clean energy could cause them a lot of time and money. It is important to link the subsidies to changes that are actually feasible, so they will be able to make use of it.

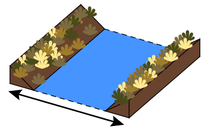
SPATIAL IMPLEMENTATION



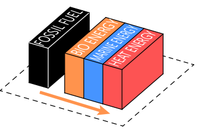
2.17 Wisselpolder



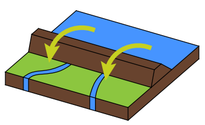
2.18 Diversifying landscape



2.19 Wider river beds



2.20 Transition to clean energy



2.21 Flooding suitable polders

STRATEGIC INTERVENTIONS

GOAL

Decrease housing deficiency

STRATEGY

- Urban core densification
- Utilising the new landscape
- Increase resiliency to flooding

POLICY

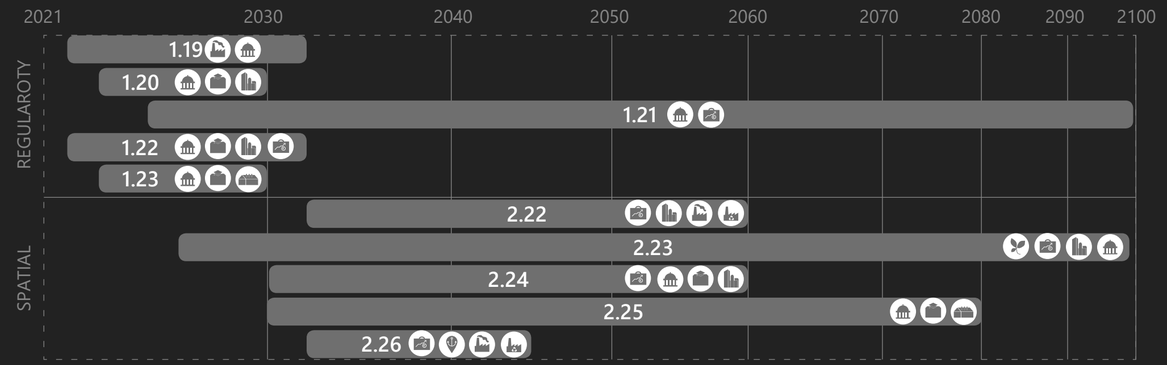
1 - REGULATORY

1.19 Assess non-housing programme adjacent to urban areas on direct servicing of that urban area and on mixibility with housing of the specific programme in question
1.20 Define function mix in terms of percentages of programme per section of the urban area
1.21 No permits for new buildings outside of urban core without (water) resiliency plan
1.22 Spatial quality assessment for existing urban areas intending to redevelop/densify low-scoring areas
1.23 Quantify criteria to grade heritage of buildings in to-be flooded areas

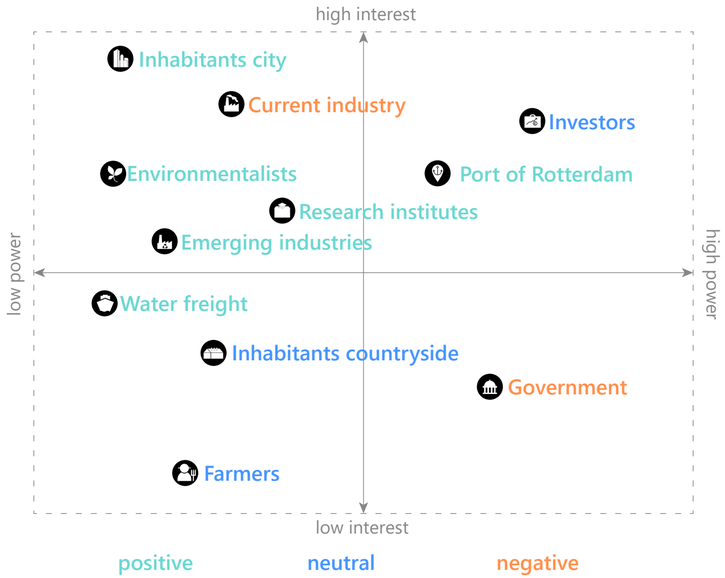
2 - PRACTICAL & SPATIAL

2.22 Higher (vertical) function mix within urban blocks
2.23 Utilising the new landscape using floating structures
2.24 Redevelop existing urban areas with higher density
2.25 Site-specific actionplan to preserve heritage buildings
2.26 Relocate industrial programme, which can't be mixed with housing or is not directly servicing the adjacent urban area, to the productive landscape (port/ Westland)

PHASING



STAKEHOLDERS



Stakeholders to focus on

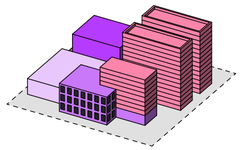
Inhabitants city & current industry

People now living in the cities may be affected doubly: an increase in population through urban densification, as well as an increase in general bustle by the mixing of housing with industry (only what is assessed as mixable). The current industry will therefore have to unite with housing, deal with a more dense environment and generally adept to the new situation.

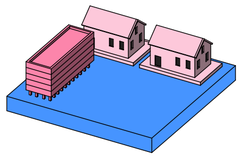
Port of Rotterdam & Industries

As the urban cores get more dense, and the assessments regarding function mixing and direct city servicing are made, the industries will be met with the choice to either integrate into the city further, or move to the port. This will carry both opportunities and burdens which must be adequately met with funding, subsidy and clear guiding plans.

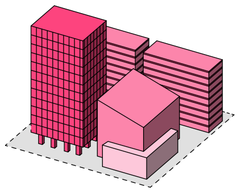
SPATIAL IMPLEMENTATION



2.1 Higher function mix



2.2 Floating structures



2.3 Higher urban area density

2.3 Site-specific preservation

STRATEGIC INTERVENTIONS

GOAL

Use land efficiently

STRATEGY

- Flooded land is not considered “lost”
- Space for opportunities in the new landscape
- Diminish land scarcity resulting from flooding

POLICY

1 - REGULATORY

1.24 Land on which wisselpolders are established will be “leased” by the government from land owners, as wisselpolders are temporary (~30y). This provides compensation, land owners retain ownership and land can be re-utilised.

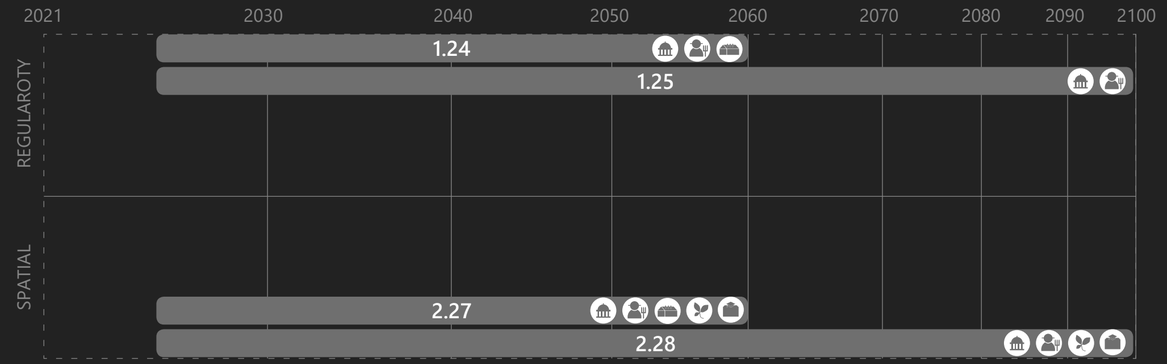
1.25 Current plot structure is retained in flooded areas with agriculture as planned programme. The plot structure is projected onto the water, giving current land owners the “rights” to use their plot of water for new agricultural forms.

2 - PRACTICAL & SPATIAL

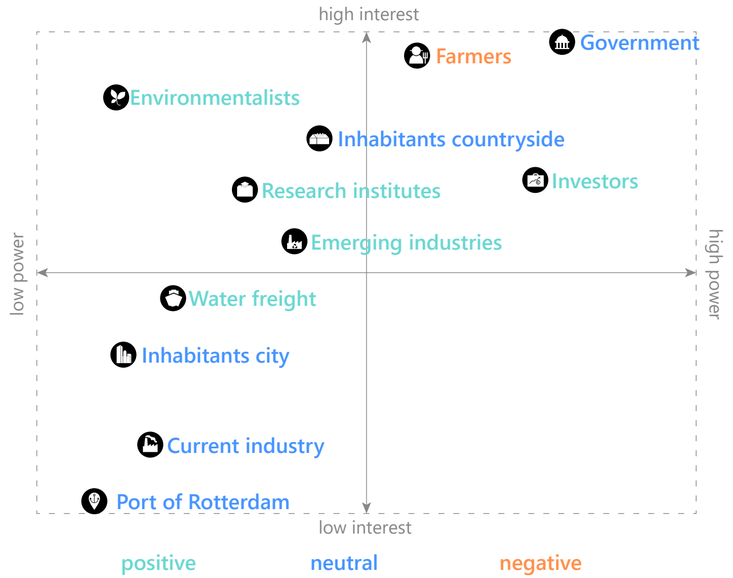
2.27 Establishing leased land in wisselpolders

2.28 Projected plot structure in flooded, agricultural areas

PHASING



STAKEHOLDERS



Stakeholders to focus on

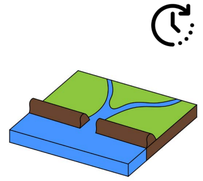
Farmers & Government

At the time of writing, the relationship between farmers and the government is strained. For this plan to succeed, direct connections need to be made between these stakeholders. These proposals completely change the lives of some farmers, and most of the costs will have to be covered by the government. Clear proof of its overall benefit to the country will need to be explained.

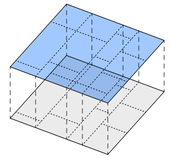
Environmentalists & Research institutes

The questions of how the wisselpolders and flooded land should look like, what its positive and negative effects on the environment will be and where the synergies lie between form and use, are exciting research questions to study on for research institutes and which environmentalists may campain for.

SPATIAL IMPLEMENTATION



2.27 Leased wisselpolders



2.28 Projected plot structure

STRATEGIC INTERVENTIONS

GOAL

Safeguarding Spatial Justice

STRATEGY

Which aspects of our plan improve spatial justice?

The idea of giving up certain luxuries we have now to safeguard the possibilities of future residents and generations in itself feels like the just thing to do. Relating to the question of sustainability, we are trying to maximize the potential of the future. The difficulty mostly lies in how to not compromise the needs of the current residents.

In making sure cities don't expand beyond their current border, the difference in distance to services, infrastructure and greenery will only diminish, making it more just.

Instead of the flood risk being high for a small amount of people, the risk will decreased and will be spread out.
As opposed to how it often is treated now, the plan will treat nature as a genuine stakeholder too. By greatly increasing the size and amount of natural environments, animals will be (more and more) given the things they have a right to as well: a healthy place to live.

Part of the people who are most affected by the plan, are also people that are causing a disproportionate amount of problems for the whole of the population currently. The transition to a more safe and sustainable agricultural sector will harm people either way, also without the land flooding. It might not feel just to them, but the situation might not be just now either.

The plan is basically about negatively impacting a small group of people to positively impact the greater good. Whether that is just or not is debatable, but if we can offer the people who are negatively impacted a good alternative/offer, the plan could bring us all forward.

Which aspects could be problematic for spatial justice?

How to make sure that the rich don't only have access to living risk-free and/or in an attractive (natural) environment?
People should have a choice in deciding where they want to live. Though eviction is avoided, it will occur. How can this be handled in a way that is just?
How will people not feel without rights and/or power?
How will freedom of choice and of property not be compromised?

POLICY

1 - REGULATORY

1.26 The safety of all residents should be put first at all times. In the transition to a flooded landscape, risk analysis should be performed by a multitude of independent specialists and companies for each intervention in the landscape.

1.27 Invest in infrastructure so accessibility of all is safeguarded, also when the landscape changes.

1.28 Social housing developers should be engaged with realizing resilient housing as well.

1.29 Notifying residents at least 2 years in advance if they live in areas which will be flooded.

1.30 Set up a program where people can get information and guidance if they their land has to be disowned.

2 - PRACTICAL & SPATIAL

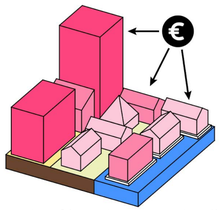
2.29 Mix of housing types in all kinds of built environments.

2.30 Densification in all urban areas that will stay, so the pressure on the housing market is decreased and people have more freedom in choosing where and how they want to live.

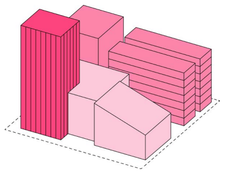
2.31 Building temporary (emergency) homes during the transition to accommodate people who cannot find a home in time.

2.32 An up-to-date and well-connected infrastructural system

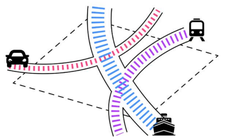
SPATIAL IMPLEMENTATION



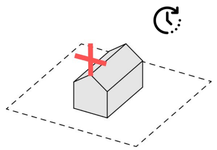
Mix of housing types in all kinds of environments



High level of density



Qualitative infrastructural system

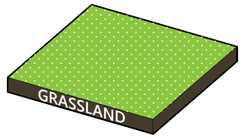


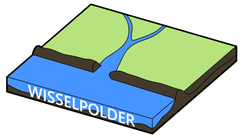
Temporary (emergency) homes

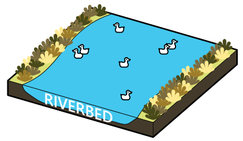
SPATIAL TYPOLOGICAL DICTIONARY

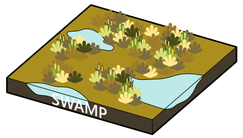
Landscape

For landscape, there will be more wisselpolder and wider riverbeds in South Holland as a response to the new flooded landscape. Wisselpolder is an alternative to prevent lands from flooding in a natural way. Wider river beds can provide the environment for the freight network



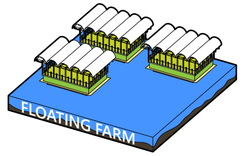


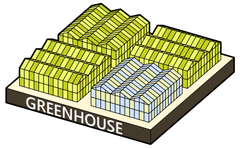


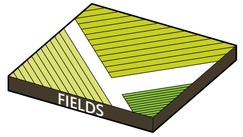


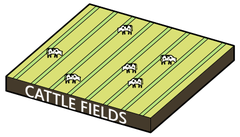
Agriculture

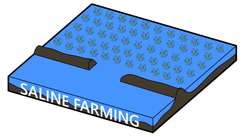
Based on traditional ways of agriculture, several new-tech ways of cultivating are introduced: floating farm, stalked greenhouse, saline farming, and floating allotment. They can be seen as the response to the new flooded landscape and fit the circular economy.

