

# Neighbours of the Industry

*Using the energy transition to step out of the shadow of industry.*



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Delft, March 2026

## Abstract

The energy transition is rapidly changing the Netherlands. For the industry, this comes with challenges, but it also creates opportunities. But what about the people living in peri-urban areas, “in the shadow of industry”? Do they experience specific disadvantages, and could they also benefit from the changes taking place around them?

Tata Steel and the IJmond region were used as a case study because here the tensions become visible. The area has heavy industry, residential neighbourhoods, ecological pressure, and a strong local identity, making it an interesting place to explore the “toxic” relationship between industry and community. To understand this relationship, the research combined street interviews, media analysis, spatial analysis, demographic analysis, literature review, and site visits. Together, these methods helped show the perspective, struggles, and dreams of the community, the residents of the peri-urban area in close proximity to large industry, and with that shape the vision and strategy.

The analysis shows that the community faces several challenges. Pollution and health concerns are evident problems in the area. Also, lower purchasing power, poorer housing conditions, and limited resources make it harder to participate in the energy transition. Mobility is fragmented, which increases car dependence. At the same time, the region is not only defined by problems. Many residents depend on industrial jobs, and the industry remains part of the local identity. This creates a situation in which people are both affected by and connected to the industry.

In this project, environmental, social, and economic interventions are formed to help residents become more aware of their energy use and support them in the energy transition. The strategy is guided by three central themes, so the perspective and voice of the community itself remains central. The themes being ‘wellbeing’, ‘chances and choices’, and ‘identity’ cover the possible concerns of the community and form the basis for the interventions formulated in the strategy. These interventions were developed into four projects, tested against a theoretical framework based on spatial justice, the Sustainable Development Goals, and the vision goals that emerged from the analysis.

**Keywords: energy transition, peri-urban community, industry, spatial justice, Regio IJmond.**

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# 1

- 1.1 The energy transition
- 1.2 Location
- 1.3 The peri-urban phenomenon
- 1.4 Layers of time
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- 1.6 The neighbours of the industry

## Living with Industry

### Living with Industry

In today's situation, the media shows that many stakeholders with conflicting ideas are involved.

Climate activists are protesting against the pollution of Tata Steel and they would rather see the factory closing down completely.

Workers of Tata Steel are afraid of losing their jobs. They argue that their job is part of their identity, and they cannot easily retrain.

Tata Steel itself is struggling with the energy transition. They aim to meet the sustainability

goals but need to compete with other steel companies and maintain their economic position on the steel market too.

The government wishes to preserve Tata Steel, and provides financial support. They believe Tata Steel to be important for the Dutch economy.

The residents living in close proximity to Tata Steel are worried about the health risks from pollution in the area.

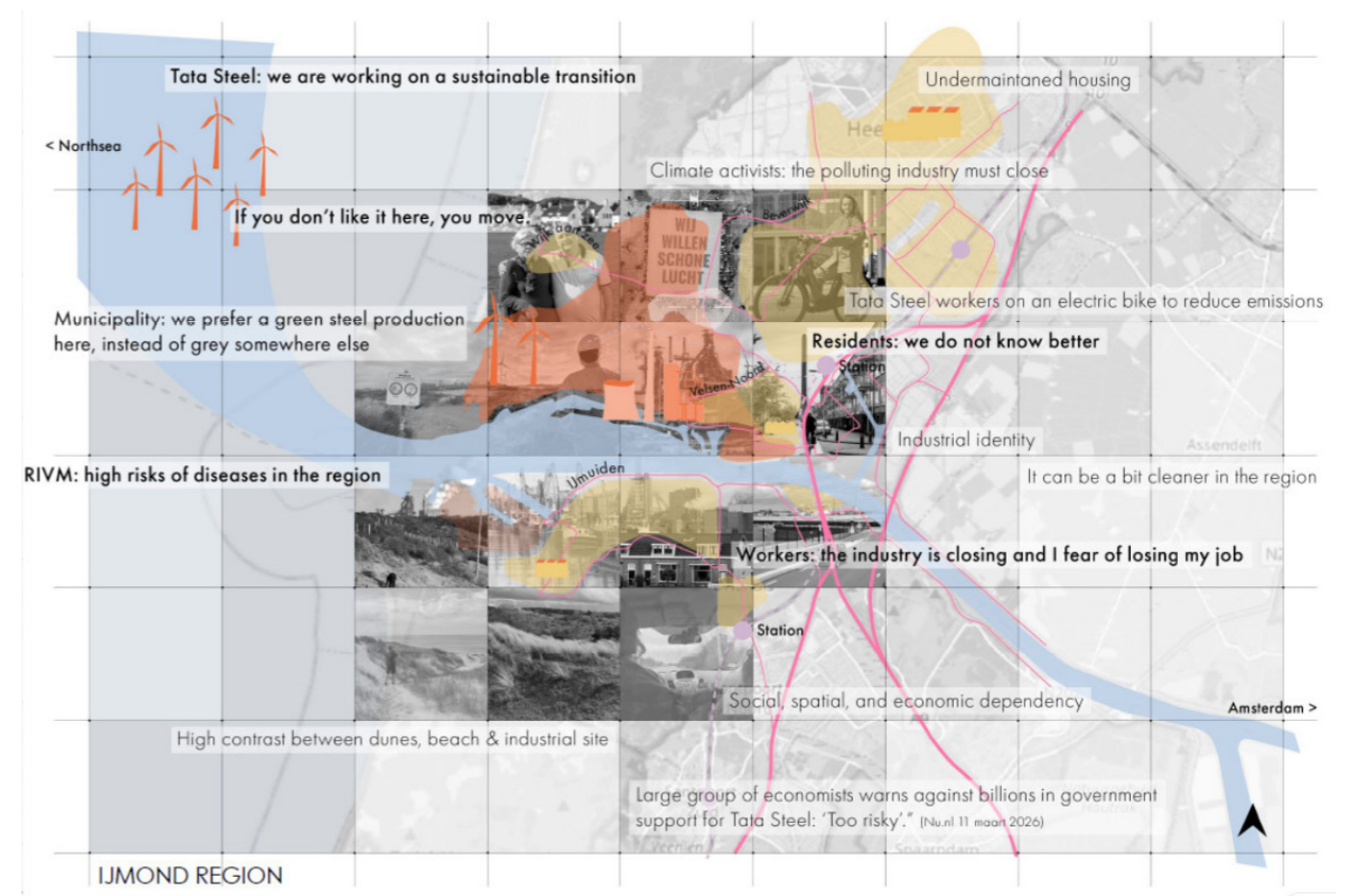


Figure 1.1: Conflicting ideas in the area (Source: Derived from media analyses)

## 1.1 The energy transition

The energy transition is important for the sustainability of our world. Fossil fuels are responsible for 68% of global greenhouse emissions, and almost 90% of all CO<sub>2</sub> emissions (United Nations, n.d.). Changing to renewable energy is a big step in slowing down climate change. The Netherlands wants to be fossil fuel free in 2050 (Rijksoverheid, n.d.). As they mention, the fossil fuels are getting scarce, and the Netherlands wishes to be less reliant on the rest of the world for energy. The Netherlands wants to make use of district heating, wind energy and solar panels to achieve their goal. Reducing energy consumption is also an important part of the energy transition. Using cleaner or less polluting transport options, insulating buildings better, and introducing or strengthening circular systems all help lower this consumption.

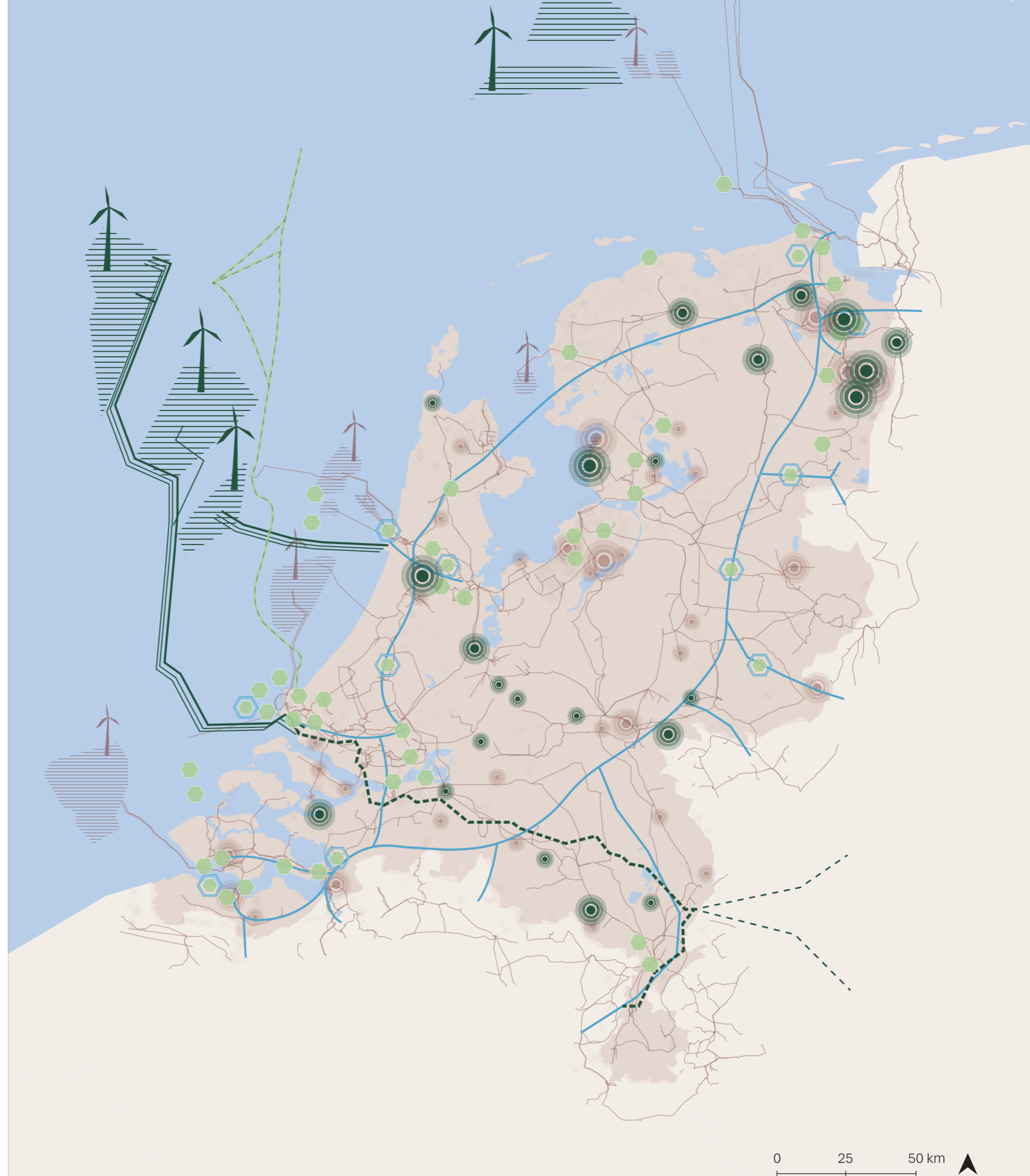
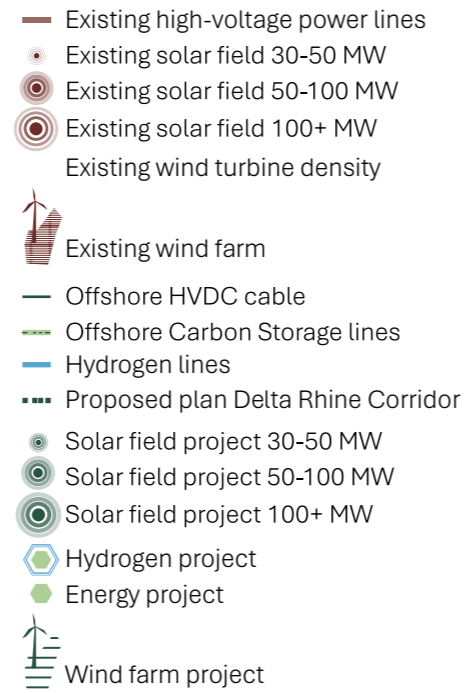
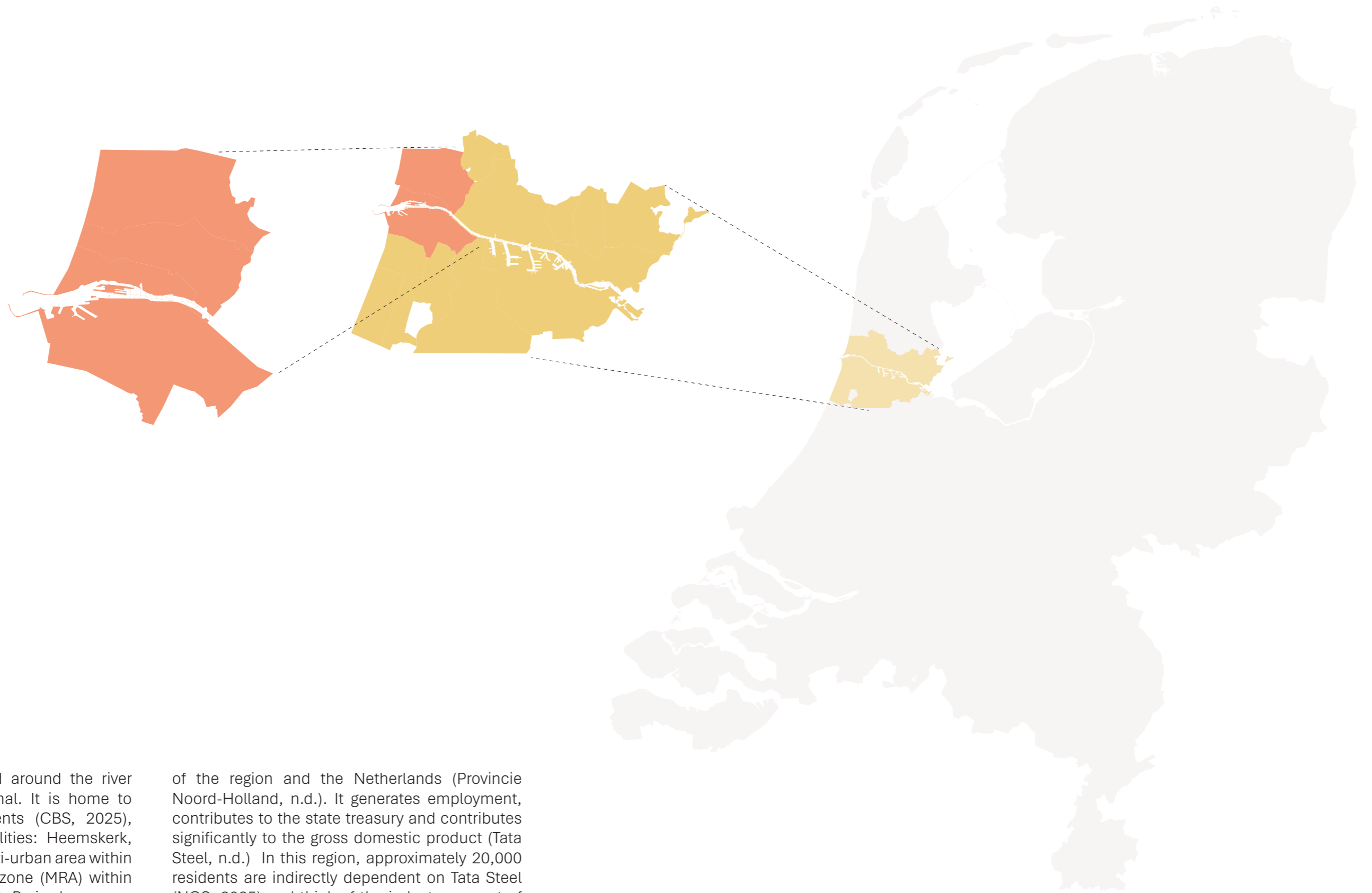