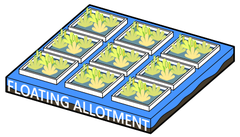


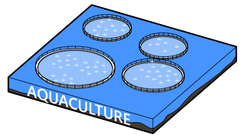


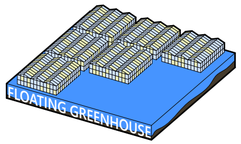






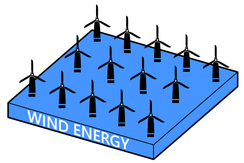


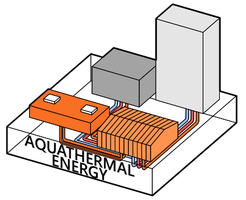


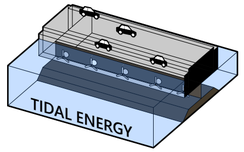


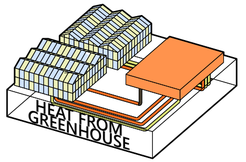
Energy sector

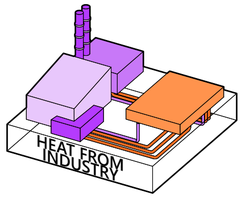
For the energy sector, we tried to introduce more clean and renewable energy, which can be produced from the new landscape, for example, tidal energy. What's more, heat energy can be collected from industry and greenhouse, which is part of the new flow.

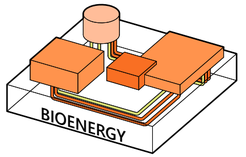






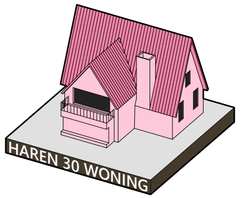


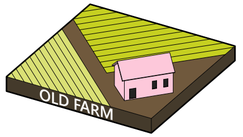


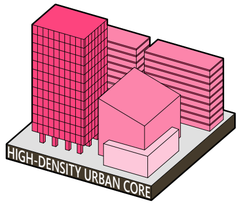


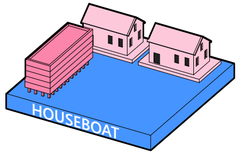
Urban environments

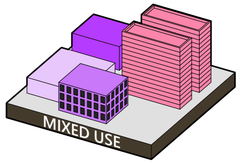
The typologies of urban environments show the change in people's life. With a larger population, urban density must be increased under the new landscape conditions, and urban and rural residents need to be rationally resettled.











FLOWS & MOBILITY // SYSTEM

The flows highlighted in the conceptual framework are put together into a diagram to see their interrelations in one overview. The symbiotic link between biomass from agriculture (organic waste) and energy/ heat produced by the bio refinery becomes apparent. In this way, energy that was used to ultimately produce organic waste from agriculture is put back into its own production instead of discarded. Several other streams of biomass contribute to the overall functioning of the bio refinery and its contribution to other programme, such as housing. The (carbon) emissions are highlighted but not mitigated.

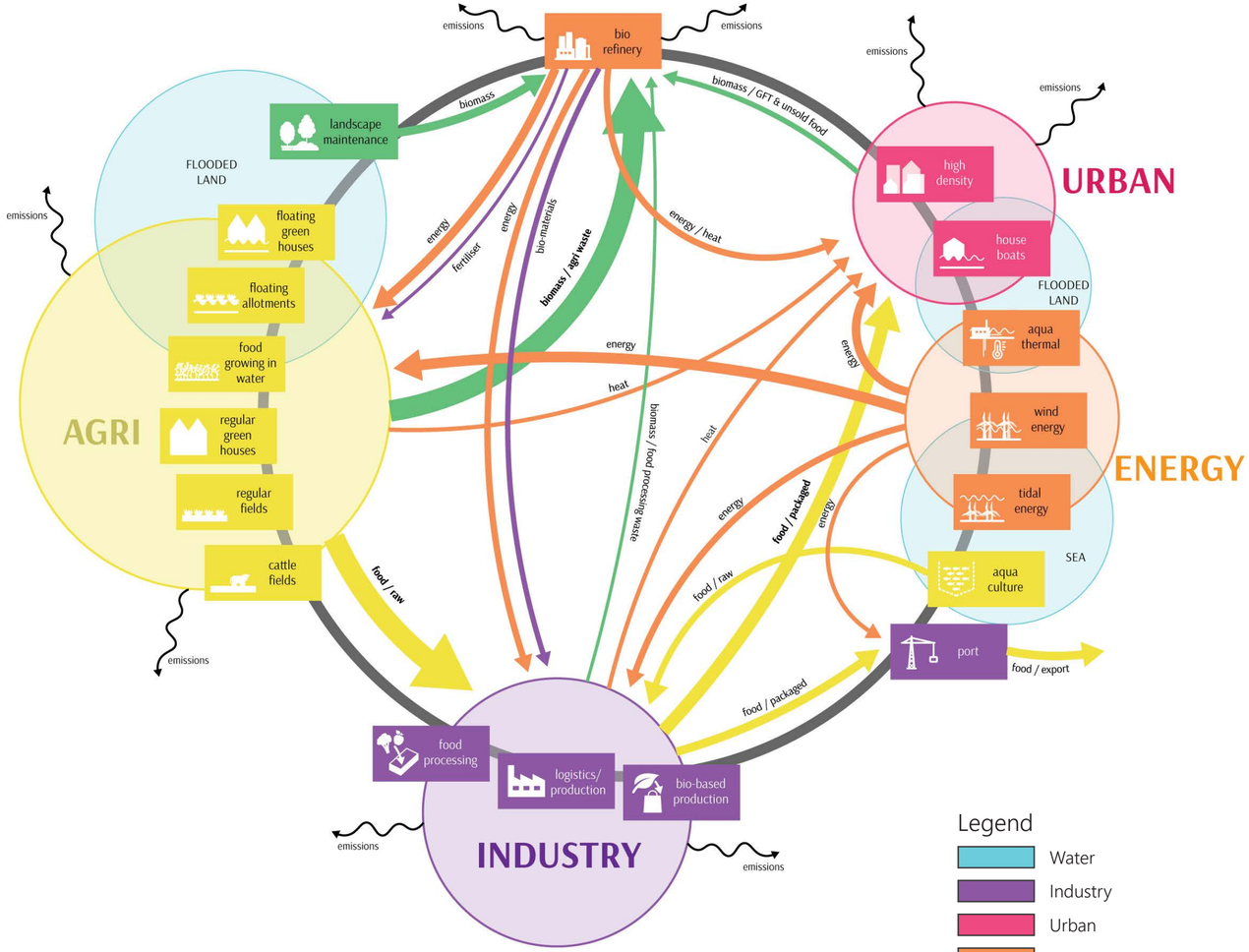


Image by author
with input from Gurría et al (2020), PBL (2014)

FLOWS & MOBILITY // SPATIAL IMPLICATIONS

The flow diagram on the previous page is made less abstract in the following images. The general flows of energy, agriculture and biomass are shown as they would be in the future scenario with more (real) context. The axonometric provides a good overview of the current flows, how the current landscape looks generally, as well as the changes to both of these topics if the proposed flows and spatial implementations come to fruition.

Image by author

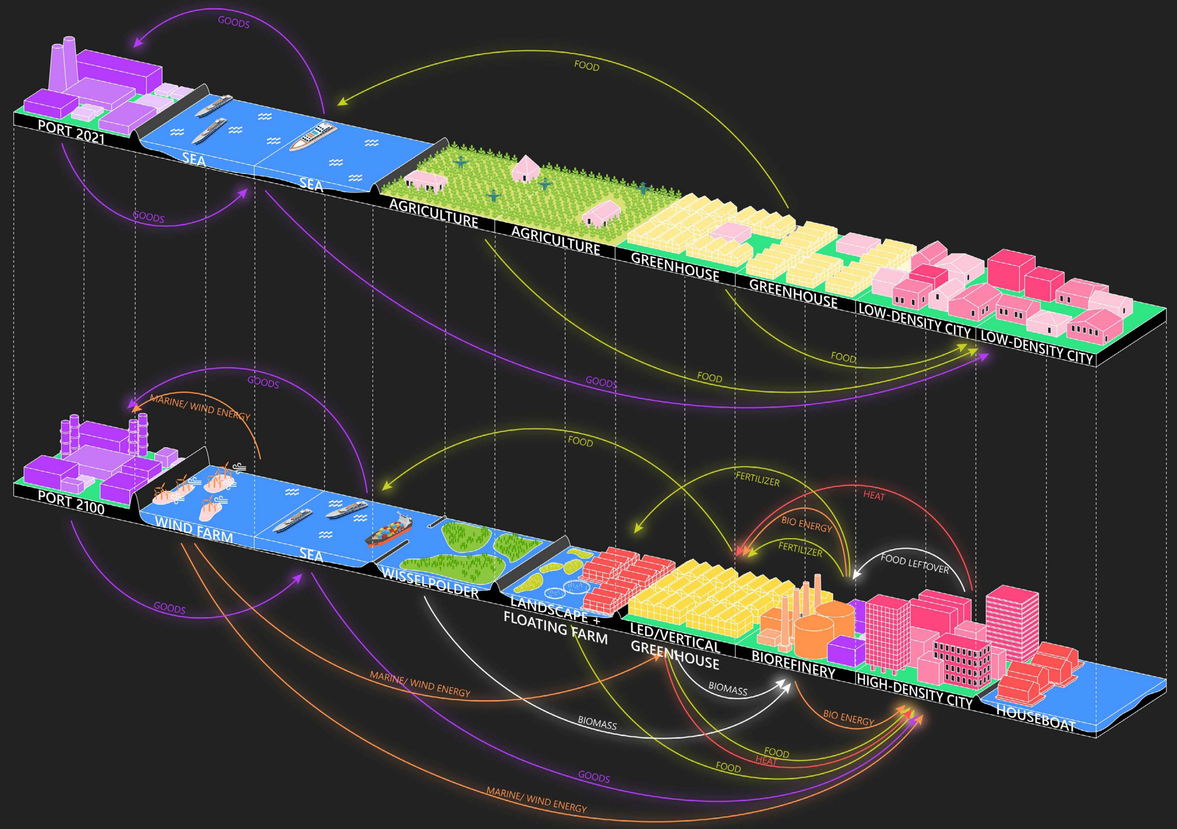
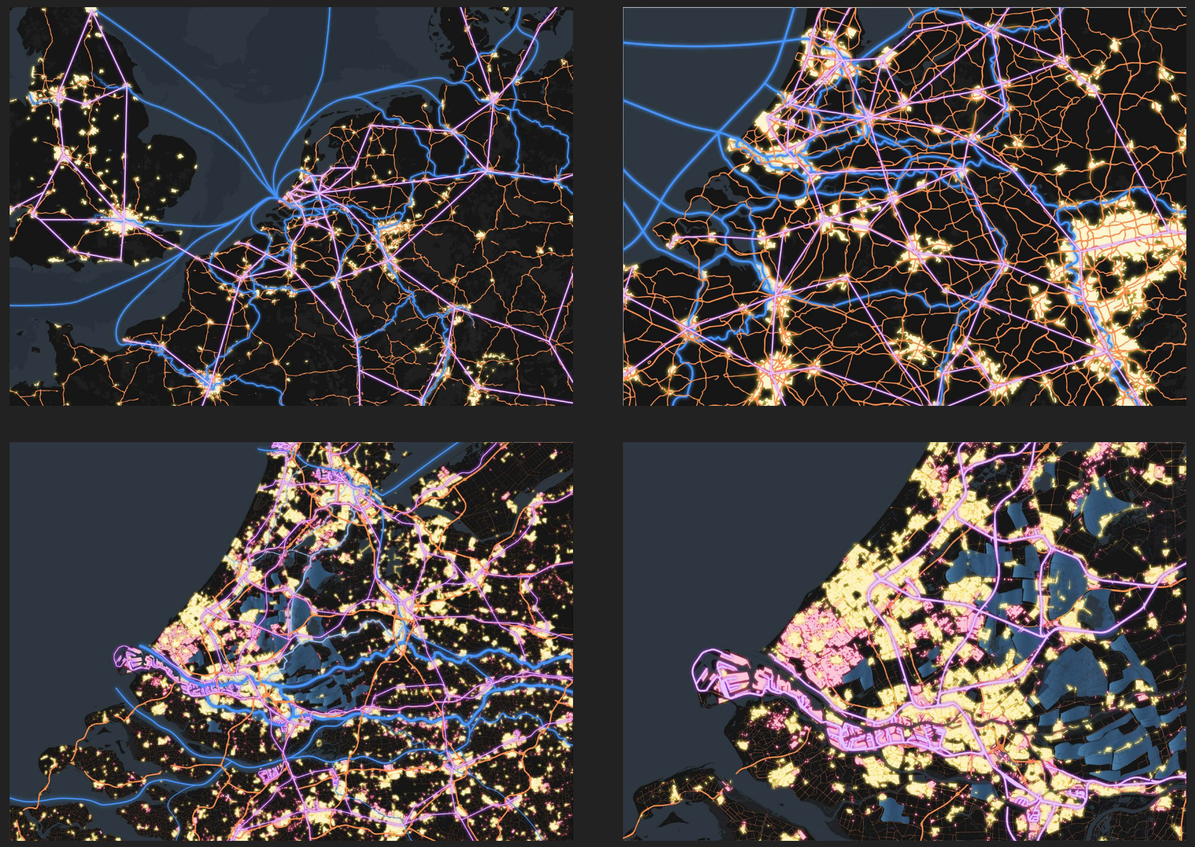


Image by author

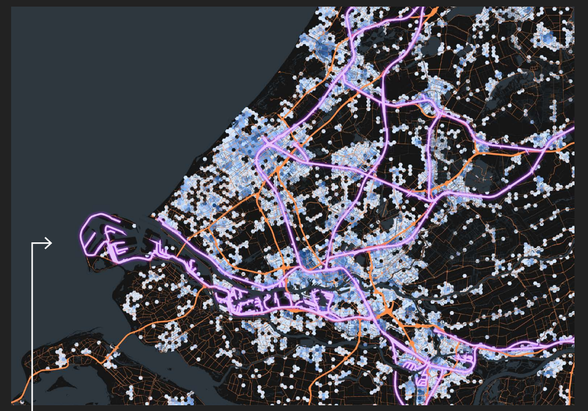
FLOWS & MOBILITY // THROUGH THE SCALES

As our connection with other parts of Europe is for a large part through waterways, making more room for the river and therefore for freight passing through will have a positive impact on connectivity. Flooding the landscape will, however, also bring complications when it comes to flows and mobility. Some current transportation networks will have to be removed or will not be able to intensify, which is why we propose a new way of distribution in the province. To counteract the current process of 'verdozing' of the landscape, distribution, wholesale and logistic centres should be relocated as much as possible to larger industrial areas around the port and greenport. Only industrial activity related to a specific location elsewhere should stay. As goes for housing, these buildings too should be concentrated rather than dispersed.

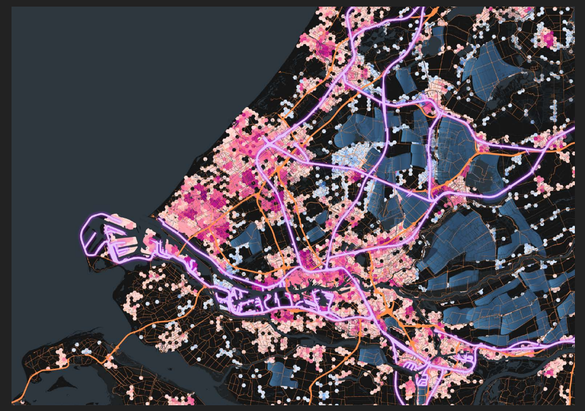


Mobility networks

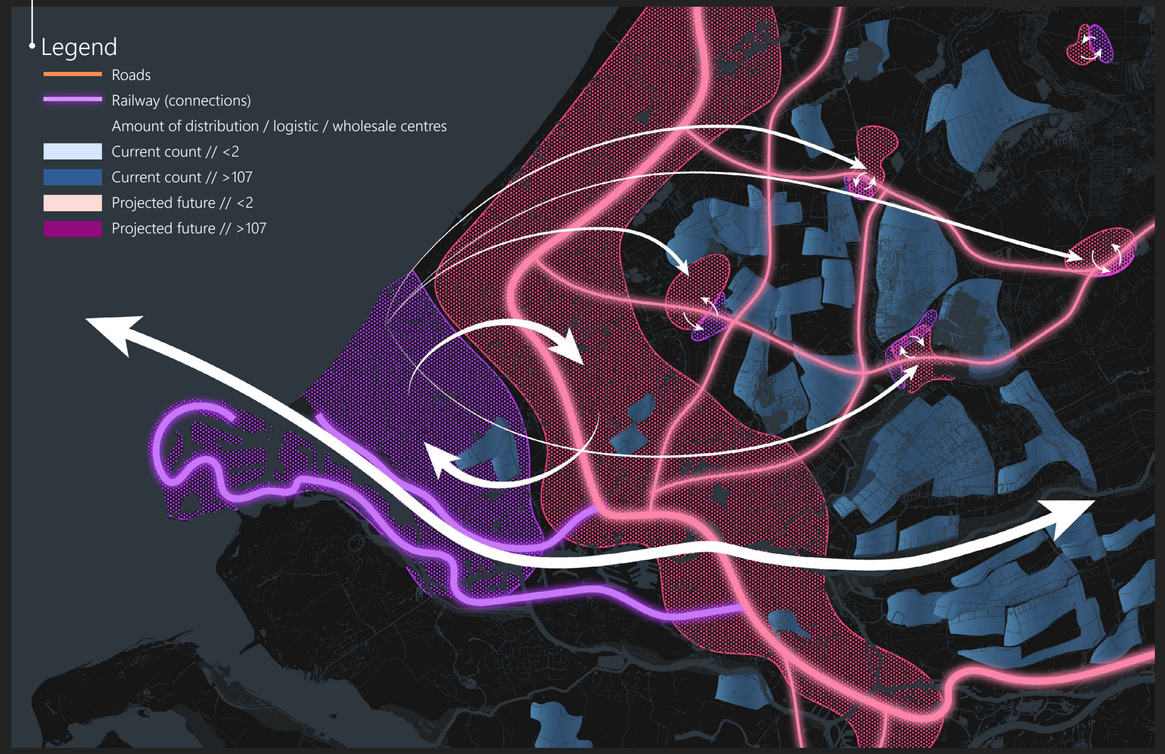
Images by author, with input from PDOK (2012), Provincie Zuid-Holland (2020)



Current situation // dispersion



Envisioned situation // concentration



Mobility & logistics // envisioned concept

Images by author, with input from PDOK (2012), Provincie Zuid-Holland (2020)

FLOWS & MOBILITY // ENERGY SYNERGY

Industries, urban cores and greenhouses are the main driving forces of this energy mobility, alongside the flooded landscape. The flows will help the economy to be fully circular and efficient as the waste will be processed in biorefineries, and the energy created will be distributed accros South Holland. Input flows are coming from the urban cores and greenhouses, to arrive in energy hubs and biorefineries. The energy created is then redistributed to South Holland. The energy from surface water will also particiapte in this energy mobility system as it will contribute in smaller areas. Greenhouses, industries and cities located next to the flooded landscape will benefit from direct energy supply from the water.

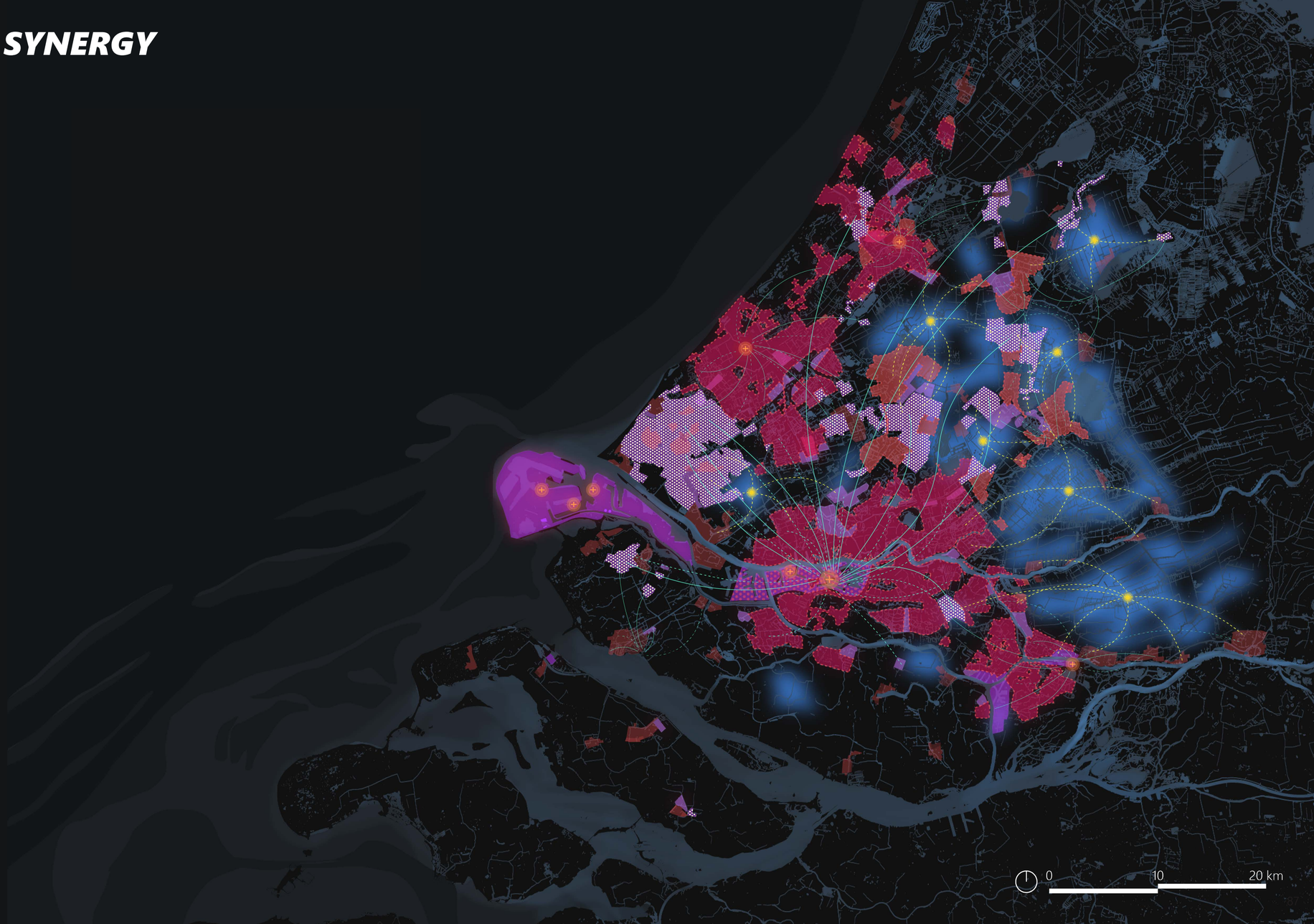


Image by author
with input from PDOK (2012), source (year)

FLOWS & MOBILITY // ENERGY NETWORK

The energy network developed accross South Holland will deal with different kind of energy sources. In 2100, South Holland will fully be clean and sustainable in its energy system. The focus will mostly be on hydorgen, thermal energy, biofuels and electricity. It is therefore important to adapt the network to the flooded landscape and distribute it accross the territory, taking into account the new features of the landscape.

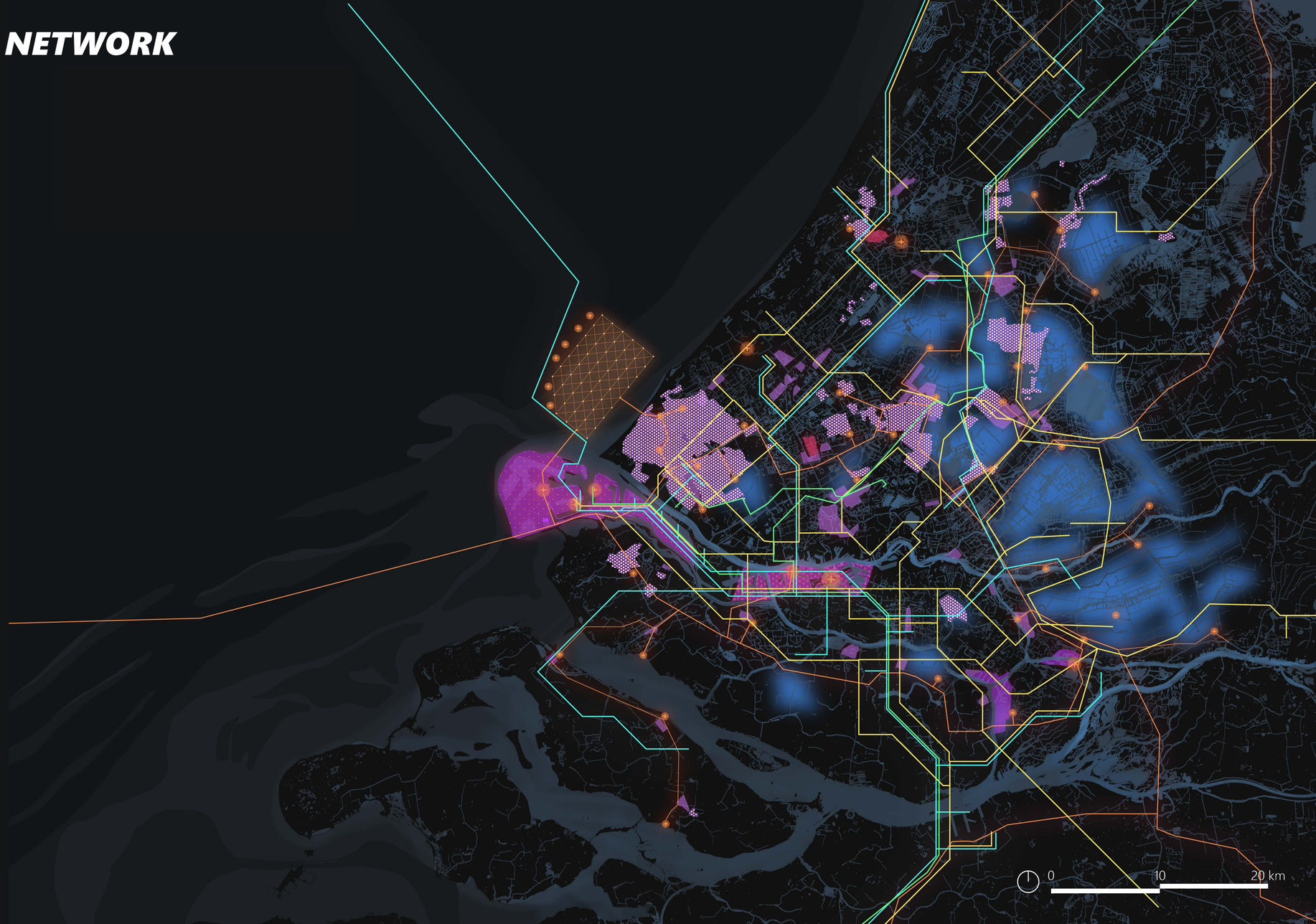


Image by author
with input from PDOK (2012), source (year)

STRATEGY CONTEXTUALIZED

THE NEW URBAN LANDSCAPE

GOUDA

The municipality of Gouda and its surroundings are used as a sort of test ground of the strategy and policy. Within our vision, the city of Gouda will be surrounded by flooding polders, new types of agriculture and its city centre will need to be a lot denser than it is now. Gouda is a place where everything could come together, which is why exploring the spatial implications of the proposed strategy is relevant. This new urban landscape could set an example for how other municipalities in South Holland, the Netherlands or even Europe could deal with similar issues.