Figure 1.2: the current energy plans (Source: Ministerie van Klimaat en Groene Groei, 2024)

## 1.2 Location



The IJmond region is located around the river mouth of the North Sea Canal. It is home to approximately 152000 residents (CBS, 2025), consisting of three municipalities: Heemskerk, Beverwijk and Velsen. It is a peri-urban area within the Amsterdam metropolitan zone (MRA) within the province of North Holland. Peri-urban areas will be further elaborated in the next chapter.

Due to the proximity of both the North Sea and Amsterdam, the region grew as a large site for industrial activities and trading zones. Tata Steel has been a big part of the economic growth

of the region and the Netherlands (Provincie Noord-Holland, n.d.). It generates employment, contributes to the state treasury and contributes significantly to the gross domestic product (Tata Steel, n.d.) In this region, approximately 20,000 residents are indirectly dependent on Tata Steel (NOS, 2025) and think of the industry as part of the identity of the region. The harbour culture significantly enhances the regional character. The region features Natura 2000 and other high-quality nature. The natural landscapes and the immediate proximity to the coastline enhance the area's residential appeal.

Figure 1.3: The research location

### 1.3 The peri-urban phenomenon

#### Introducing the peri-urban area

‘Peri-urban areas (peripheral – around, about or beyond) are those non-urban landscapes adjacent to or surrounding metropolitan settlements.’ (Buxton, 2022). Peri-urban areas have lower population density than cities, but are denser than rural areas. They interact with the cities around and with the rural areas adjacent. Globally, metropolitan areas often expand into peri-urban areas as they expand into the surrounding rural areas. This often happens in combination with industrial areas, as shown in figure 1.6.

In the Netherlands, there are seven distinct peri-urban areas adjacent to heavy industrial sites. Because of the industry and the strong mobility network, like rivers, canals, and highways, the residential areas are being fragmented. These areas come with unique challenges and opportunities regarding the energy transition.

The IJmond region originated as an industrial site due to its strategic spatial orientation along the North Sea Canal, which facilitates a great trading position. The surrounding residential areas emerged as working-class neighbourhoods of the local industry. The development of the region is further elaborated in the next chapter.

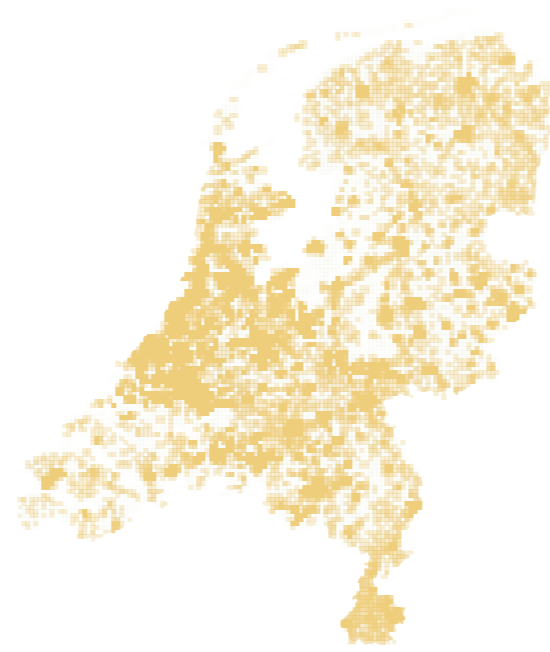


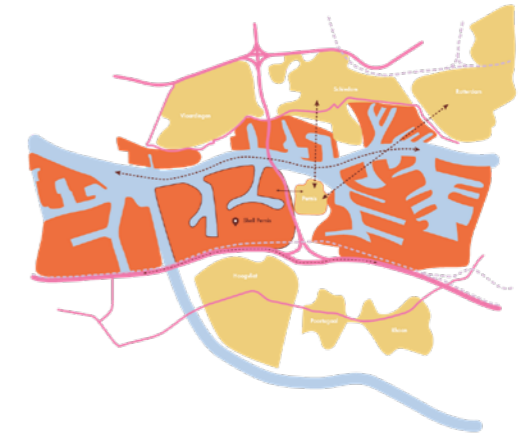
Figure 1.4: Typology rural urban peri urban in the Netherlands (Source: CBS wijken en buurten 2025)



Figure 1.5: Distances between peri-urban areas and urban areas (Source: Google Maps)



Tata Steel IJmuiden



Shell Pernis & Port Rozenburg (Rotterdam)



Chemours Dordrecht



Port of Moerdijk



Parengo Renkum



Chemelot Sittard-Geleen

Figure 1.6: Spatial aspects of industrial peri-urban neighbourhoods

# 1.4 Layers of time

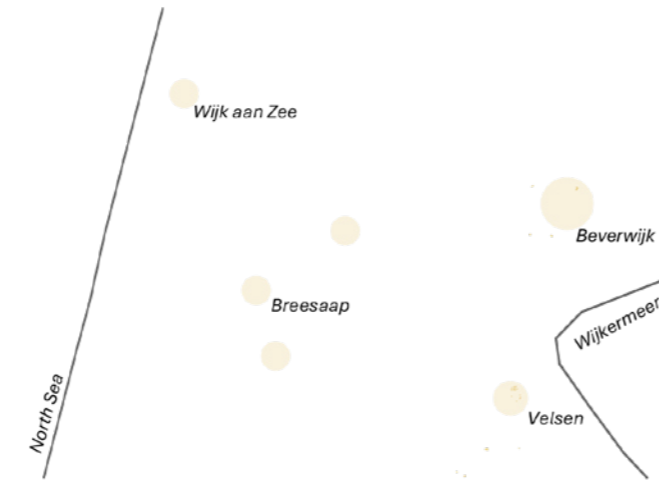
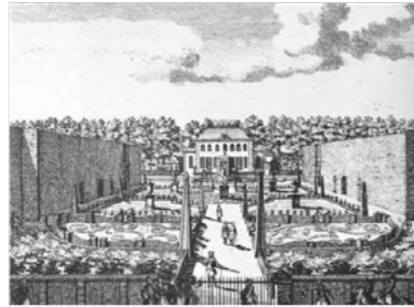
The history of the IJmond region

## 17th & 18th centuries

In the 17th and 18th centuries, the edge of the dunes was popular with Amsterdam merchants, who built country estates such as Beekestijn and Velserbeek.

## 1865-1876

Construction of the North Sea Canal took place to improve Amsterdam's accessibility. This project marked the birth of IJmuiden.



## 1885-1900

IJmuiden flourished due to the fishing industry and its harbor, providing an ideal location close to fishing grounds.

## 1918-1924

The Koninklijke Nederlandsche Hoogovens en Staalfabrieken NV was constructed on the north bank.

## 1920-1930

In Velsen-Noord, housing was built in the 1920s and 1930s on behalf of Hoogovens.



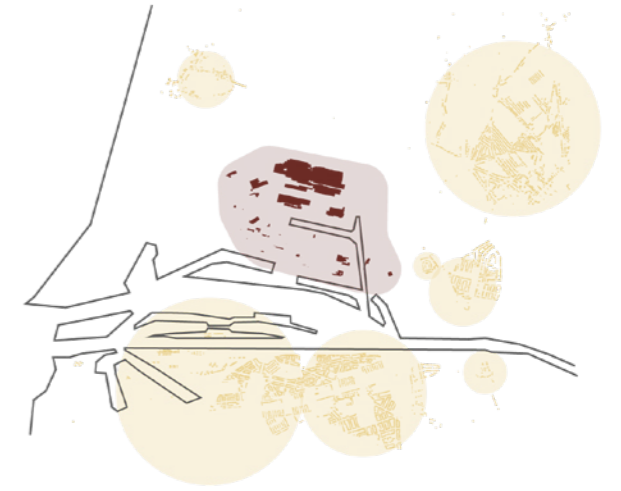
Figure 1.7 - 1.10 (Source: CBS panden)

## 1947-1957

Reconstruction after World War II began in 1947 to provide better housing for the workers. Because Oud-IJmuiden had lost much of its residential function during the war, W.M.Dudok designed a 'new' IJmuiden.

## 1970s

The earliest measurements of air pollution in the vicinity of the factory were recorded.



## 1999

Koninklijke Hoogovens NV and British Steel merged and continued under the name Corus.

## 2007

Tata Steel later acquired the Corus Group.