THE NEW PRODUCTIVE LANDSCAPE

PORT OF ROTTERDAM & GREENPORT WESTLAND

The port of Rotterdam and Westland are anything but generic spaces, which is exactly why the vision reserves a special role for this area. The port and greenport will, together with the energy producing structures at sea, form the productive landscape that supports the rest of Zuid-Holland and the Netherlands. As the port and greenport are in many ways our connection to the rest of Europe and the world, it is only logical to centralize our productive and logistic activities here, too. As this new productive landscape is a backbone within the vision, it is essential to investigate the spatial impact of the strategy in this area as well.

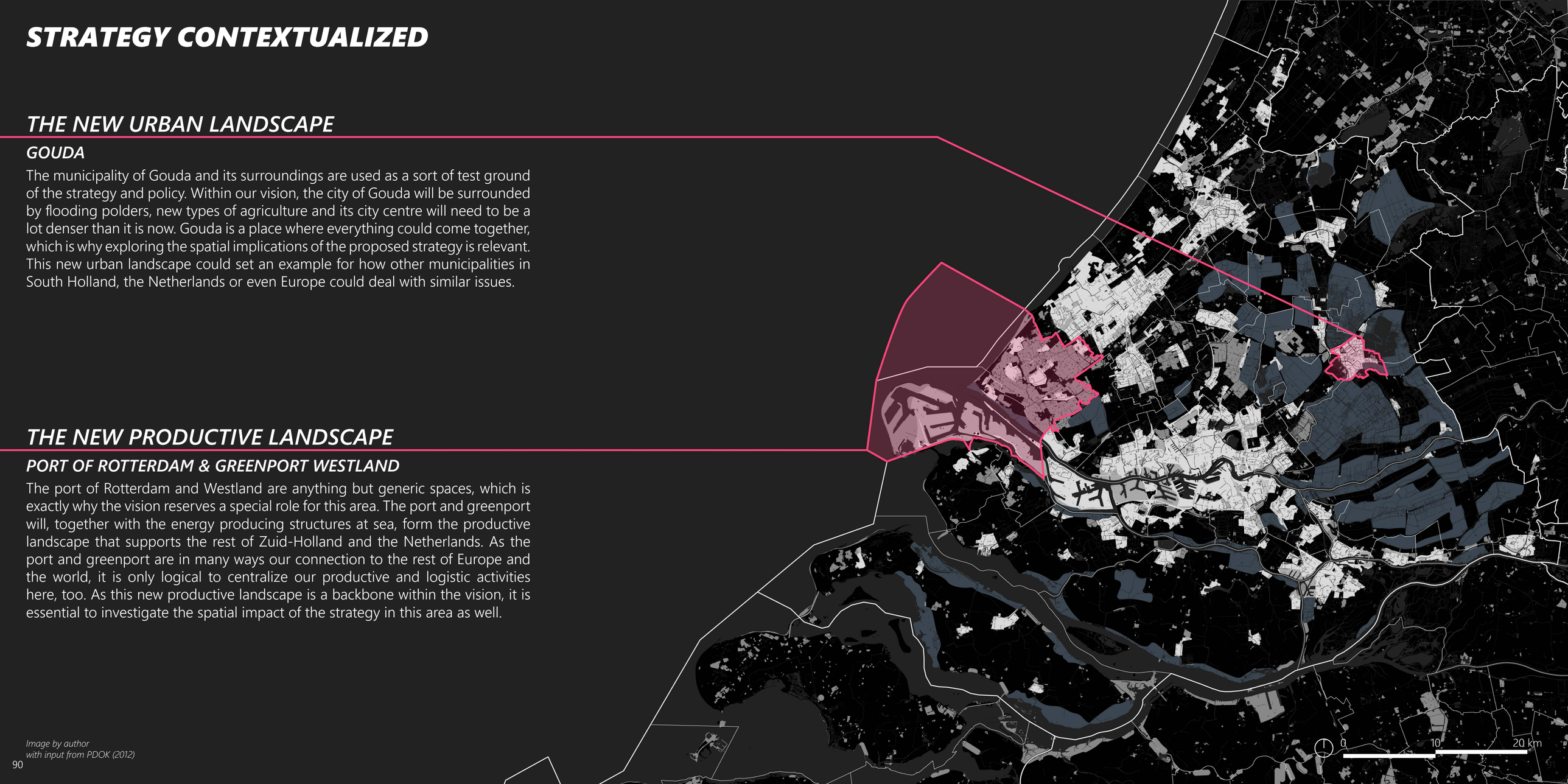
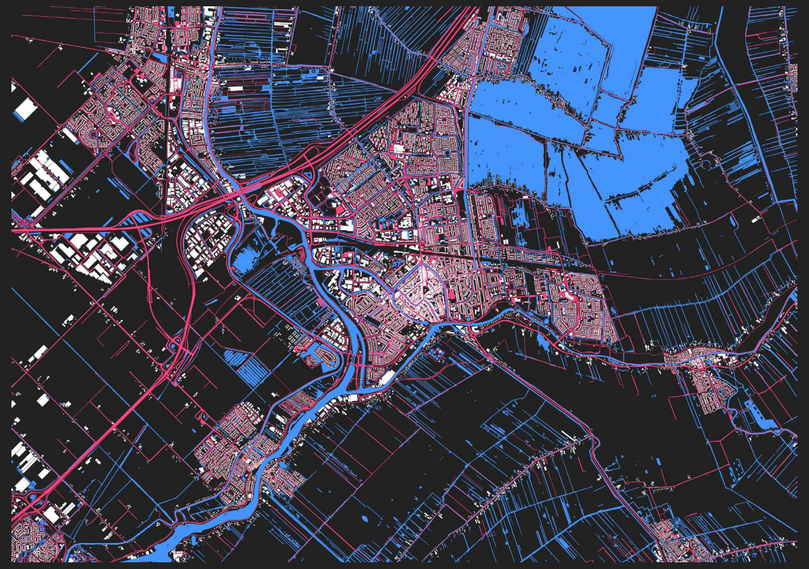
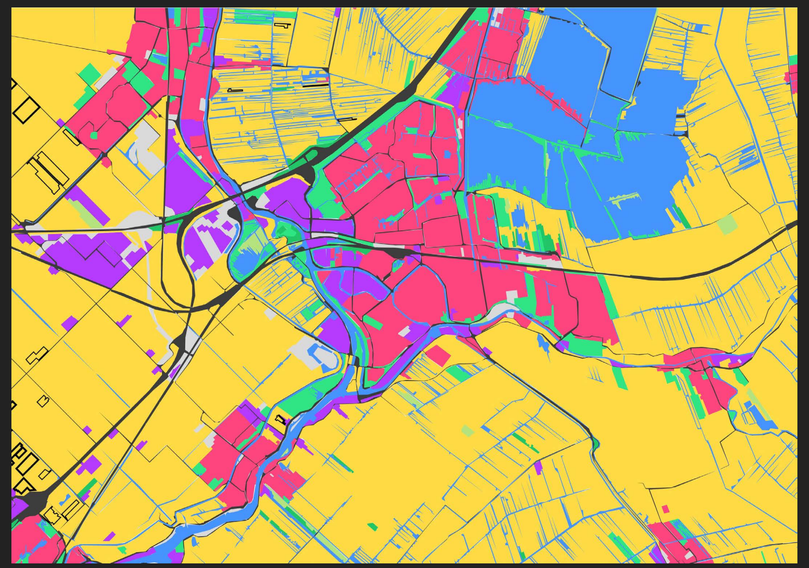


Image by author
with input from PDOK (2012)

THE NEW URBAN LANDSCAPE

The city of Gouda has many of the Dutch typicalities one may think of when speaking about the Dutch landscape and its cities. A historic city centre where most commercial functions are located, surrounded by housing neighbourhoods realized in almost all the different decades of the 20th century. But besides its picturesque centre and the famous cheese the region produces, the landscape it is situated in has stayed completely true to the Dutch tradition, too. Except for the Reeuwijkse plassen, the area is completely pumped dry and is used almost solely for agricultural purposes - resulting in a monotonous landscape which does little for the residents or nature. As the city is vulnerable to sea level rise, subsidence and salinity, giving parts of the land back to the water could provide a solution for multiple problems at once.





Images by author
with input from PDOK (2012)

Legend
- Water
- Buildings
- Infrastructure

Legend
- Water
- Urban / Housing
- Natural
- Industrial
- Semi-built
- Agricultural
- Greenhouse
- Infrastructure

Legend
- Agricultural
- Green corridor
- Urban / Housing
- Industrial
- Urban Industrial mix
- Forest
- Humid / Swamp
- Grasslands
- Infrastructure
- Wisselpolder
- Water

By widening the river bed - partly permanently and partly in the form of wisselpolders - the chance of flood is decreased and the river bed become a natural transition zone again, improving water quality and biodiversity. As agricultural land is flooded and either given back to nature or used for new types of agriculture or floating housing, the city becomes situated in the midst of a diverse landscape. In order for this to succeed, it is important that the city centre becomes more dense and that the land is used as efficiently as possible. The industrial zones in the inner city will be transformed to mixed-use housing areas and old neighbourhoods will be redeveloped over the years.

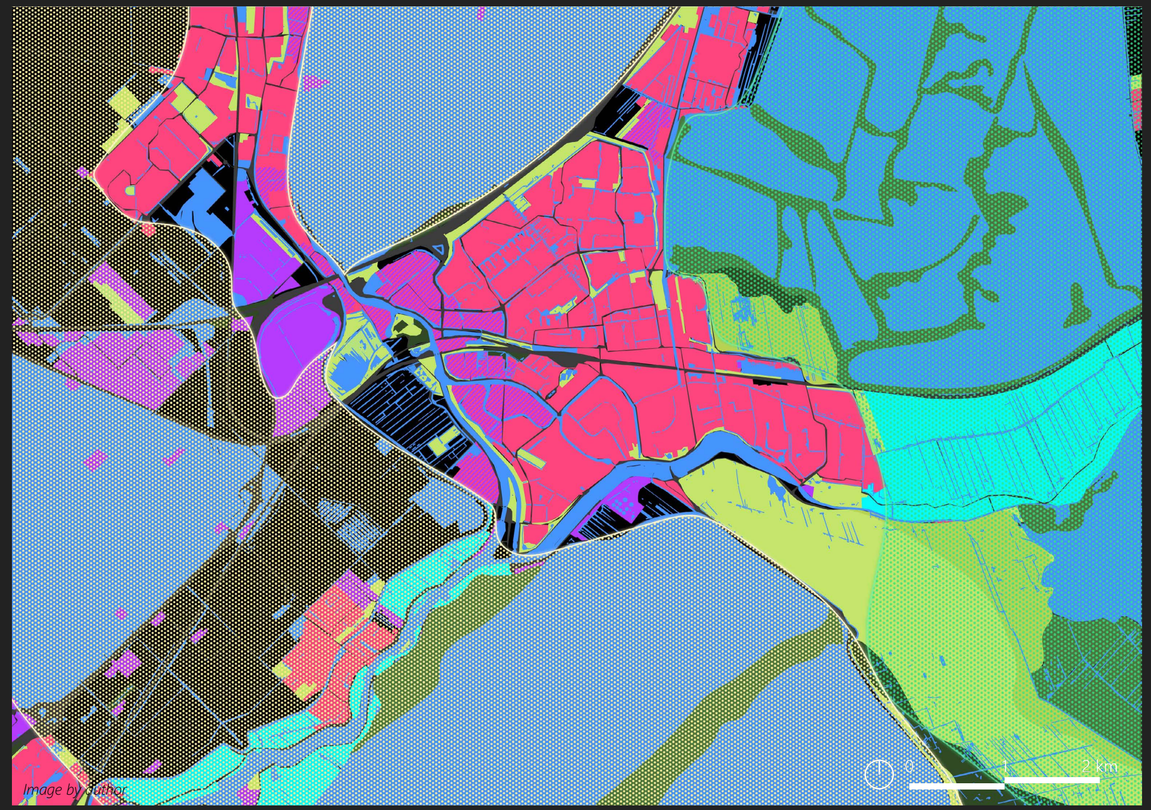


Image by author

THE NEW URBAN LANDSCAPE

Image by author

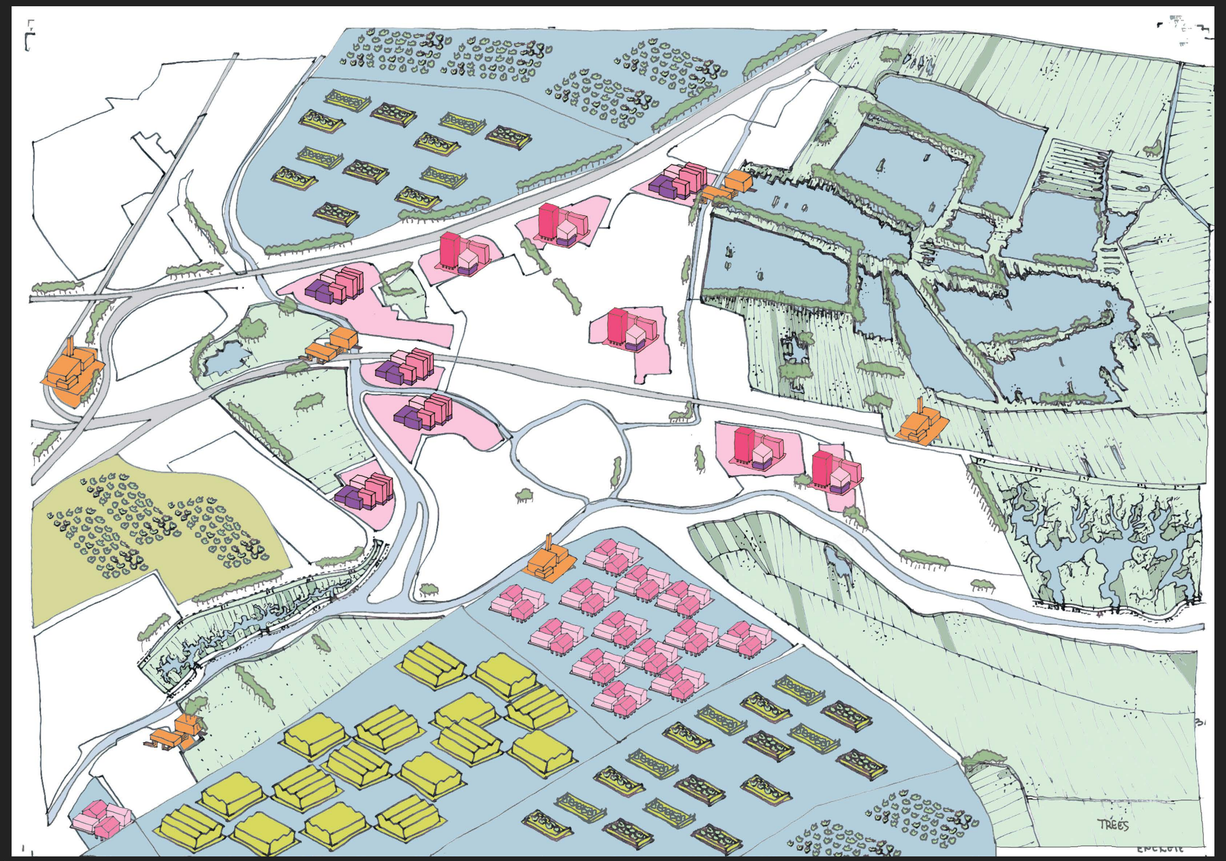
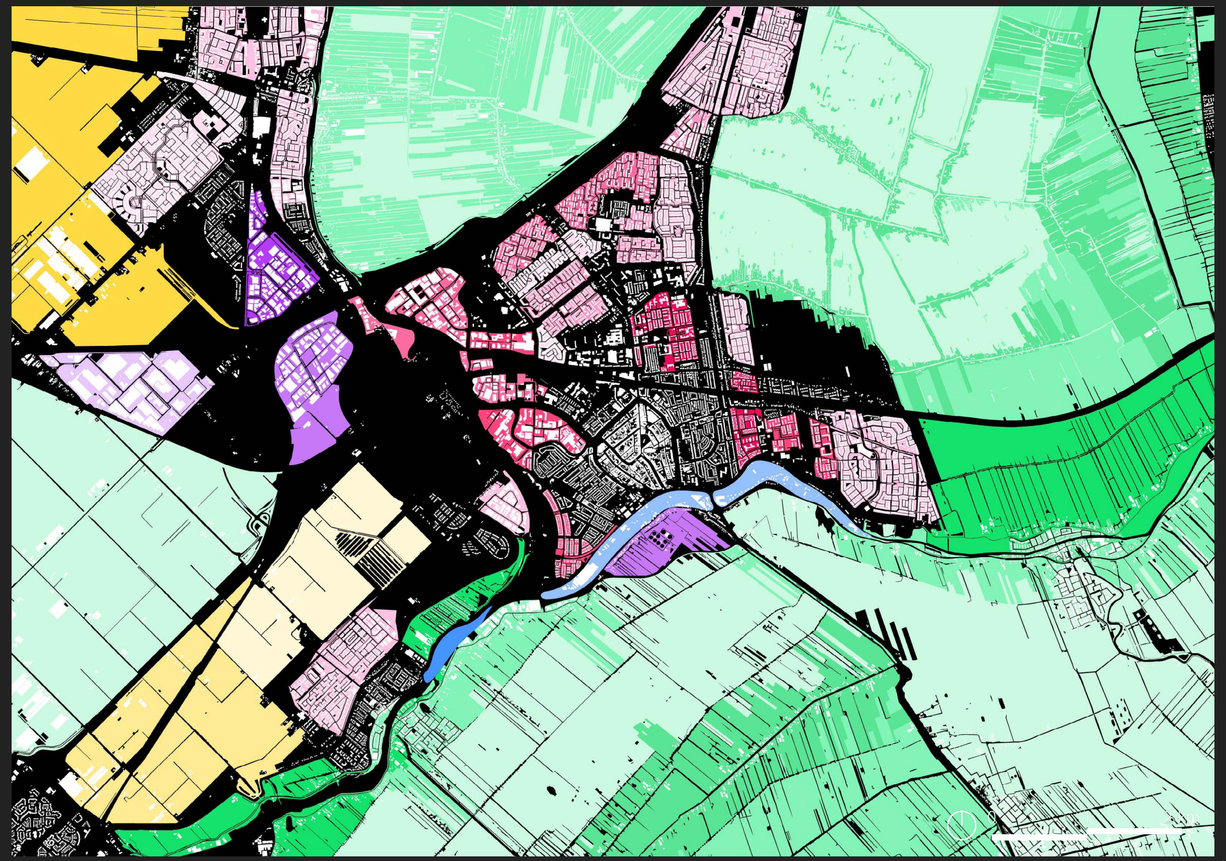
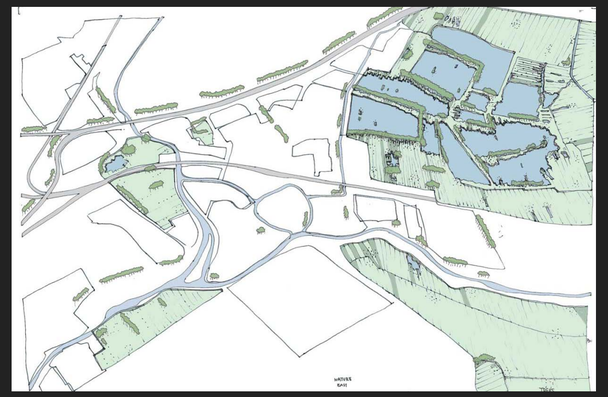


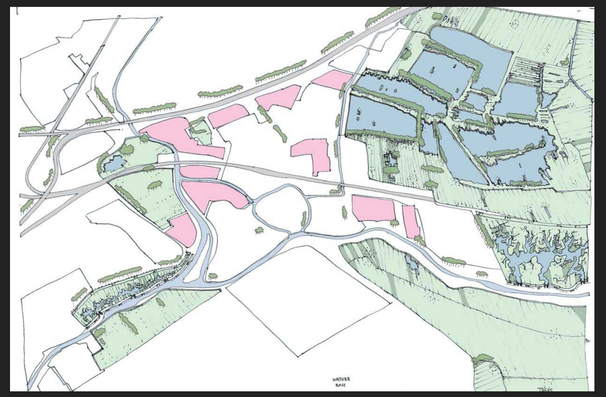
Image by author
with input from PDOK (2012)



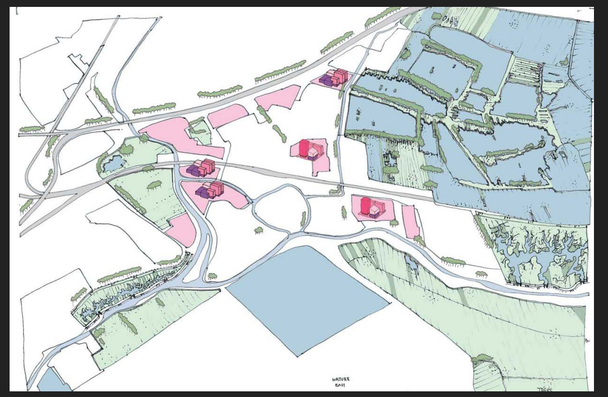
THE NEW URBAN LANDSCAPE



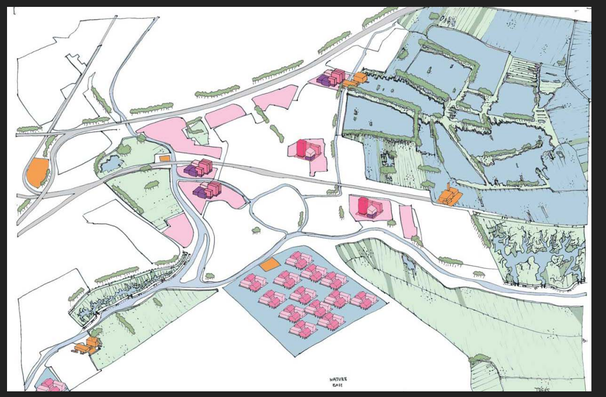
Phase 0 - Current situation.



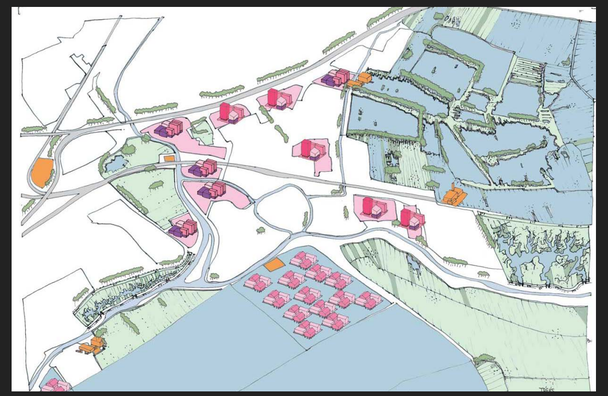
Phase 1 - Wisselpolders are established and planning/ design starts for urban area development (mix, high density).



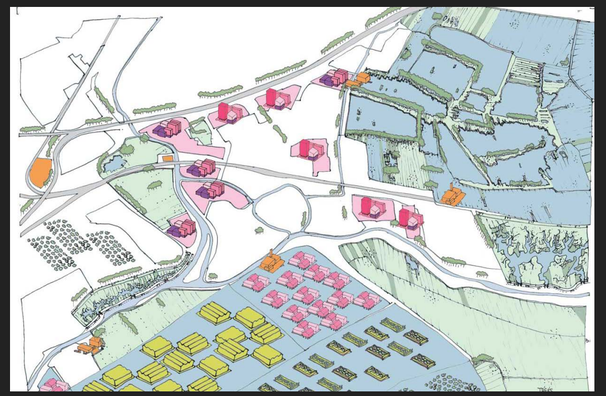
Phase 2 - First urban area developments (mix, high density) are built, several polders in the green corridor and one part for floating houses are flooded.



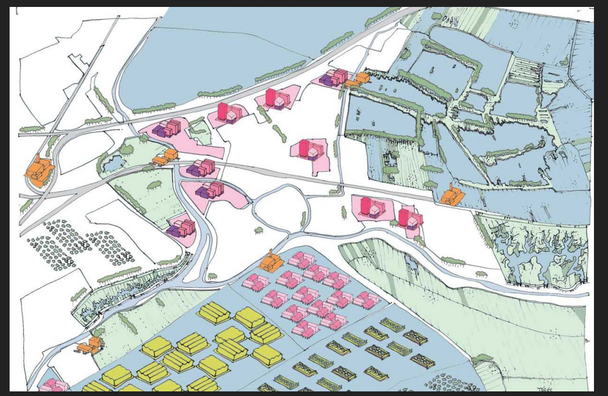
Phase 3 - First floating urban area development is built, the energy network takes shape with heat plants and a biomass refinery.



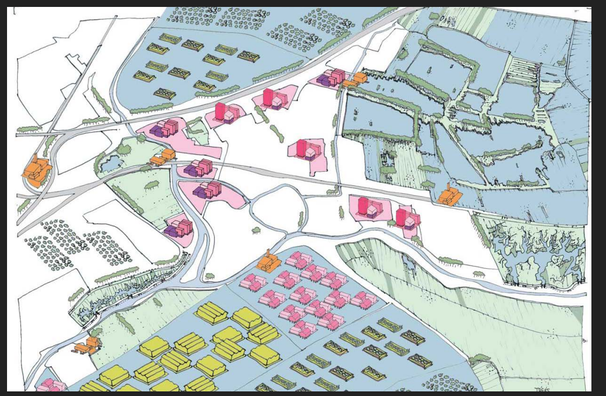
Phase 4 - First complete polder outside of the green corridor is flooded, final urban area developments (mix, high density) are built.



Phase 5 - First floating agriculture is built in the flooded polder, another biomass refinery comes online.



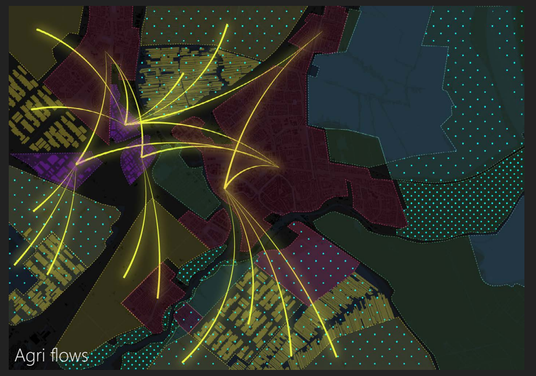
Phase 6 - Second complete polder outside of the green corridor is flooded, the energy network has been completed.

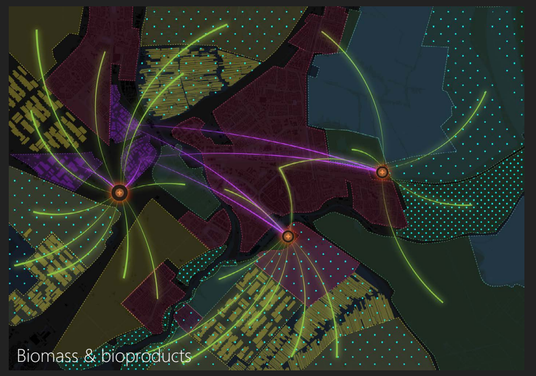


Phase 7 - Second floating agriculture is built on the flooded polder, all spatial implementations for the area are present.

All images by author

GOUDA // FLOWS OVERVIEW





Legend

- Agri - greenhouses
- Agri - fields
- Agri - floating greenhouses
- Agri - floating allotments
- Agri - in-soil flooded farm
- Green
- Green - flooded
- Green - wisselpolder
- Urban area
- Urban area - floating houses
- Industrial area
- Water
- Flow - agri output to input
- Flow - biomass output to input
- Flow - bio material output to input
- Flow - heat with throughput
- Flow - electricity with throughput
- Heat redistr. & biomass plant resp.