## 2008

The television program ZEMBLA drew national attention to the excessive emission of toxic substances by Corus.

## 2023

The RIVM formally confirmed the direct correlation between industrial emissions and health complaints among local residents.

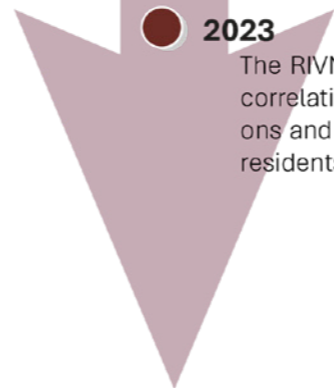
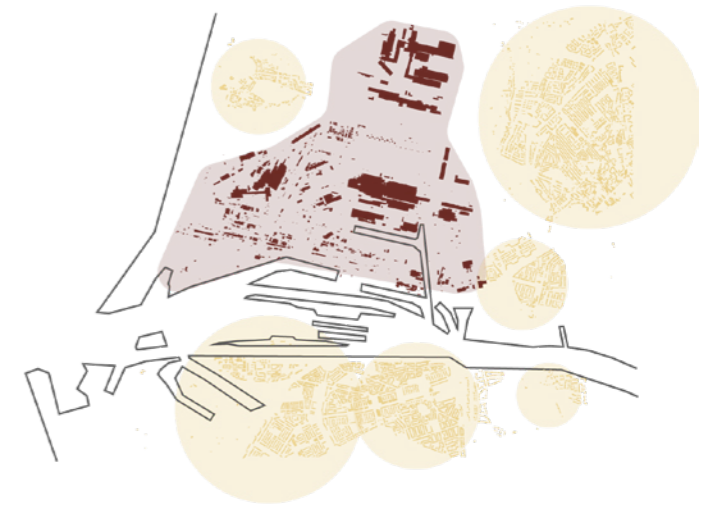


Image 1.1 tm 1.8 (Source: Noord Hollands archief)

## 1.5 The impact of the industry

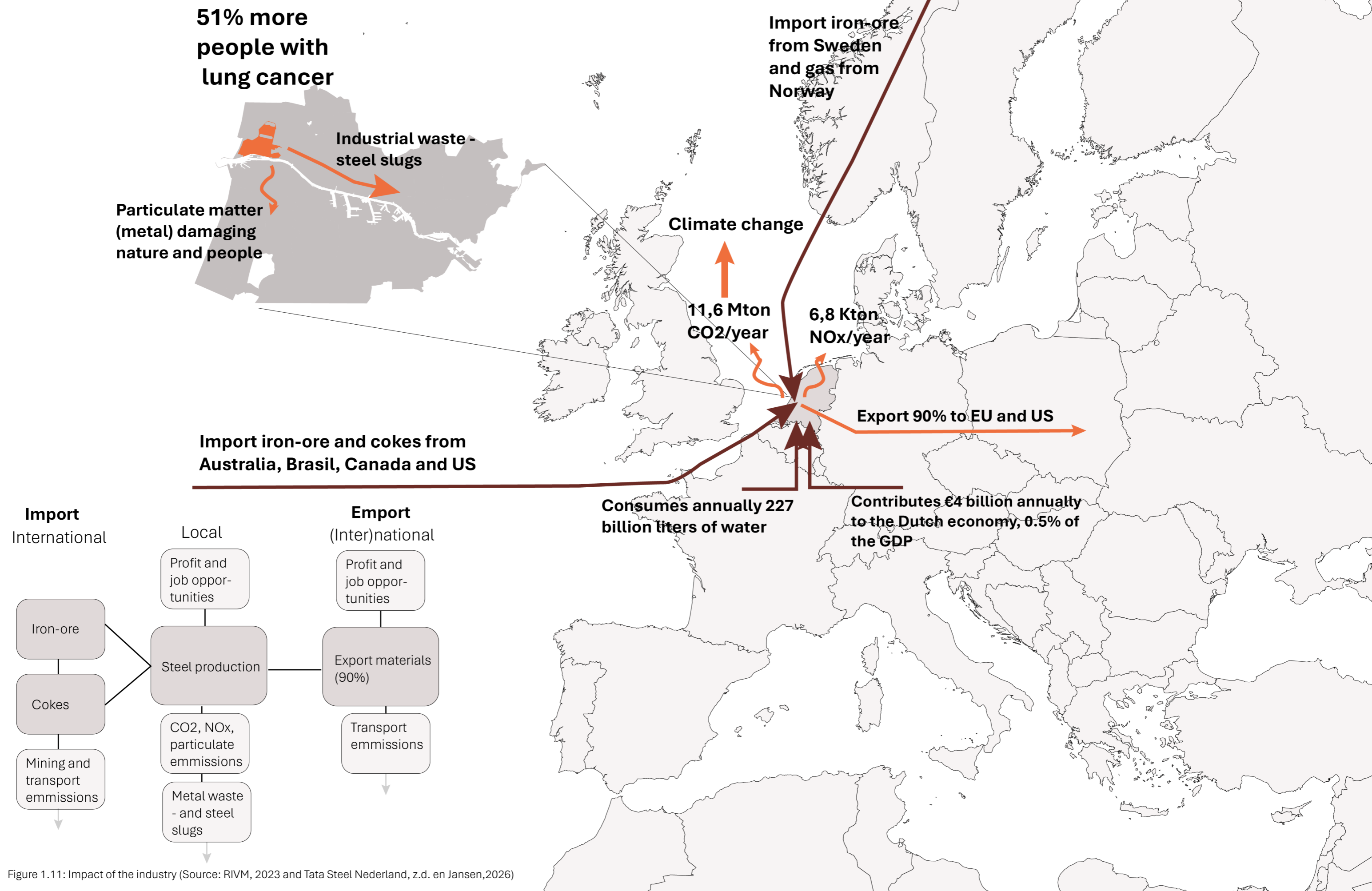


Figure 1.11: Impact of the industry (Source: RIVM, 2023 and Tata Steel Nederland, z.d. en Jansen, 2026)

The region's industry is focused on international trading, which is of importance to the Dutch economy. However, the industry does not only bring benefits. The industry generates substantial pollution and consumes significant amounts of energy, making it a major contributor to climate change. Consequently, the industry damages the environment on both local and global scales.

### CO2 emissions in the Netherlands

Source: Tata Steel's sustainability report 2021-2022

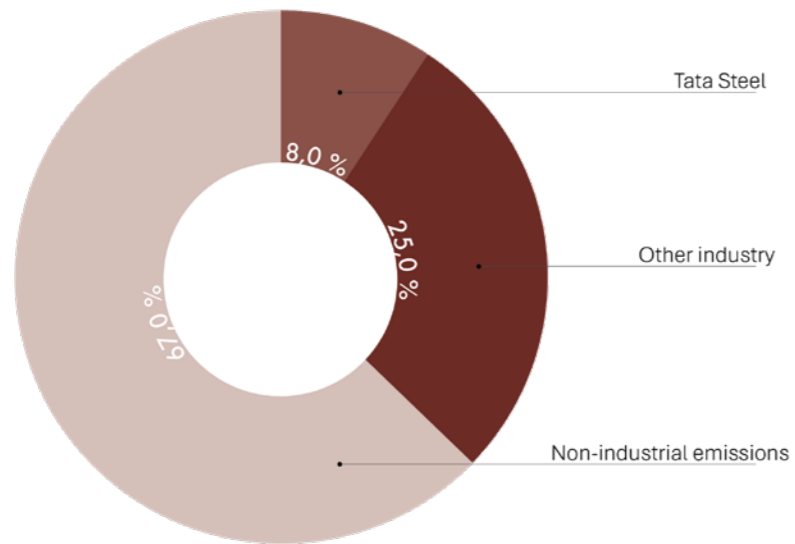


Figure 1.12: CO2 emissions in the Netherlands

### Energy consumption in the Netherlands

Source: Tata Steel's sustainability report 2021-2022 & Compendium voor de Leefomgeving 2022

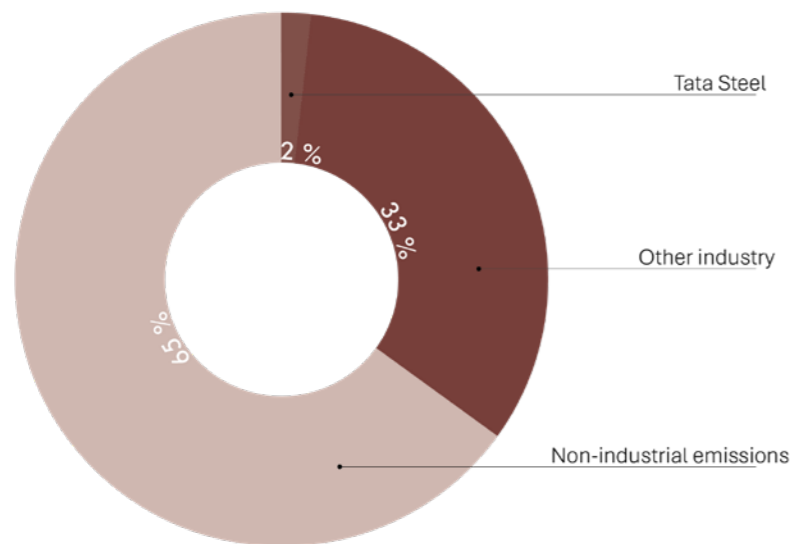


Figure 1.13: Energy consumption in the Netherlands

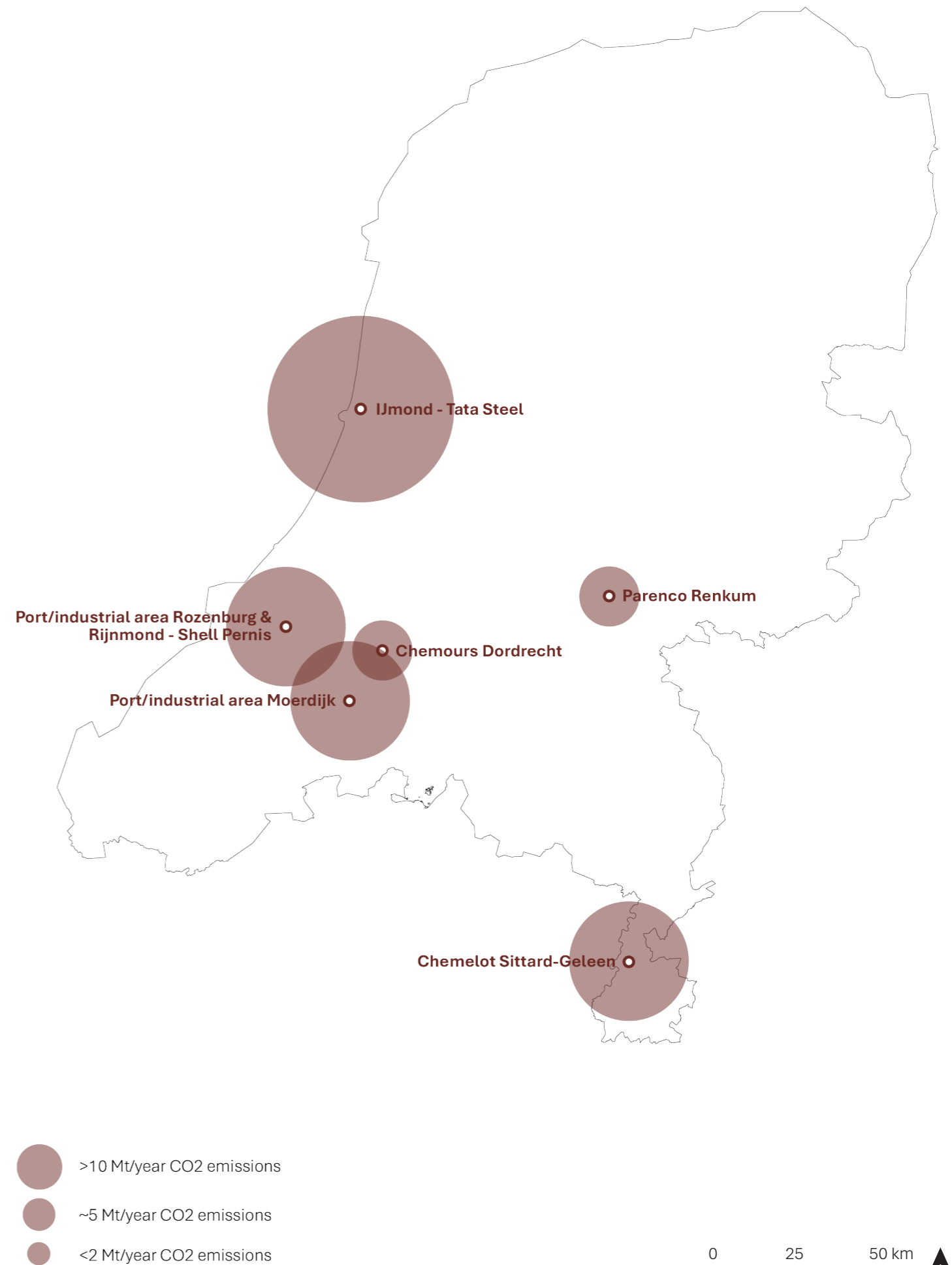


Figure 1.14: CO2 emission industry (Source: WarmteAtlas Ligging industrie en CO2)

## 1.6 The neighbours of the industry

### *The community*

The first objective of this research was to identify a community that has complex challenges regarding the energy transition. The focus shifted toward communities that are neighbours of the industry all around the Netherlands. The IJmond region was selected as a primary case study due to the topicality and the evident tensions. The IJmond region provides an opportunity to develop solutions applicable to various peri-urban areas neighbouring heavy industry, regarding the energy transition and overall liveability.