The abstract flow diagram has been applied onto the real-life situation in Gouda. Locations of production sources are defined, such as: agriculture, nature, industry, biorefineries and heat plants. These may be both existing or the (desired) future situation. Whether an area is destined to be flooded or not is also taken into account. This map shows a closed system for the city of Gouda, assuming things produced in the direct vicinity are destined for use within the city. This is not necessarily realistic, but was a necessary decision to make for the overall cohesion of the map and its flows.

Images by author
with input from PDOK (2012)

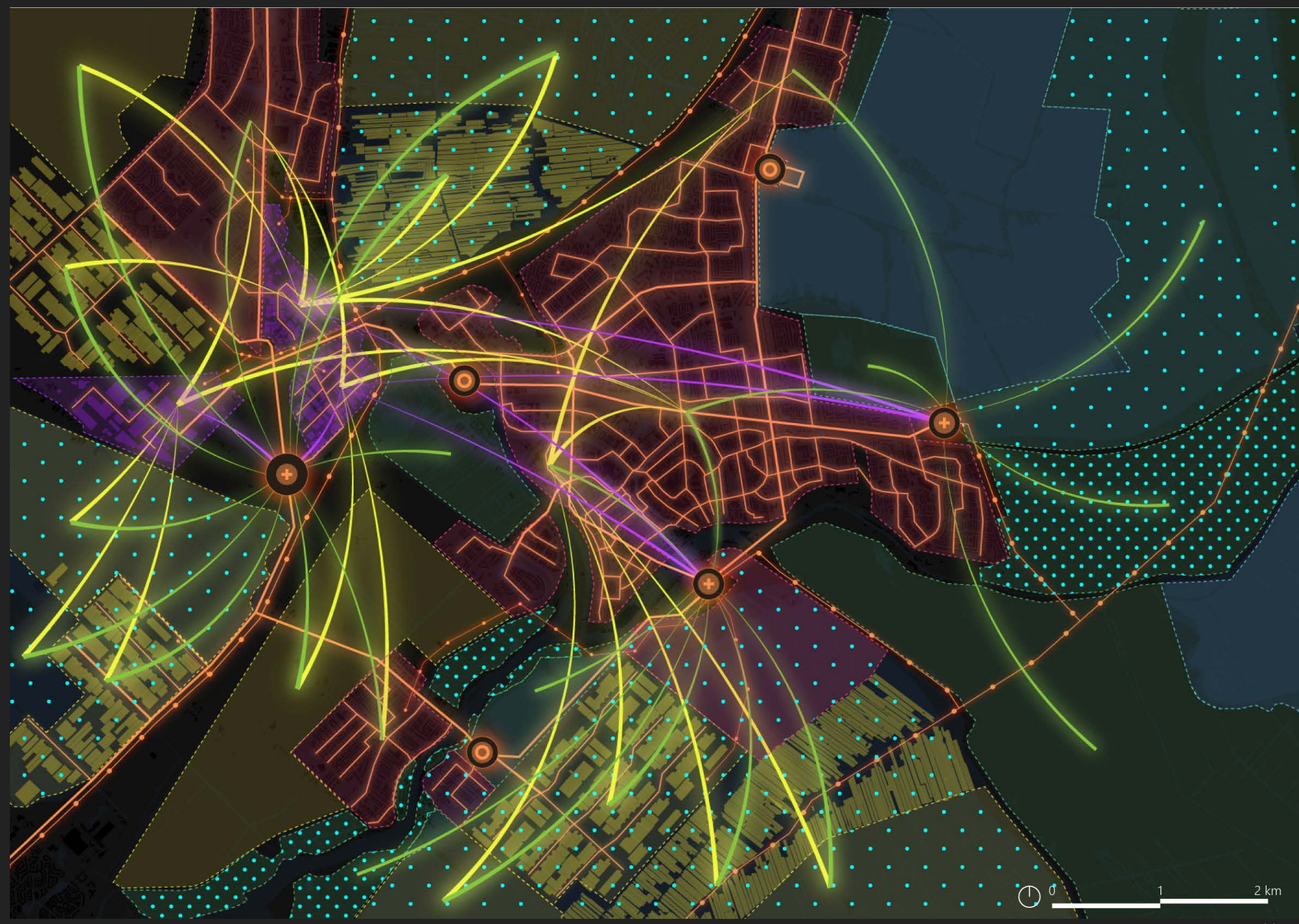


Image By author

THE NEW PRODUCTIVE LANDSCAPE

Port of Rotterdam & Green Port Westland

The new productive landscape is largely fostered by the synergy between the two "ports" : the port of Rotterdam and the green port that is Westland. Together, they participate in this future productive circular landscape, taking into account the new built environment, affected by the flooding. This future energy backbone of South Holland is powered by the great energy production at sea -wind and marine. The port will play a key role in converting the off-shore energy as well as producing biomass from Westland and processing it in the future bio-based infrastructures. To facilitate this circular process and support this productive landscape, new connections will be developed between Westland and the Port.

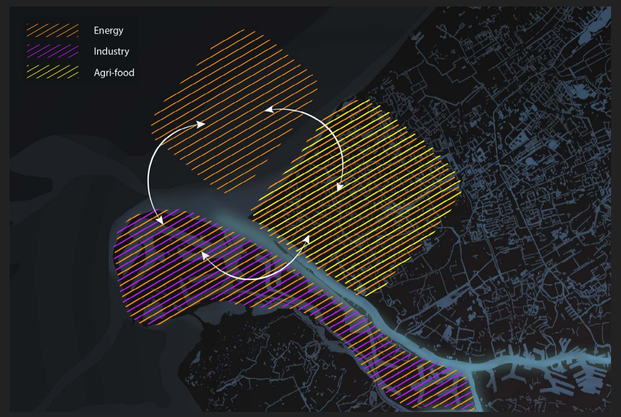


Image by author
with input from PDOK (2012)

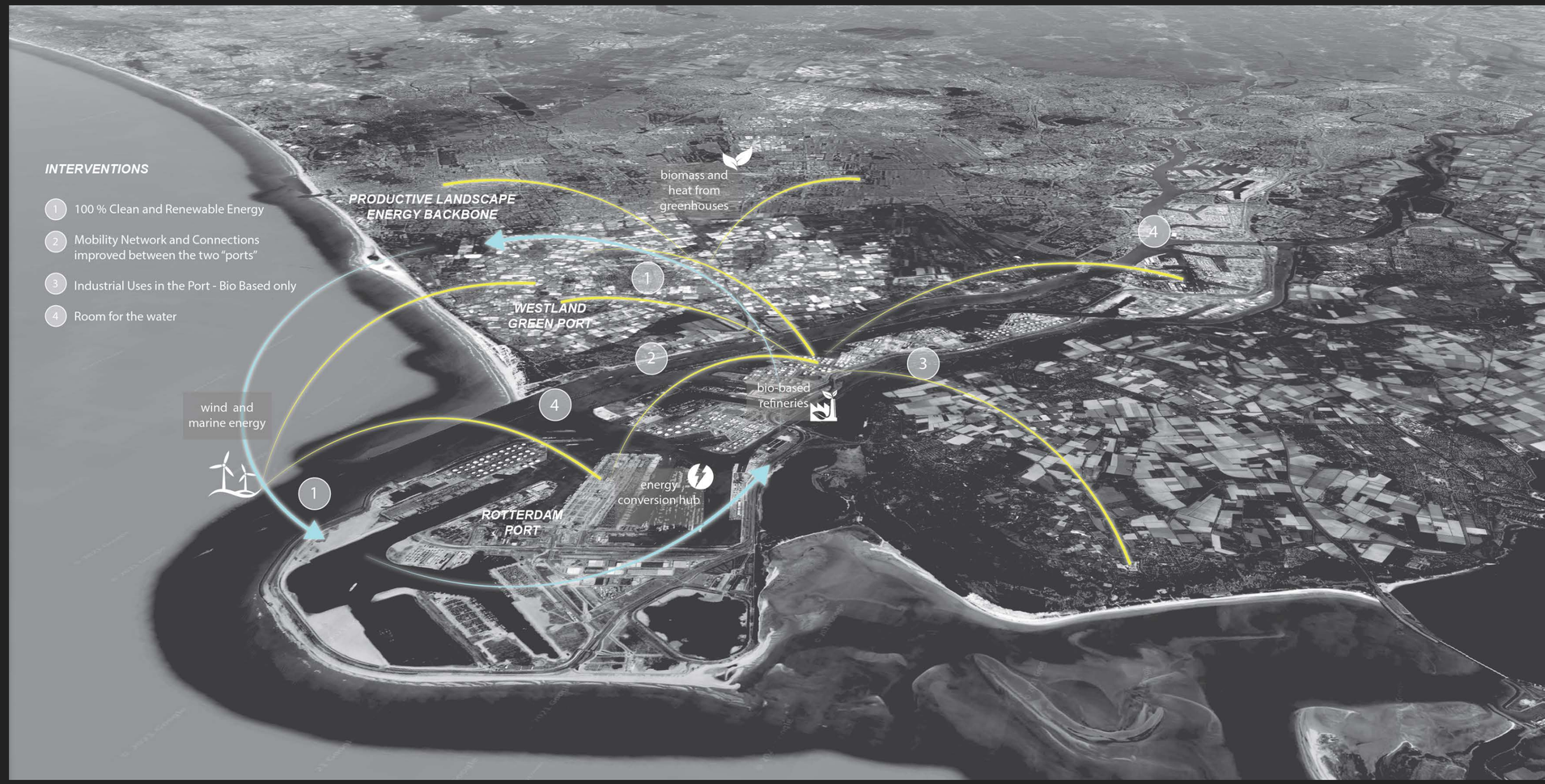
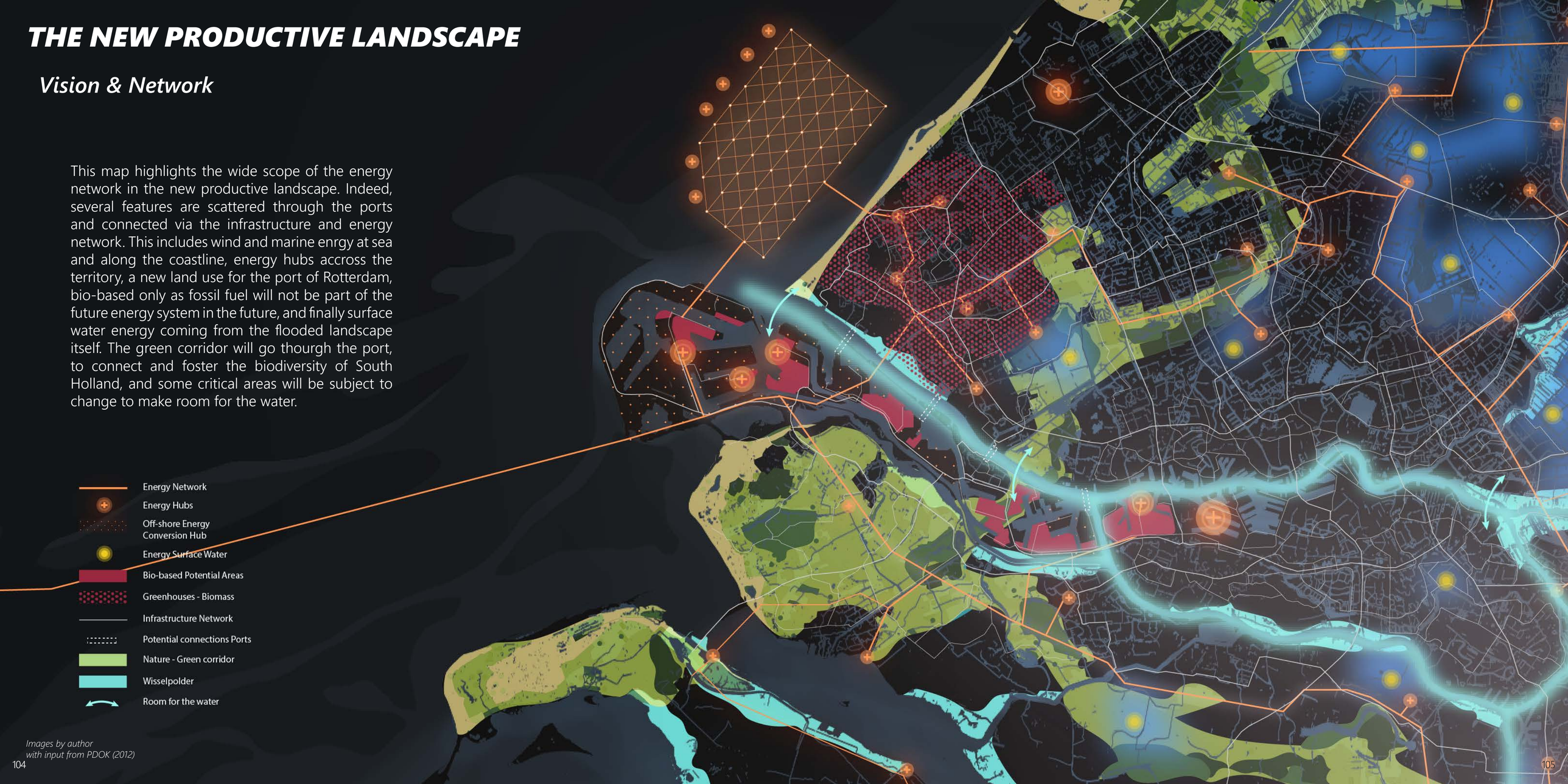


Image by author
with input from Google (n.d.)

THE NEW PRODUCTIVE LANDSCAPE

Vision & Network

This map highlights the wide scope of the energy network in the new productive landscape. Indeed, several features are scattered through the ports and connected via the infrastructure and energy network. This includes wind and marine enrgy at sea and along the coastline, energy hubs accross the territory, a new land use for the port of Rotterdam, bio-based only as fossil fuel will not be part of the future energy system in the future, and finally surface water energy coming from the flooded landscape itself. The green corridor will go thourgh the port, to connect and foster the biodiversity of South Holland, and some critical areas will be subject to change to make room for the water.