# Theory & Methodology

- 2.1 Problem statement & research question
- 2.2 Theoretical framework
- 2.3 Conceptual framework

## 2.1 Problem statement & research question

### 2.1.1 Problem statement: Living in the shadow of industry

The energy transition is crucial to sustain the planet and reduce climate change. This energy transition is happening by transitioning from fossil fuels to renewable energy, and changing energy consumption patterns to reduce energy demand. In the Netherlands, heavy industries consume over 35% of the total energy demand and are very dependent on fossil fuels. By 2050, the industry will have to be circular and emit no greenhouse gas emissions.

Industrial pollution not only impacts climate change, but also creates an unhealthy environment for residents living in neighbourhoods close to the industry. Living in these peri-urban areas, close to the industry and at the borders of cities, the industrial infrastructure makes them spatially disconnected and fragmented.

These peri-urban residents often have socio-economic disadvantages, including lower average incomes and poorly insulated housing. This results in higher energy consumption and limited capacity to invest in sustainable solutions. This combination of environmental degradation and socio-economic vulnerability contributes to spatial injustice and slows the adoption of the energy transition within these areas.

Despite being situated at the front line of industrial energy use, these local residents are rarely included in policy or planning processes that shape the future of sustainable energy. Communities living in close proximity to large industrial sites, such as those surrounding Tata Steel, face a unique challenge regarding both energy transition and energy consumption. Tata Steel and the neighbourhood around it form a perfect case study for comparable peri-urban areas, because the tensions are visible and timely.

#### Toxic relationship

Tata Steel, the government, and residents are in a constant discussion. The industry has to become more sustainable and pollute less. But transitioning a large industry depended on fossil fuels, trying to compete with steel manufacturers from China,

comes with difficulties. It is an environmental vs. social vs. economic dilemma, and priorities, and these topics differ with every stakeholder. The energy transition makes the future of Tata Steel in the Netherlands an uncertain one.

The industry and the neighbours used to be one community. The neighbourhoods were built for the workers of industry. Possible health risks were taken for granted because Tata Steel was an important employer and driver of the economy in the region. But after the RIVM results in 2021, the concerns from residents and workers about their health became facts, shifting their relationship. Leaving, however, is not always an option. There is a dependency on the industry for job security, but also identity linked to the industry. The housing crisis adds to this dependency: housing is scarce and expensive elsewhere, while close to the industry, it is cheaper, reinforcing dependency, but also pointing out the injustice. The combination of these aspects makes the relationship between Tata and the community a toxic relationship.

The community mainly experiences disadvantages from living near the industry, while proximity to industry could also bring opportunities, if the industry seized the potential of renewable energy and shared the benefits with its neighbours. This transition could motivate residents to make their own changes. Right now, though, the community remains unmotivated due to a lack of trust and the feeling that their efforts have little impact next to the massive energy consumer next door. This lack of trust is fuelled by unkept promises from both the government and Tata Steel. The transformation of heavy polluting industries to sustainable producers could become the driver of sustainable change for these communities.

The study aims to investigate how the complex relationship between heavy industry and local residents influences the energy-related behaviours, attitudes, and capacities of residents in peri-urban neighbourhoods, and to explore spatial, social, and policy-based strategies to reduce energy injustice and enhance participation in the energy transition.

## 2.1.2 Research question & subquestions

### Main question

How can peri-urban communities in the IJmond region participate in a just and inclusive energy transition considering their wellbeing, identity, chances and choices influenced by the heavy industry?

### Sub questions

1. How have historical connections between the peri-urban community and industry shaped current social and economic dependence of the community?

*Method: Historical analysis, Typology and morphology analysis, Media analysis (research on mentions about historical connections), Literature review (on connection between industry and neighbouring areas)*

2. What challenges do residents face in the energy transition?

*Method: Street interviews (mentioned struggles), liveability index research, media analysis (news articles and civic organisations)*

3. How are the energy consumption and behaviour of peri-urban communities affected by environmental perception, spatial justice, demographic and socio-economic factors?

*Method: Atlas Leefomgeving Analysis (PM2.5, PM10, sound and odour pollution), Demographic analysis (Age, household type, housing type, household capital, income, etc.), Site observations, CBS data analysis (on house-ownership and energy consumption)*

4. What are possible future scenarios for areas around heavy industry, like Tata Steel, regarding energy transition?

*Method: References (comparable industrial areas), research by design (mapping uncertainty), literature review (on industrial innovation).*

5. How do perceptions of fairness, responsibility, and trust in industry and government influence the communities' willingness and ability to participate in the energy transition?

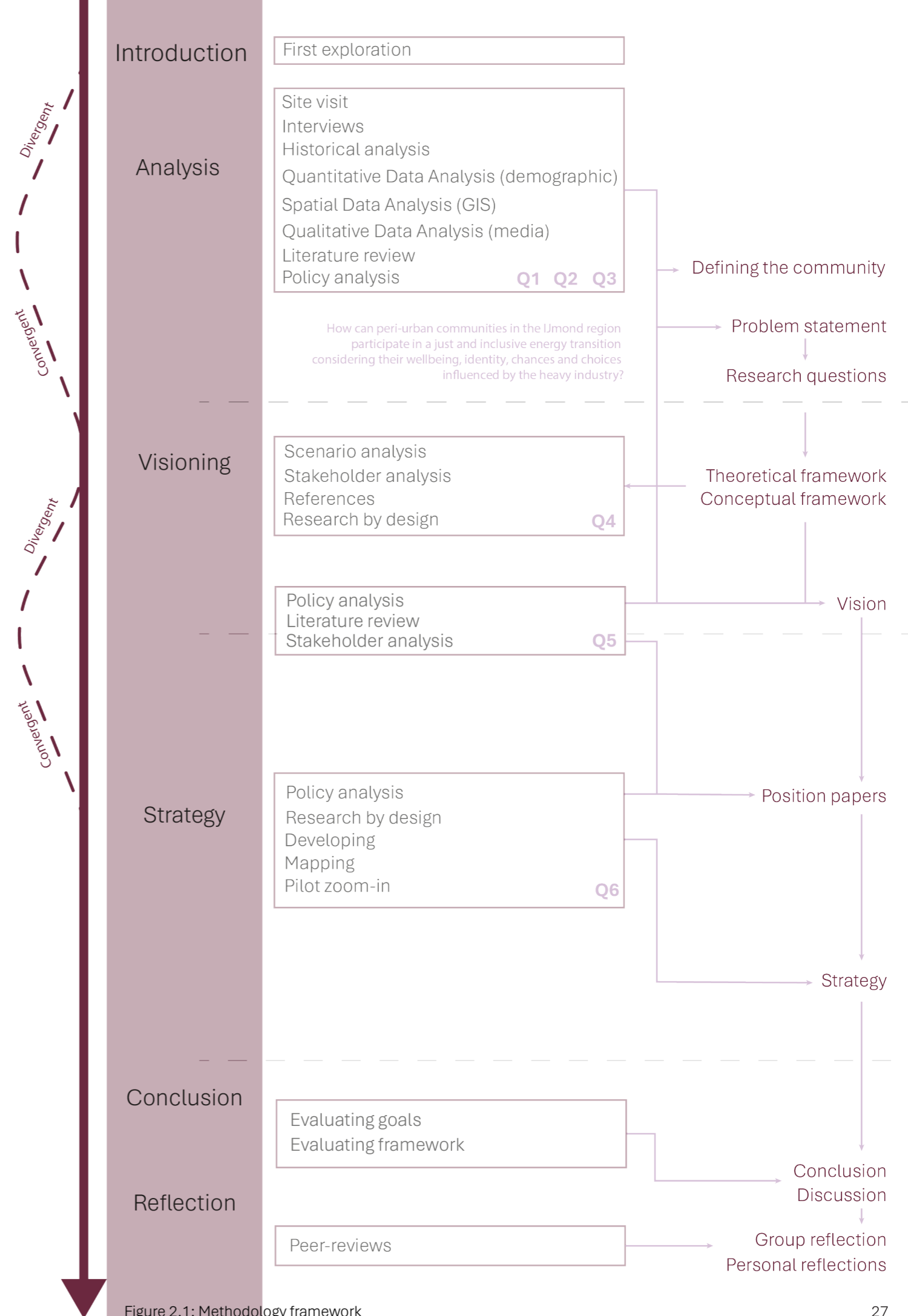
*Method: Literature review (on psychological effects), street interviews, media analysis (relationship industry, community, government).*

6. What community-driven spatial strategies and policies could inspire residents to have a more active role in the energy transition?

*Method: policy analysis (agenda government), reference analysis (on community based governance), street interview (expectations residents)*

## 2.1.3 Methodology

Through the research process, a lot of different methods have been used to gain knowledge and information. In this scheme, the different phases have been visualised: The analysis, the visioning, the strategy making, and the conclusion & reflection. The scheme is a timeline that guides through the different subjects and methods to answer the research question.



### 2.1.4 Framework

This report builds toward our final goals, starting with the challenges that shaped our vision. This vision serves as the foundation for our strategy, providing the core principles for our interventions. Together, these interventions constitute the project's strategy.



Figure 2.2: Scheme research framework

## 2.2 Theoretical framework

This research focuses on changing the environment of the community so that the toxic relationship between the industry and the neighbours can change to become independent. The theoretical framework helps with integrating the theories and ensure that it meets the project objectives and that the design is coherent. We discuss the following frameworks:

1. Spatial justice triangle
2. Sustainability triangle and intra- and intergenerational justice
3. Public goods/ the commons
4. Transtheoretical model
5. Sustainable Development Goals SDG

### 2.2.1 Spatial justice

Spatial justice is about looking at social justice through a spatial lens to improve social sustainability. It is based on the ideas of Lefebvre that space is socially produced and ideas of Soja that the geography of injustice is shaped by social processes and that spatiality affects the injustice in society.

Rocco (2025) conceptualises spatial justice in three dimensions: distributive justice, procedural justice and recognition justice.

Distributive justice concerns the fair distribution of burdens and benefits, like access to public goods and services across the region. Procedural justice concerns about the fairness in the procedures of decision-making in shaping the built environment, like participatory and communicative planning to include citizens in the negotiation. Recognition justice concerns about the symbolic and cultural dimensions of justice, recognising the needs, interests, histories and aspirations of excluded or oppressed individuals and communities (Rocco, 2025).

These three justices are interdependent. And recognition justice and procedural justice are useless without distributive justice. They are relevant for our project to use them to make arguments why the interventions we suggest are either connected to recognition, distribution, procedural.