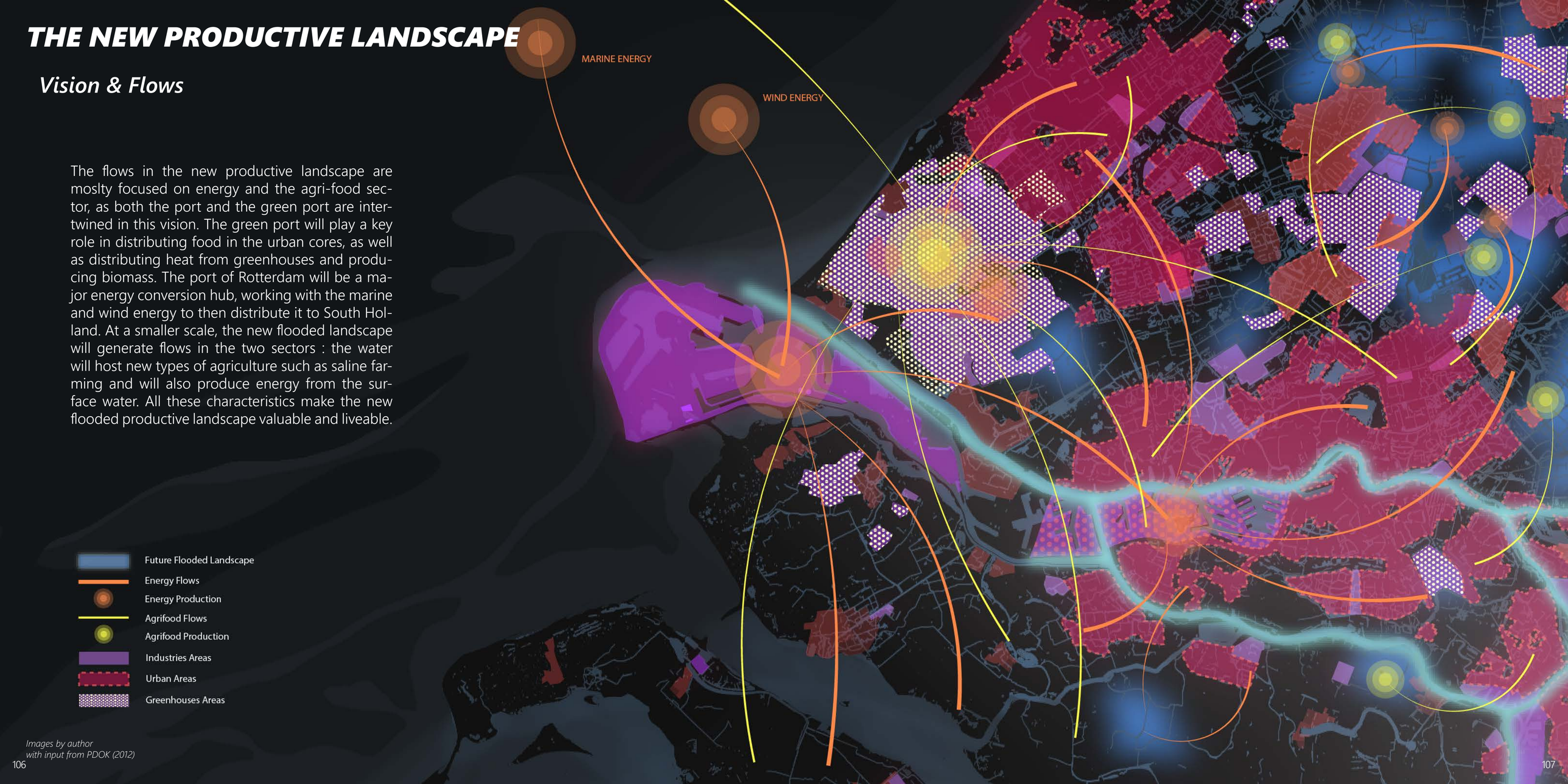


Images by author with input from PDOK (2012)

THE NEW PRODUCTIVE LANDSCAPE

Vision & Flows

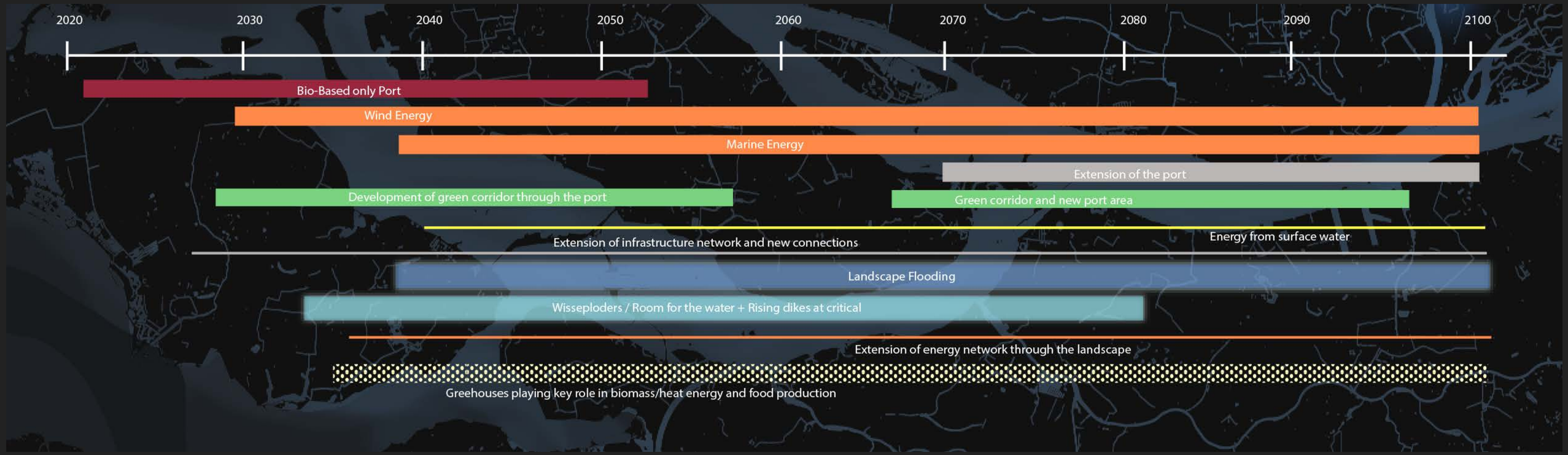
The flows in the new productive landscape are moslty focused on energy and the agri-food sector, as both the port and the green port are intertwined in this vision. The green port will play a key role in distributing food in the urban cores, as well as distributing heat from greenhouses and producing biomass. The port of Rotterdam will be a major energy conversion hub, working with the marine and wind energy to then distribute it to South Holland. At a smaller scale, the new flooded landscape will generate flows in the two sectors : the water will host new types of agriculture such as saline farming and will also produce energy from the surface water. All these characteristics make the new flooded productive landscape valuable and liveable.

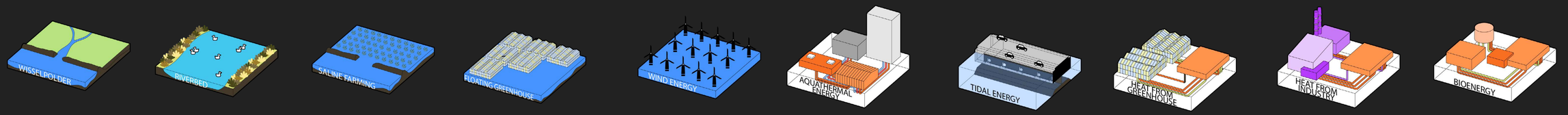


Images by author
with input from PDOK (2012)

PRODUCTIVE LANDSCAPE

Phasing





Images by author

Image by author

STAKEHOLDERS

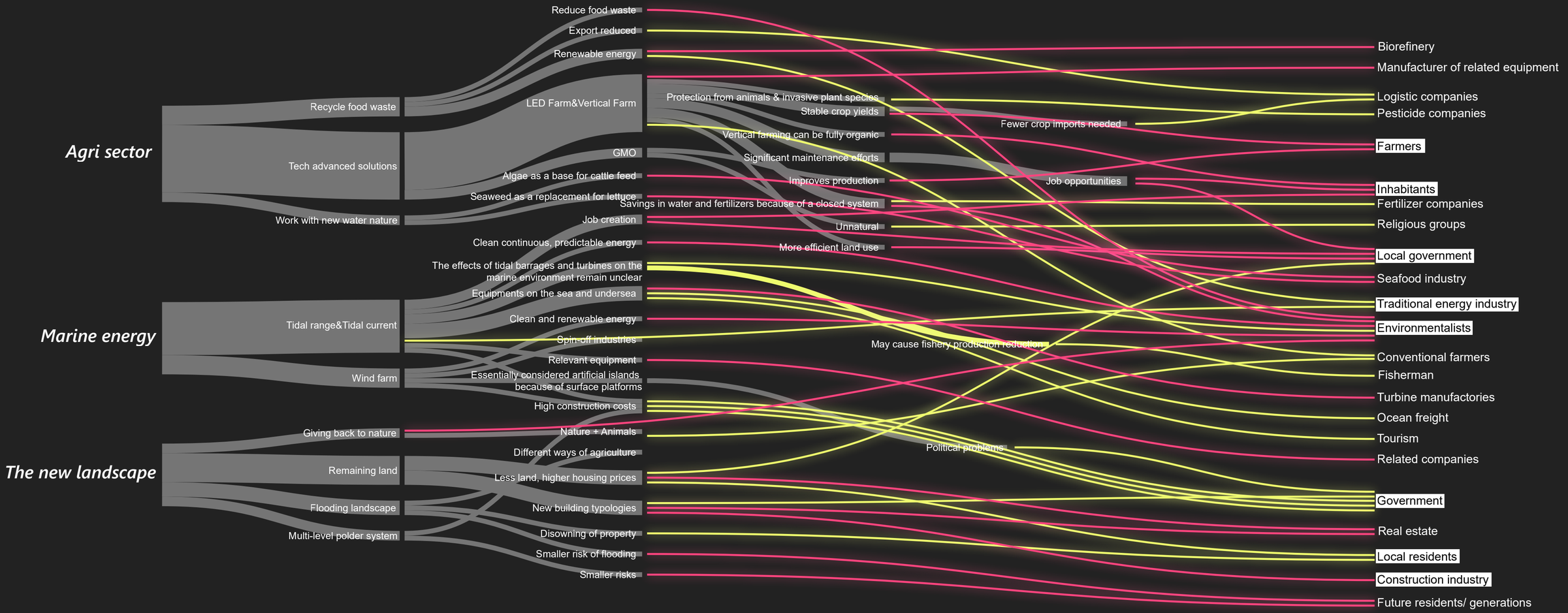


Image by author

This is an analysis of more specific stakeholders. Starting from three main sectors, then further inferring what will happen next, finally, we can get the specific stakeholder. The most important stakeholders can be recognized by the numbers of input lines, which are: natures, government, inhabitants, farmers, industry, and companies.

PHASING

REGULATORY

SPATIAL

PLANNING
Research, design & legal
<2035

SWITCHING
Action, experimentation, construction, realisation
2035-2065

LIVING
First results, a circular flooded landscape
>2065

2021 2030 2040 2050 2060 2070 2080 2090 2100

1.10 - Land purchases
1.13 - Land for green corridor
1.14 - Natura2K
1.18 - Nature protecture and maintenance
1.24 - Wisselpolder lease

FLOODED LANDSCAPE

1.3 - Reduce cattle
1.6 - Agri switch subsidy
1.7 - Sust. plan
1.5 - Encourage sust. farming
1.8 - Gov. & farmers communication
1.9 - New landscape subsidy
1.25 - Projected plot structure

AQUA AGRI

1.15 - Energy subsidy
1.16 - Fossil fuel tax

GREEN ENERGY

1.17 - R&D subsidy
1.19 - Func. mix

CIRCULAR INDUSTRY

1.4 - Increase awareness
1.1 - R&D subsidies
1.2 - Invest in durability
1.20 - Mix%
1.11 - Housing typology limit
1.22 - Qual. ass.
1.12 - Water resilient buildings
1.21 - New dev. requires water plan
1.23 - Heritage

DENSE URBAN CORES

2.7 - Wider & soft rivers
2.13 - Wisselpolders
2.16 - Room for the river
2.17 - Wisselpolders
2.18 - Diverse green corridor
2.19 - Wider & soft rivers
2.21 - Polder flooding
2.27 - Wisselpolder lease

2.4 - New landscape agri
2.8 - Agri 2.0
2.28 - Projected plot structure

2.1 - Improve infra
2.6 - Material recycling
2.5 - Organic waste processing
2.9 - Harnessing water energy
2.10 - Sea wind farms
2.11 - Heat network investment
2.12 - Biorefinery investment
2.20 - Renewable transition

2.3 - Sust. re- & deconstruction
2.22 - Urban function mix
2.26 - Relocate prog.

2.2 - Resilient housing
2.14 - Raise select dykes
2.15 - Relocate critical functions
2.23 - Floating structures
2.24 - High dens. redev.
2.25 - Site-specific heritage plans

Image by author

CONCLUSION

While looking at climate change to see how the future could be shaped to steer towards a circular future, there were synergies to be found that could not have been formed otherwise. Envisioning the possible South Holland in 2100 helped to more specifically define the bottlenecks and opportunities that may arise. The spatial vision and development strategy do not provide a straight answer to the question of how we should become fully circular by 2050, but it rather presents a way of thinking about how we could deal with these complex challenges. The solutions to problems like these are rarely found while searching for answers in what we already know and are familiar with, which is why this research has attempted to generate visionary ideas that could not only steer in the right direction, but also give a practical example of what it could look like.

As always, there is never enough time to explore all the options in a project like this, but what could have been interesting to develop further, is the implementation of the conclusions we could draw from our contextualized strategies, or test grounds, into the vision. If the strategy and vision were to be implemented into a real-life setting, it would also be important to always continue fine-tuning the vision according to the new input that could be received from the practical implementation. Though there has been much exchange of information between the forming and the testing of certain ideas, this is something we would have liked to investigate further. This might have also given us more opportunities to research and test some technical implications that we now had not looked into further.

Ultimately, the right balance between realism and imagination has led to a project that has proven to be a generator of ideas. Although it is very unlikely that the province will look like the landscape we envisioned, we think this way of working could, if used correctly, lead to many other fruitful studies that could, indeed, result in sustainability, circularity and justice.