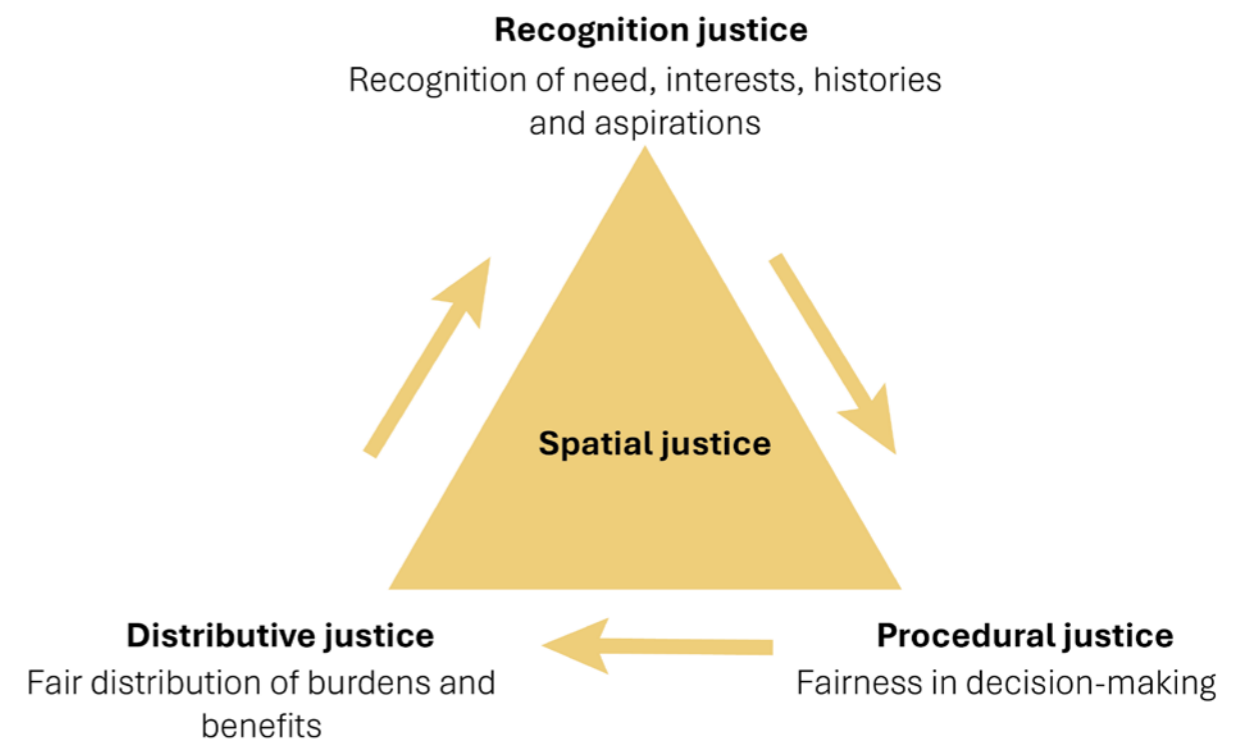


Figure 2.3: The Spatial Justice Triangle (Based on Rocco, 2025)

### 2.2.2 Sustainable triangle and intra- and intergenerational justice

The project uses the definition of sustainable development from the Brundtland report: our common future: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). For achieving this, the Sustainability Triangle, which emphasizes that sustainability is multidimensional, is applied. A sustainable environment is impossible without harmony between the three pillars, social, economic, and environmental (Rocco, 2026). To restore the balance, while the interventions in the strategy are primarily spatial, the social, economic, and environmental dimensions are woven into the strategy.

Furthermore, our approach is guided by the principles of intragenerational and intergenerational justice (Rocco, 2026). Since we are focusing on a transitioning community, which

is a process of change over time, we must look beyond the present.

- Intragenerational justice comes back into addressing the needs of the present community. Their needs are translated into the vision goals.
- To account for the needs of future generations, intergenerational justice, we tackle the impact of the uncertainty of the future. We incorporate flexibility in our strategy and make the community autonomous.

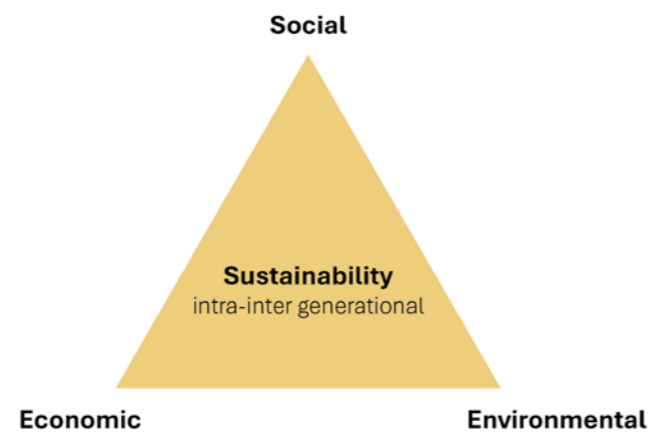


Figure 2.4: The Sustainable Triangle (Based on Rocco,2026)

### 2.2.3 Governance, public goods and the commons

Governance is systems, processes, and institutions by which communities are organised and ruled in multi- stakeholder processes involving civil society, the public sector, and the private sector (Rocco, 2026).

**Public goods** are non-excludable and non-rivalrous products or services, like street light in urban public spaces and bicycle paths.

**The Commons** are non-excludable but extrudable resources. Elinor Ostrom (1990) writes about governing them. About how communities can self-manage their commons using eight guiding principles.

1. Commons need to have clear defined boundaries.
2. Rules and governing use of common goods to local needs and conditions.
3. Participatory decision-making.
4. Commons need to be self-monitored.
5. Sanctions should be graduated by those who abuse the commons.
6. Conflict resolution should be easily accessible.
7. Commons need legal status and the right to self-organise.
8. Commoners need to network with other commoners from other resource system.

Open access to the commons leads to overuse and this could lead to the destruction of the commons, that is the tragedy of the commons (Ostrom, 1990). Tragedy of the commons, in the case of Tata Steel this would be the air pollution. Air as a common resource, and Tata Steel degrading the clean air with emissions. Governance change is needed for managing the commons and connect them to strategies. Urbanism is about improving and creating the public goods and commons.

### 2.2.4 Transtheoretical model

Currently, the toxic relationship creates certain behaviour. Transforming the physical environment alone is not sufficient. The behaviour of the community is equally important. The community needs to change from a dependence behaviour toward a autonomous behaviour. However, a change in behaviour can be uncomfortable, and even with a clear vision, the path forward often remains hazy.

To ensure lasting behavioural change for our community, we implement the Transtheoretical Model. This framework consists of five stages, including pre-contemplation, contemplation, preparation, action and maintenance (Wurzweiler, 2025).

While this model is mostly used for individuals, we apply it to the community as a collective entity, and translate the five stages into the strategy. Every stage of behaviour change requires a specific type of support. Therefore each stages is translated differently into spatial and social interventions. In this process, time is an important aspect.

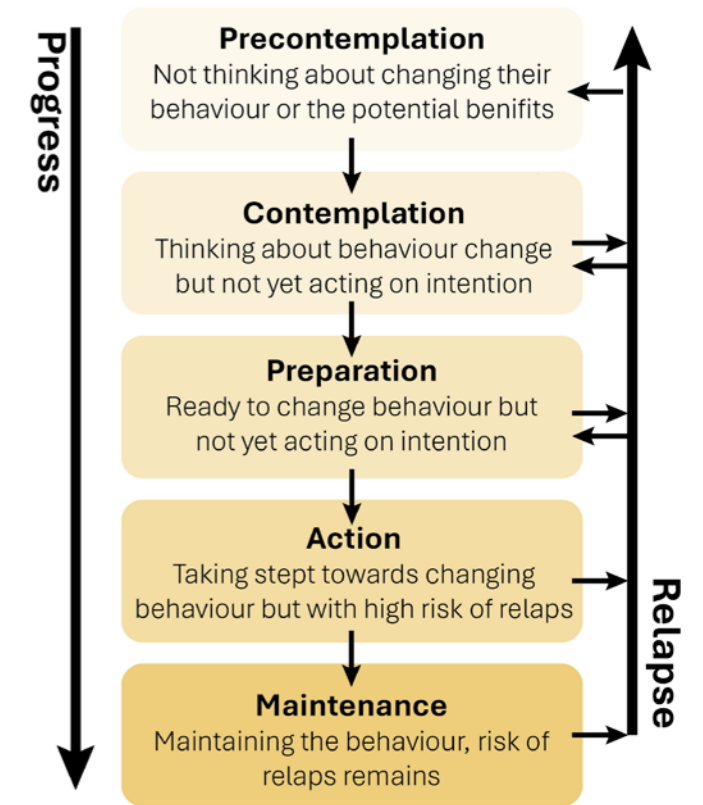


Figure 2.5: The Stages of change (Based on Niwlikar, 2025)

## 2.2.4 Sustainable Development Goals

The Sustainable Development Goals (SDGs) are 17 global goals established by the United Nations to create a more sustainable and equitable world by 2030. They provide a framework for addressing urgent challenges like poverty, inequality, and climate change, guiding toward a better future for both people and the planet (United Nations, n.d.)

To strengthen our project, we use the SDGs as a theoretical framework. By aligning our vision goals for the community with these 17 goals, we ensure that it creates more value for our project and that it contributes meaningful to the global progress towards a more sustainable world.

Our vision goals align with SDGs 1, 3, 7, 8, 9, 10, 11, 12, 16 and 17. The driver of change in the project is the energy transition, which places extra emphasis on SDGs 7, 11 and 12. To ensure it is a just transition, SDGs 10, 16 and 17 are integrated, prioritizing equity and social justice. Furthermore, there is a transformation of the industry into a sustainable sector, supporting SDGs 9 and 12. For each SDG we select the relevant targets and incorporate them into our strategy.



**1.4** By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.



**3.9** By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.



**7.1** By 2030, ensure universal access to affordable, reliable and modern energy services.

**7.2** By 2030, increase substantially the share of renewable energy in the global energy mix.

**7.3** By 2030, double the global rate of improvement in energy efficiency.

**7.A** By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.



**8.3** Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.

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



**9.1** Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

**9.2** Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

**9.3** Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

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



**10.2** By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.

**10.3** Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard.

**10.4** Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality.



**11.2** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

**11.6** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

**11.7** By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

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



**12.2** By 2030, achieve the sustainable management and efficient use of natural resources.

**12.4** By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

**12.5** By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

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

**12.7** Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

**12.8** By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

**12.C** Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.



**16.7** Ensure responsive, inclusive, participatory and representative decision-making at all levels.



**17.7** Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships.

Figure 2.6: Focus targets of the Sustainable Development Goals (Source: United Nations, n.d.)

## 2.3 Conceptual framework

### Towards a just future

The conceptual framework, see figure 2.7, shows how the concepts from the theoretical framework apply to the complex research objectives. The community, the neighbours of the industry, is the basis of this conceptual diagram. They are represented as triangles, which increase in shape over the axis of process and justice. The process refers to time and the progress of behavioural change from the transtheoretical model described in the theoretical framework. The justice includes the procedural, recognition, and distributive justice, as they are interdependent. The growing triangle stands for a more just and sustainable community in the future.

The centre axis of this conceptual framework represents how the **energy transition is a driver of change** towards a **just future** for this community. The values of the community, **wellbeing, identity, and chances & choices**, are important concepts for describing the community.

The process is influenced by **spatial interventions** in the social, environmental, and economic domains of sustainability. These are used to achieve a just future for the community. On the other hand, the **uncertainty** of future scenarios, considering the industry, influences the goals of the community as well. The **stakeholders** fall under the uncertain scenarios, because they influence the governance and decision-making that impact the process of the energy transition.

This framework guides the analytical research project by showing the relations between the theoretical framework and the aim of this research.

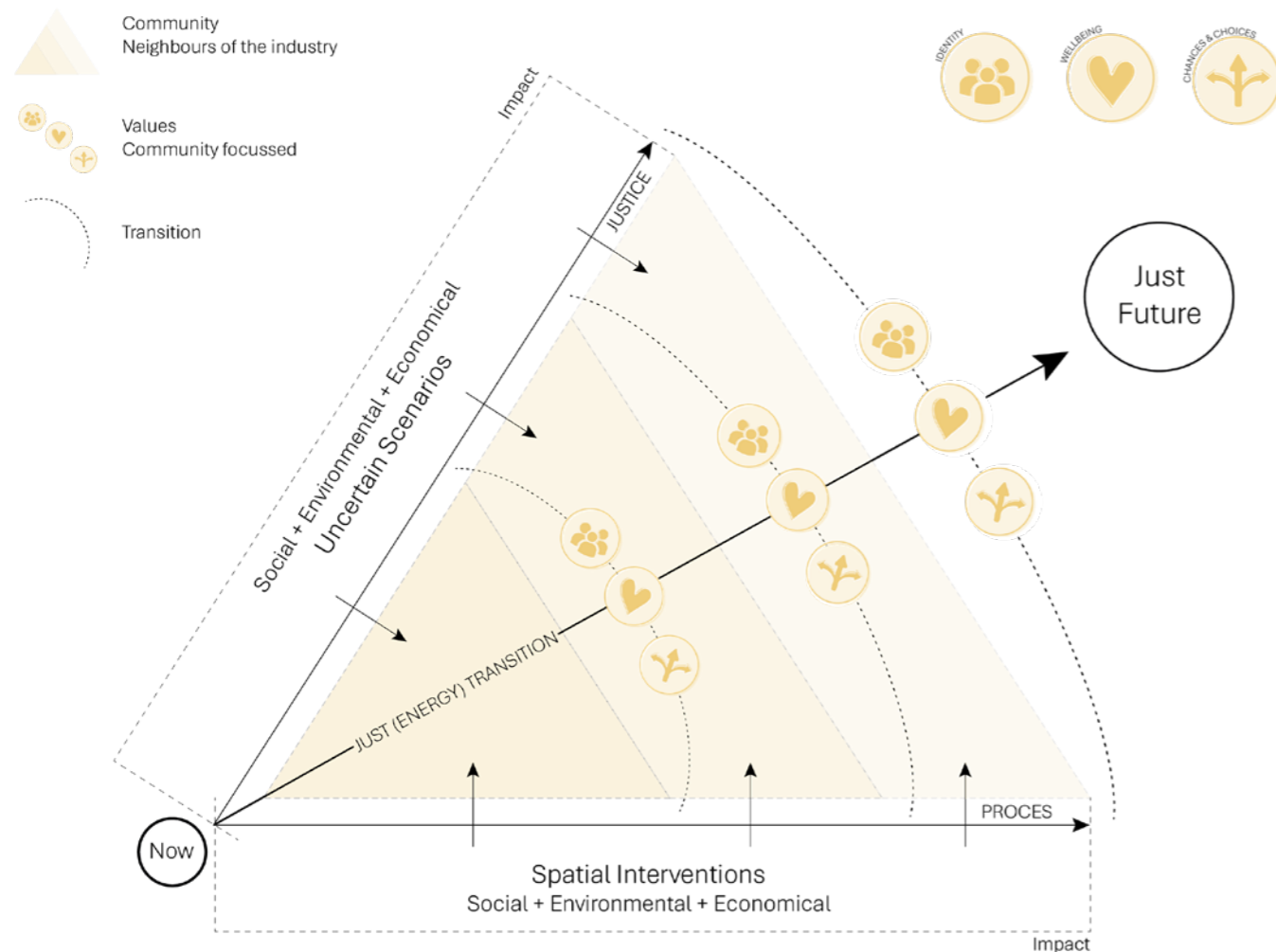


Figure 2.7: Conceptual Framework

# 3

- 3.1 The energy system
- 3.2 The future energy system
- 3.3 The structure of IJmond
- 3.4 Living in the IJmond region
- 3.5 The toxic relationship

## Living in the shadow of industry

*This chapter will dive into the current situation of the region. The region will be looked at spatially, environmentally, and economically to see what the region of IJmond contains and what the region is really about. With statistics, facts, but also opinions the real definition of the region will give a better view on how to solve the problems in this region.*

## 3.1 The energy system

### The current energy system

#### 3.1.1 Grid congestion

To meet the Climate Goals, the Netherlands must be climate-neutral by 2050. This means that the energy supply will rely entirely on sustainable sources. This requires a transition of the current energy system, including moving away from fossil fuels to renewable energy sources (Rijksoverheid, n.d.).

However, the energy system is already under significant pressure. “Everywhere in the area, the energy transition is taking place at a high acceleration. But, in many places, the electricity grid has reached its limits” (Liander, 2025, p. 4). This phenomenon, known as grid congestion, occurs when the network becomes overloaded by too much demand or supply of electricity. Grid congestion, particularly regarding offtake, is most severe in North Holland. This is largely driven by the integration of renewable energy sources, such as solar and wind energy. Moreover, grid congestion hinders the implementation of new energy projects, whereby the energy transition is further delayed (energy.nl, 2022).

Without measures, the electricity grid in North Holland, including the IJmond region, will become overloaded in the coming years (Liander, 2025). Currently grid congestion is already hindering local businesses with getting a new or expanded power connection. Without measures grid congestion will eventually impact residential households as well.

Grid operators need to expand the grid as quickly as possible, and this requires billions of euros in investments. These financial demands put pressure on the affordable household energy bills, increasing the risk of energy poverty (Liander, 2025). Projects in North Holland are facing further delays due to a major shortage of technicians, nitrogen regulations and long permit processes. To maintain speed cooperation with municipalities and the development of local solutions are vital. In the short term, measures to manage energy consumption and reduce peak demand are essential to reduce pressure on the grid.

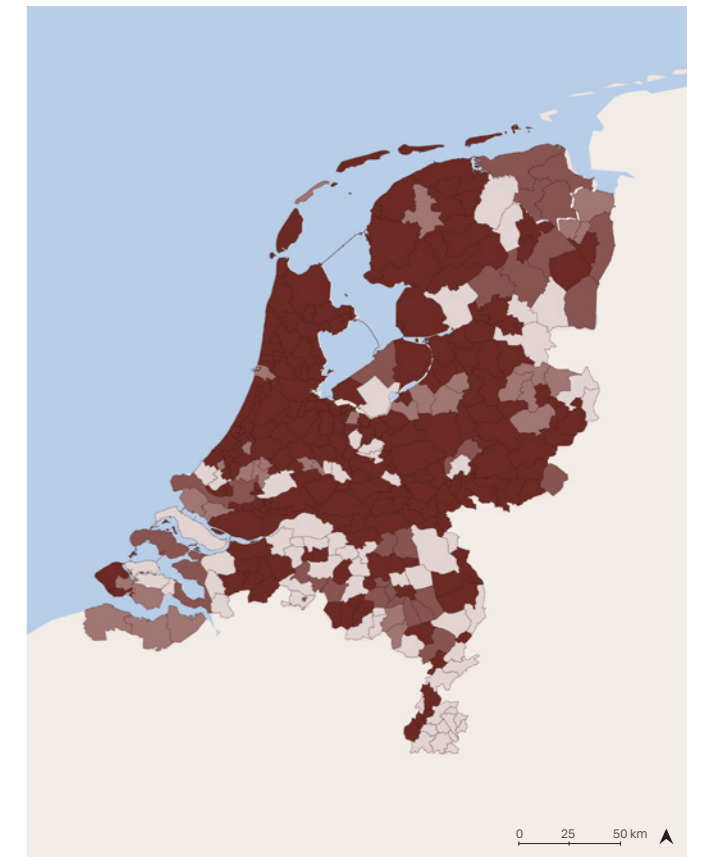


Figure 3.1: Grid congestion regional grid operator - offtake, status 18:00 (Source: Partners in Energie, n.d.)

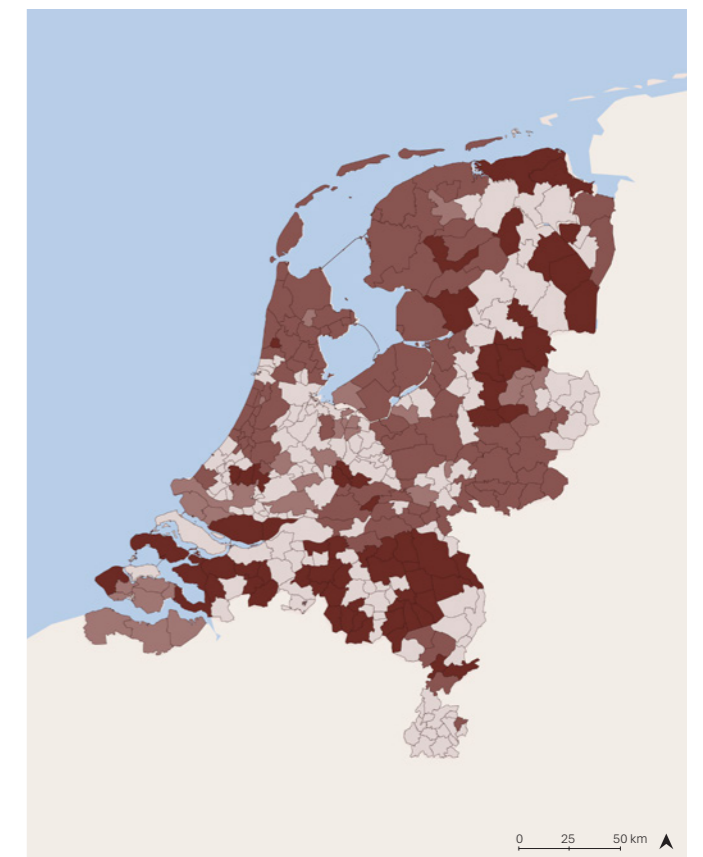


Figure 3.2: Grid congestion regional grid operator - feed-in, status 18:00 (Source: Partners in Energie, n.d.)

### 3.1.2 Current national energy system

The current energy system of the Netherlands consists of a national network and infrastructure. High-voltage electricity lines connect the different urban areas in the country. The grid is also linked to several offshore wind farms and solar park, which already produce renewable electricity on a large scale, contributing to the national renewable energy supply (zonnemarkt, n.d.).

Currently, half of the Netherlands' electricity comes from sustainable sources, with the largest share generated by offshore and onshore wind turbines (54%) followed by solar panels (36%) (Ministerie van klimaat en groene groei, 2024).

- High-voltage power lines
- Solar field 30-50 MW
- ◉ Solar field 50-100 MW
- ◉ Solar field 100+ MW
- Wind turbine density
- Wind farm