Image by author

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APPENDIX // INDIVIDUAL REFLECTION

REFLECTION PAUL

This quarter has been one of the best group work experiences I've had in the many different projects I've done as a team. It has surpassed a lot of things I've done in a work environment too. Overall the communication, working together and discussions went really well. Everyone stuck to deadlines and our finished product is something I'm very happy about. I think my team members deserve commendation for that!

Mostly I struggled with work ethic this quarter, when discussing I expect from myself to do things faster and communicate that timeframe to my groupmates, where I'd end up being distracted, slower or just not doing any work at all for a day or two. Partly this circles back to my own way of working which I explored in AC3 of the premaster - which also came back in Q1 and Q2, and partly it's also just everything going on. However, it's easy to blame the situation where it's mostly a communication issue. Simply not saying the most efficient timeframe for me to work on a product, but expecting me to take it easy as well, is an important thing to do that I should get used to. I guess it's a relfection of myself that I project onto others, thinking I'll be 100% efficient and work hard and whatever as a way of showing myself to others, while not necessarily expecting that from others (so why do I expect it from myself or portray myself in that way?).

I have managed to semi-successfully work on a goal I formulated from Q2, namely to properly communicate ideas and such that are in my head and not fully-fleshed out - before actually spending two days in my head and fully fleshing them out. Both the actual communication (taking the step to do it instead of being quiet) and also somehow visually showing what I imagine before it actually is made have improved this quarter. Probably due to the necessity to work together, I can't ruminate on ideas for a whole week in silence. I do both see this as a positive and negative, as I notice when I share the idea in the way I have done this quarter, I somehow lose some motivation or such to actually finish it. As I've "already shared it", or something. The way I have communicated these things is still rudimentary - drawing quick sketches on a small blocknote I keep by the desk. However, it turned out to be effective (based on feedback). And it is also much, much better than talking into air about some idea I have, which never really lands the way I intend.

REFLECTION ANOUK

At first, I was quite overwhelmed with the brief of the course and all the information we received. I found it difficult to immediately think of and define the possible spatial implications of such a broad topic as circularity. The SDS lectures luckily quickly gave us some guidance on the topics we could focus on and the ways in which we could continue the research. While first focussing on material flows connected to the chemical sector, we had a rough start as we were not able to set out a clear plan of action. Eventually, by taking a step back and asking ourselves in which way we would like to handle the assignment, which themes we found interesting and how we saw the future of the Netherlands, we found our focus. This immediately motivated us again and uplifted the team spirit, as we could now start researching something we were genuinely interested in and felt like something of our own, something original.

The regional design process was refreshingly different from the previous projects in the Urbanism master. It incorporated most of the reasons I chose to follow this master track in the first place: it incorporated economic structures, societal processes, sustainability and the spatial dimension in such a way that we could design from a holistic approach. By combining the main focus of the project, circularity, with our own concerns about flood risk, we were able to find synergies in places we had not expected at the start. Whenever we were stuck, we could therefore dive deeper into one of the two topics to gather more information and have new input for ideas.

A difficult aspect of this project was making sure we were doing things that made sense within our research. Sometimes, we did not really know what to look for anymore to find answers to the research questions, or even forgot what exactly it was that we wanted to know. It was a good exercise to have a project in which the way to go is not completely laid out for you, but it was also at times quite tiring to have to take initiative in this every few days, instead of just fulfilling the task you were set, like sometimes happens in other projects. Especially because of the way we had to work online during the whole project because of the Corona measures, communication was difficult at times and working together cost more energy than it normally would. I think that in the end, however, we all put our strengths to good use to create a project that we are all quite happy with and we can look back to in a positive way.

REFLECTION XINQI

At the very beginning of this project, our idea was simple: JUST IMAGING 2100.

It is pretty difficult to achieve a vision for the future that every teammate agrees on, because nowadays, the speed of development in technology and society is too fast. The probability of uncertain events is greatly increased. In this context, the method of design by research is becoming more important.

Nothing can be determined that will not change in the future, except one thing: rising sea level and the upcoming flooding. The flooding problem is like the sword of Damocles for the Netherlands. With the flooding as research background, we tried to envision the future with circular economy.

Planning can be seen as a strong tool to prevent damage. When we say accepting flooding, we don't mean to give up South Holland. Instead, we tried to find a new way to live with it. Inspired by SDS lectures, we did research both on the existing networks and potential ones in agriculture, energy, and landscape and urban environments. As a planner, we need to understand a complex system to detect problems and to search for opportunities to improve that system. Circular economy is a hot topic that has been talking about during recent years, which is the thing that we believe has a lot of potentials based on the new future landscape. By connecting circular economy to these sectors, a more sustainable future can be established. To connect regional design with circular economy in spatial dimension is our main goal. In our vision, the South Holland in 2100 is a resilient space where water, agriculture, energy plant, urban cores and Rotterdam Port will work in synergy.

The project is about acceptance, and it is like a challenge to the now existing react way to flood problem. How to convince them to accept the flooding to a certain extent, how to balance the stakeholders are the questions we discussed a lot. Thus, it is of utmost importance to have stakeholder analysis, and we did a lot of thinking on these.

To sum up as a teammate, I believe I have learned a lot from my teammates during this hard time. With almost everything online, the workflow changed a lot, and it became harder for a team to cooperate. Luckily, we have learned to develop the project while being limited in our ways of communication and combined our strength on this.

REFLECTION CÉLESTE

From the beginning when I learned about this quarter studio, I was very excited about it ! The big scale always appealed to me and I was happy to hear that we will be working on a regional design and research project during this new quarter. The lectures and workshop we have been having during the quarter were quite interesting and useful, they contributed to understand the assignment and helped developing a research question. As I previously said, I found it exciting to work on a regional scale, however it happened to be as well quite challenging. The specificity of the territory given - South Holland was sometimes difficult to understand and deal with. As a new student discovering The Netherlands, I definitely lack of knowledge about the characteristics of this specific landscape and I sometimes found it hard to get really familiar with all the aspects. I was therefore happy to have a "mixed-group" international and dutch students, as it made it easier to share knowledge and use efficiently some database. The whole quarter was well organised and the studio sessions happened to be very interesting and helpful as we were getting feedback from three tutors having each a different point of view on the assignment. I think this allowed us to really deepen our research and to come up with an enriched proposal. I admit that it was sometimes quite challenging and difficult to process the feedback from all the tutors and work with it for the next studio session -that was always coming so quick from Tuesday to Friday, but it was a great challenge to take up ! Regarding the group work, I have been happy to work with my classmates : we all had different interests and skills, and this was very enriching ! At the beginning I was quite "scared" about group work as we all know that it can go very well as it can sometimes be very difficult... But we all gave inputs to the project, developed ideas and shared knowledge, so in the end I can say that we were quite harmonious and productive. I also really appreciated the way our tutors supported us with our choice of research proposal. I have always enjoyed working about the future built environment and this quarter, developing a project about the future flooded landscape was quite thrilling. I liked using real data to develop a proposal for the future flooded South Holland, and mapping it in QGIs. To my mind, envisioning the future and leaving space to utopia allow ourselves to think beyond and unlock potential "real future solutions". The only "disappointment" of this quarter is about the covid situation and having to work with a group online, but of course this couldn't be change and I hope next year will be better ! And to be honest, I think with my group members we did great and we managed to have a very nice study environment - and of course, the tutors did great as well... Bravo !

APPENDIX // PROCESS

Initial research set up (week 2)

PROBLEM STATEMENT

mobility

Suboptimal private single/double flows of goods and people (half empty trucks or buses)

social (spatial) justice

Good spatial quality limited to high-value plots, low-value plots 'banned' to outskirts

segregation

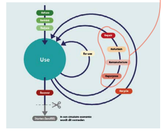
flood risk

having a circular economy is not going to protect Zuid-Holland from the water. How we will protect ourselves will inevitably change the landscape and this will then also influence the flows and structures of the circular economy.

material flows (closing loop within our borders)

In order to have a circular economy (by 2050), 38% of the waste needs to be dealt with differently

If we want our economy to become more circular, more production needs to take place here as well



housing deficiency

Pressure on the housing market leads to more inequality

GOAL / SCENARIO

Circular material + waste flows in a new landscape

To tackle closing the waste cycle: restructure / reimagine the whole spatial fabric (that is changing) instead of trying it to apply it to already existing structure

VISION

zero waste

Protected from flood risk

giving back to nature

Fair distribution of spatial quality

Optimise mobility through decentralisation

POSSIBLE SOLUTIONS

floating wetlands

TOD on land with central functions

decentralized urban structure: more urbanization, efficient use of land

Big circular

Small circular

Interconnected communities on water with diffuse functions

Fair distribution of spatial quality

space for nature

new management of waste flows in the future "land"

reducing waste - more production from the country

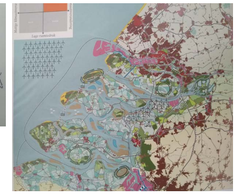
developing a new system

garbage collection via water (roboat)

bigger focus on public transport, less use of individual motoric traffic

underwater and floating constructions

RESEARCH



what is the small circular cycle and the big circular cycle? --> which functions do you group?

which areas that are at risk are suitable?

which areas are at risk?

how can we best protect against flood?

which areas are suitable for reshaping?

how do the flows work currently?and how can they work in the future flooded landscape?

how do logistics work in landscapes like this? (interconnected wetlands / decentralized urban structure)

what structures can be built on / in the water? (agrifood)

Which type of waste should we diminish first to face the decreasing available space ? And how can this be done ?

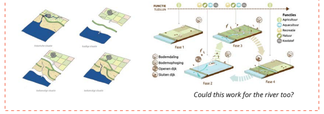
Flooding is an inevitable future and we need to develop solutions and systems to tackle this upcoming challenge

APPENDIX // PROCESS

Zoom ins to further direct the process (week 4)

CASE STUDY // AGRICULTURE // BERGAMBACHT

Wisselpolders concept (changing/switching polders)

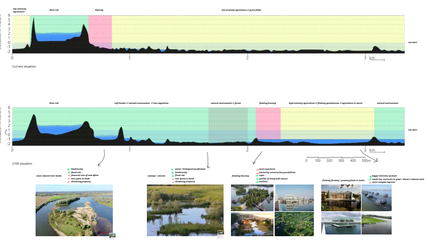


Could this work for the river too?

Generic / Ordinary location, could be replicated

PLAN

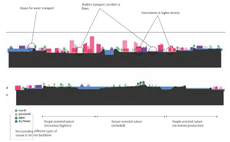
SECTION



CURRENT

2100 SCENARIO

CASE STUDY // GREEN CORRIDOR // MIDDEN DELFLAND



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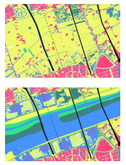

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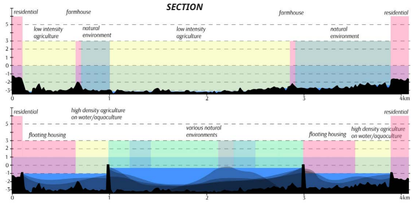
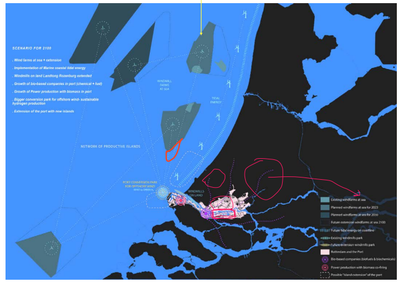


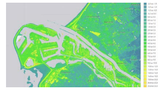
CURRENT

2100 SCENARIO

CASE STUDY // PORT OF ROTTERDAM

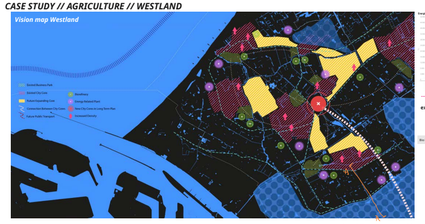


Energy Backbone



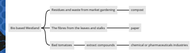
Maasvlakte 2 Wind farm next wind farm will generate more than 400 GWh of green electricity, equivalent to the energy consumption of 138,000 households for a year.

CASE STUDY // AGRICULTURE // WESTLAND



—> Agriculture takes the majority of energy use

existed circular economy examples - agri sector



—> Westland is currently using solar energy and geothermal energy as renewable energy. Meanwhile, there are trying to be free of gas by 2050. Marine energy can be introduced to local government.

existed circular economy examples - water + energy

Algae bioreactor +

Water-storing paving +

Water-storing greenhouse roofs +

Deep geothermal drilling 1,5 km - 4 km +

Heat/Cold Storage +

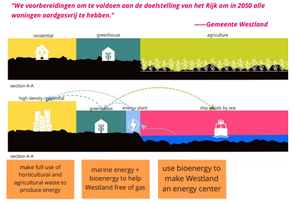
Solar cells +

Wind mills & wind turbines +

—> keep developing those solutions, especially those relevant to our scenario. + introduce marine energy

"We voorbereidingen om te voldoen aan de doelstelling van het Rijk om in 2050 alle woningen aardgasvrij te hebben."

——Gemeente Westland



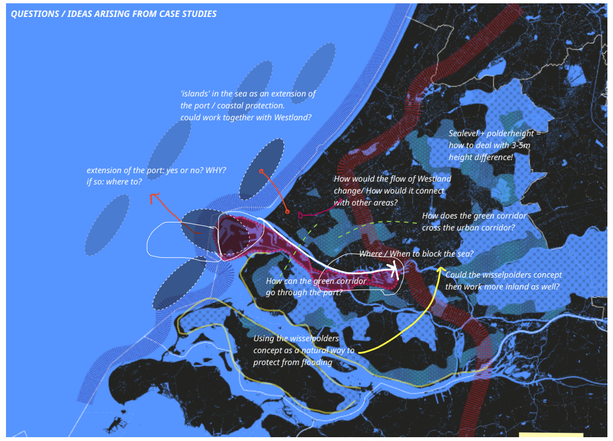
CURRENT

2100 SCENARIO

make full use of horticultural and agricultural waste to produce energy

marine energy + bioenergy to help Westland free of gas

use bioenergy to make Westland an energy center



Way of brainstorming

Complete overview of Miro boards