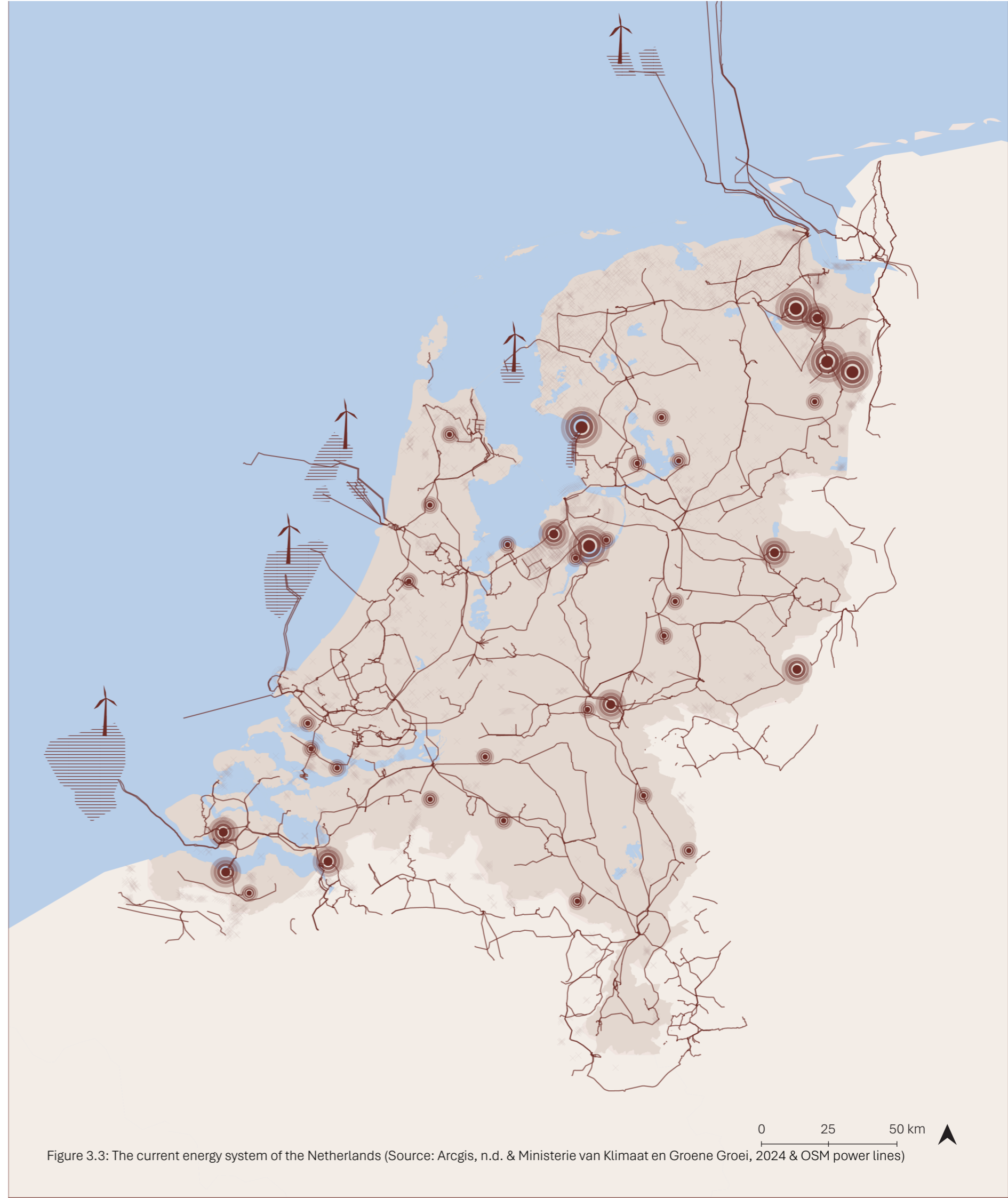


Figure 3.3: The current energy system of the Netherlands (Source: Arcgis, n.d. & Ministerie van Klimaat en Groene Groei, 2024 & OSM power lines)

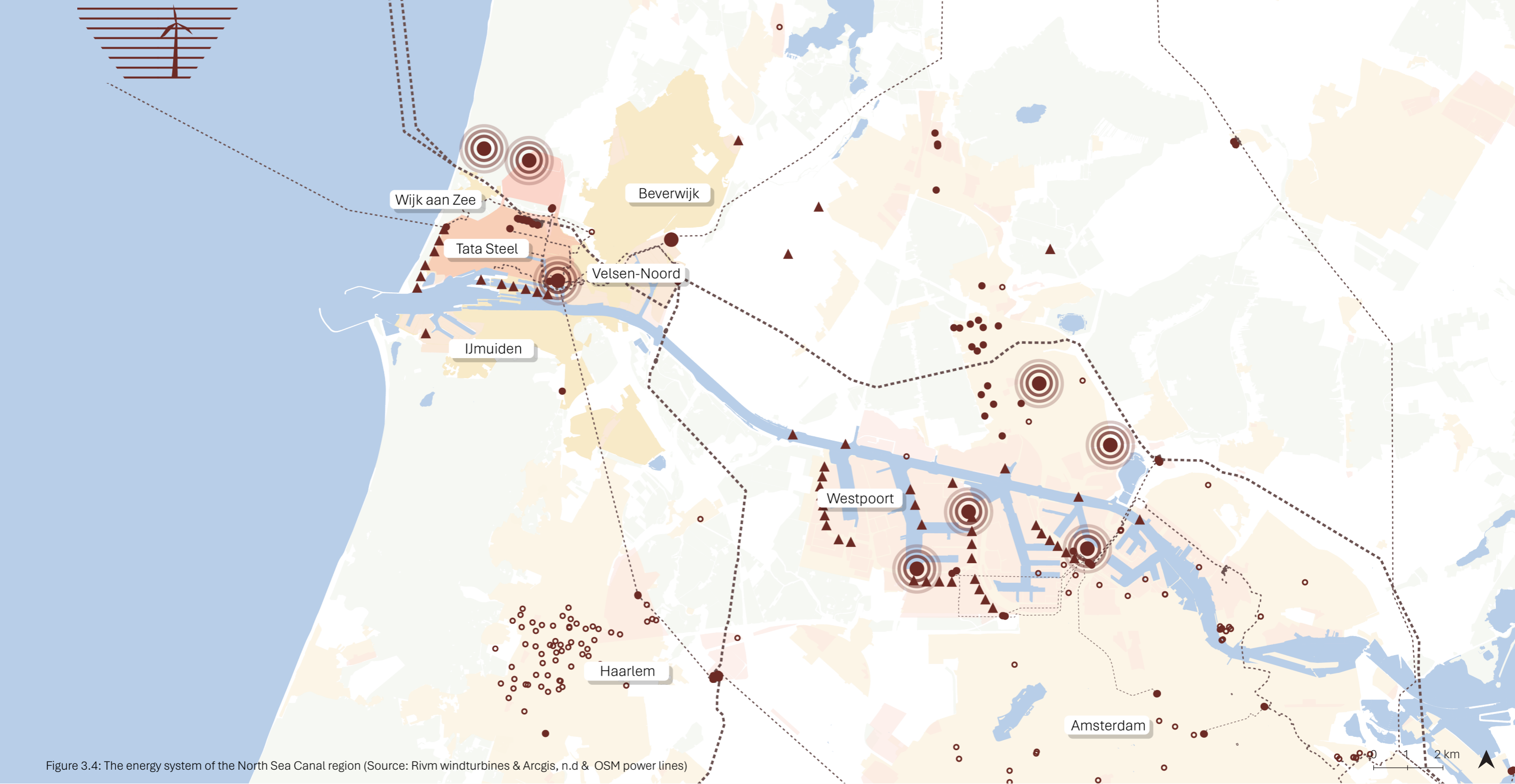


Figure 3.4: The energy system of the North Sea Canal region (Source: Rijn windturbines & Arcgis, n.d & OSM power lines)

### 3.1.3 Current regional energy system

The IJmond region is an important location for bringing offshore wind energy ashore. The regional energy map shows the location of current wind turbines and solar parks in the region. Various converter stations are essential to transform high-voltage power from the regional grid into low-voltage electricity required to supply local households.

- Residential area
- Industry
- Power Lines 380 & 220 kV
- Power Lines 150 & 110 kV
- Power Lines 70 & 50 kV
- Sub stations
- Transformer stations
- Switch stations
- Wind turbine
- Solar field 0,5-5MW
- Wind farm

## 3.2 The future energy system

### Energy plans for the future & potentials

#### 3.2.1 Renewable energy potentials

The IJmond region has great potential for renewable energy. The industry function offers potential for industrial waste heat. Waste heat, a byproduct of industrial processes, can be captured and transported via a thermal network to heat buildings (NPLW, n.d.). As illustrated on the map Tata Steel is a major source of this residual heat, offering a sustainable alternative for regional heat supply.

The open landscape in the area also offers substantial potential for solar energy, as illustrated on the map showing the solar energy potential in kWh per day per municipality. Municipalities within the IJmond region contain areas with fewer obstacles, such as the dunes, making the area suitable for large-scale energy production via solar panels.

Coastal areas, such as the IJmond region, offer potential for wind energy. As shown on the map the region benefits from higher wind speeds, making it an ideal location for turbines. The area serves as a potential strategic location for connecting future offshore wind parks in the North Sea to the national grid. The industry can play a role in bringing this offshore wind energy ashore (Rijksoverheid, n.d.).

Windspeed potential

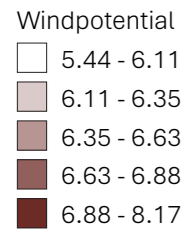
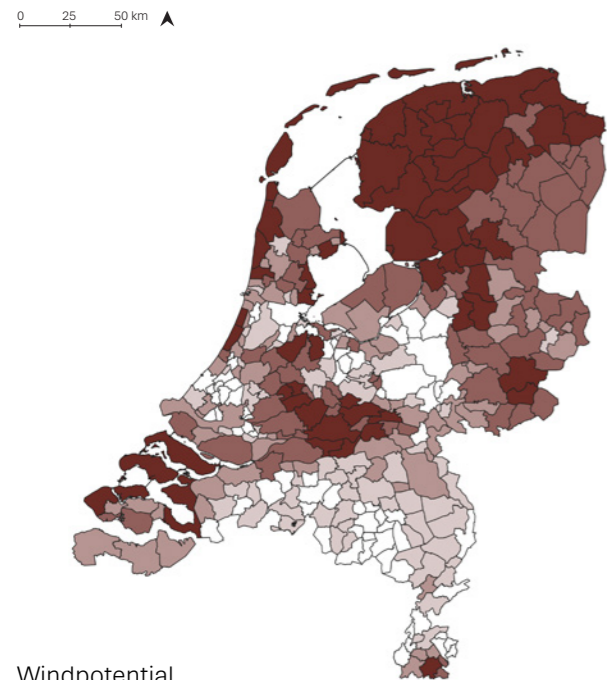


Figure 3.5: Windspeed potential 50m (Source: Global Solar Atlas)

PV potential

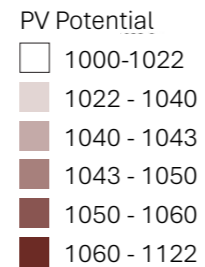
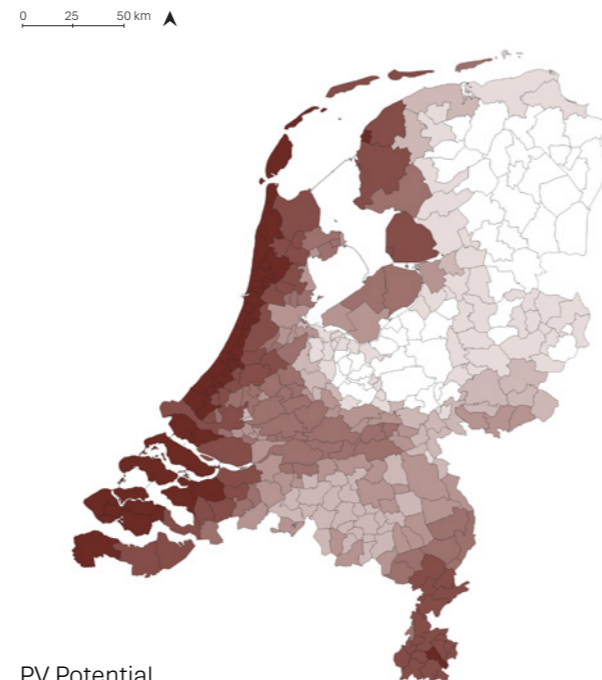


Figure 3.6: PV potential (Source: CBS, PVOUT dataset)

Amount of industry with restwarmth potential

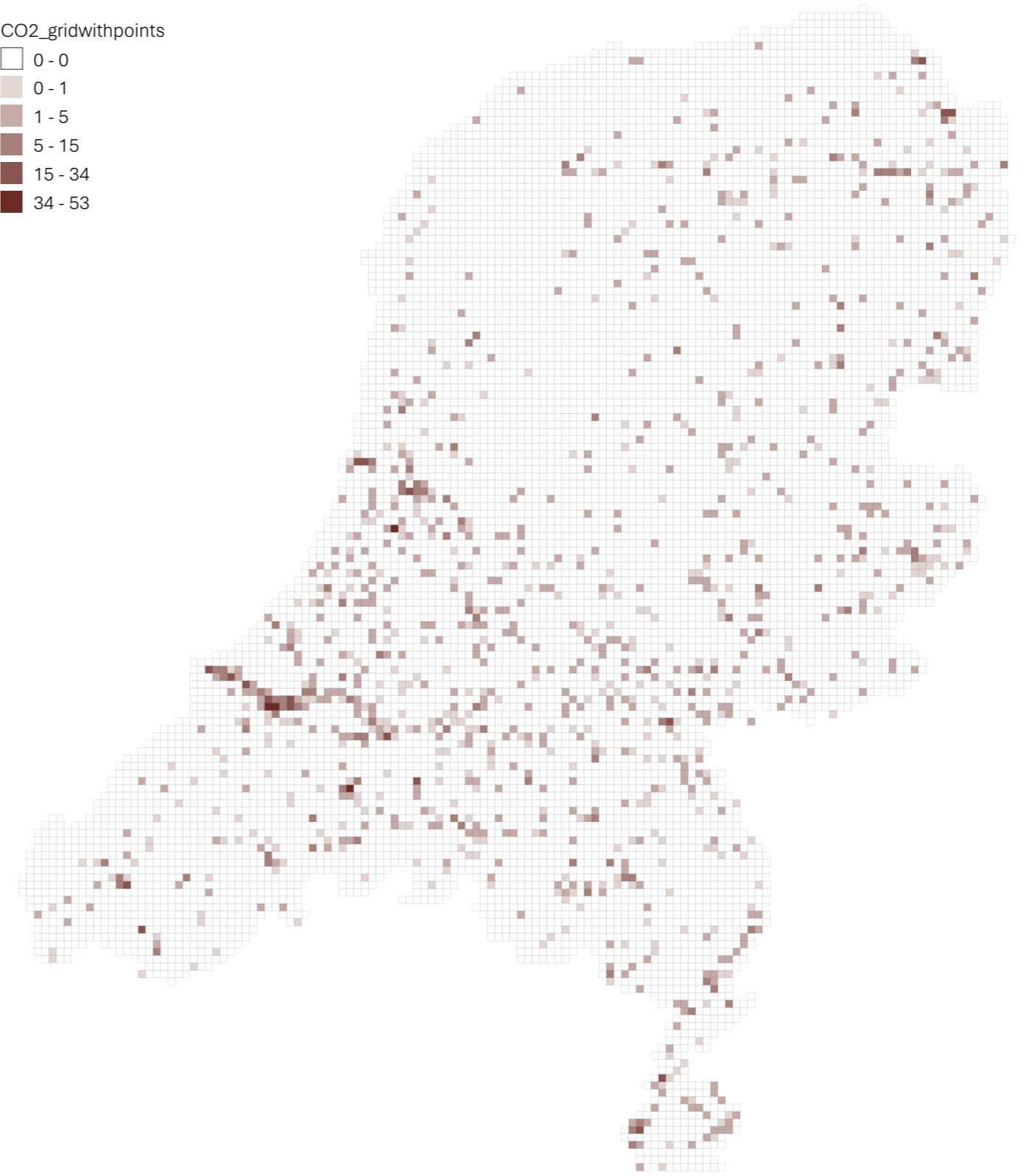
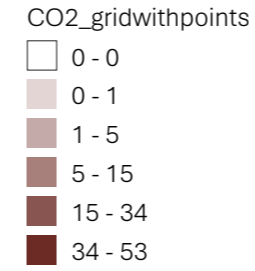
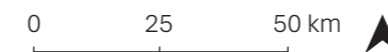


Figure 3.7: Waste heat industry potential (Source: WarmteAtlas Ligging industrie en CO2)



### 3.2.2 Future energy plans

The geographical location of the IJmond region gives the region an important role in the national energy transition. As illustrated on the map, there is significant activity along the North Sea Canal. These projects consist of the landfall of power from new offshore wind parks and the development of a regional infrastructure for hydrogen transport and storage. Hydrogen is expected to play an important role in the energy transition of large-scale industry. The future hydrogen networks connect the industry of IJmond and Amsterdam. TenneT is expanding the offshore high-voltage network, with Beverwijk and Wijk aan Zee as important locations for essential transformation hubs. Tackling the grid congestion remains a main priority both nationally and within the IJmond region, as it currently delays the further implementation of renewable energy projects.

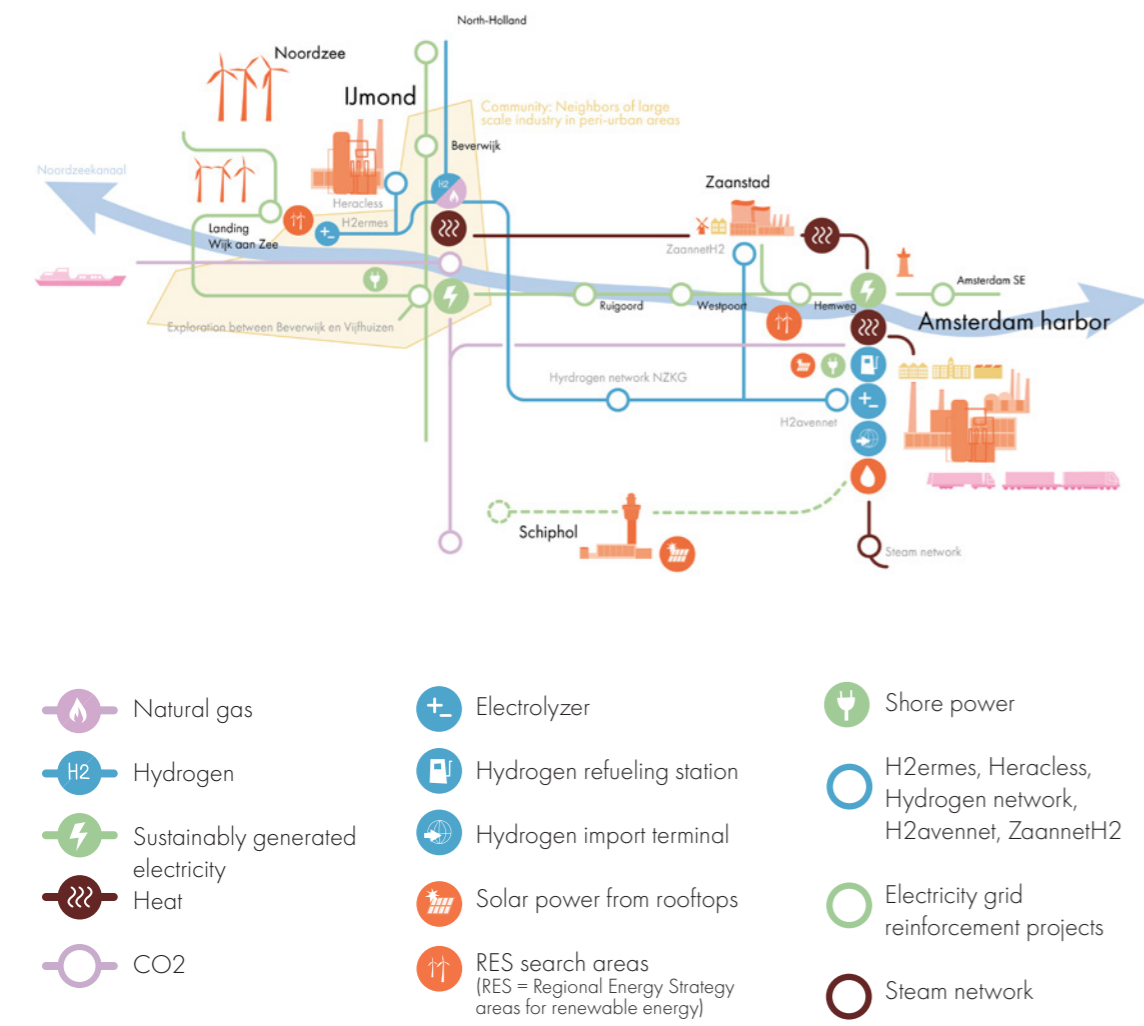


Figure 3.8: Ambition for the Energy Transition in the North Sea Canal Region (Source: Provincie Noord-Holland, 2022)

- Existing high-voltage power lines
- Existing solar field 30-50 MW
- Existing solar field 50-100 MW
- Existing solar field 100+ MW
- Existing wind turbine density
- Existing wind farm
- Offshore HVDC cable
- Offshore Carbon Storage lines
- Hydrogen lines
- Proposed plan Delta Rhine Corridor
- Solar field project 30-50 MW
- Solar field project 50-100 MW
- Solar field project 100+ MW
- Hydrogen project
- Energy project
- Wind farm project

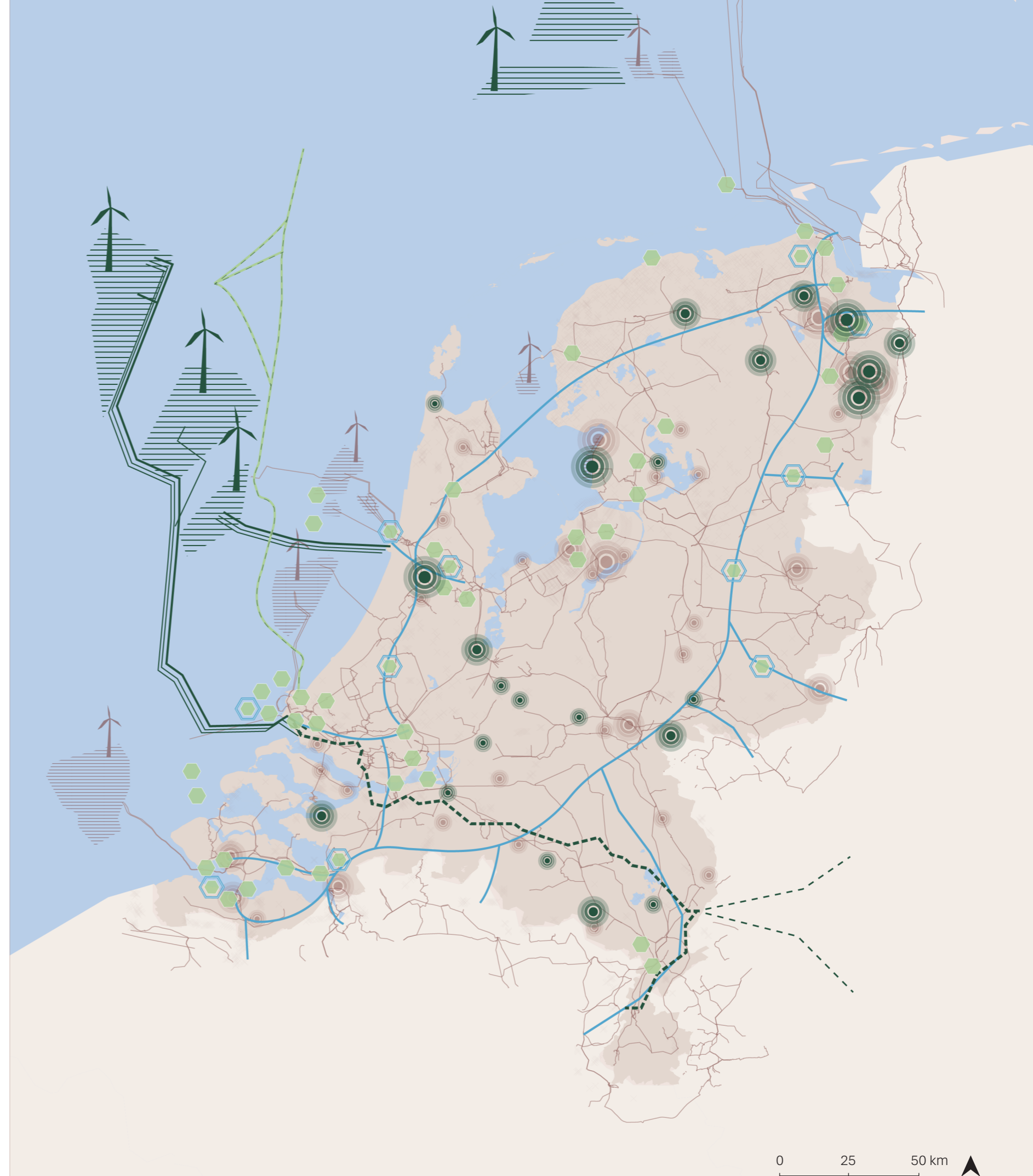


Figure 3.9: The current energy plans (Source: Ministerie van Klimaat en Groene Groei, 2024)

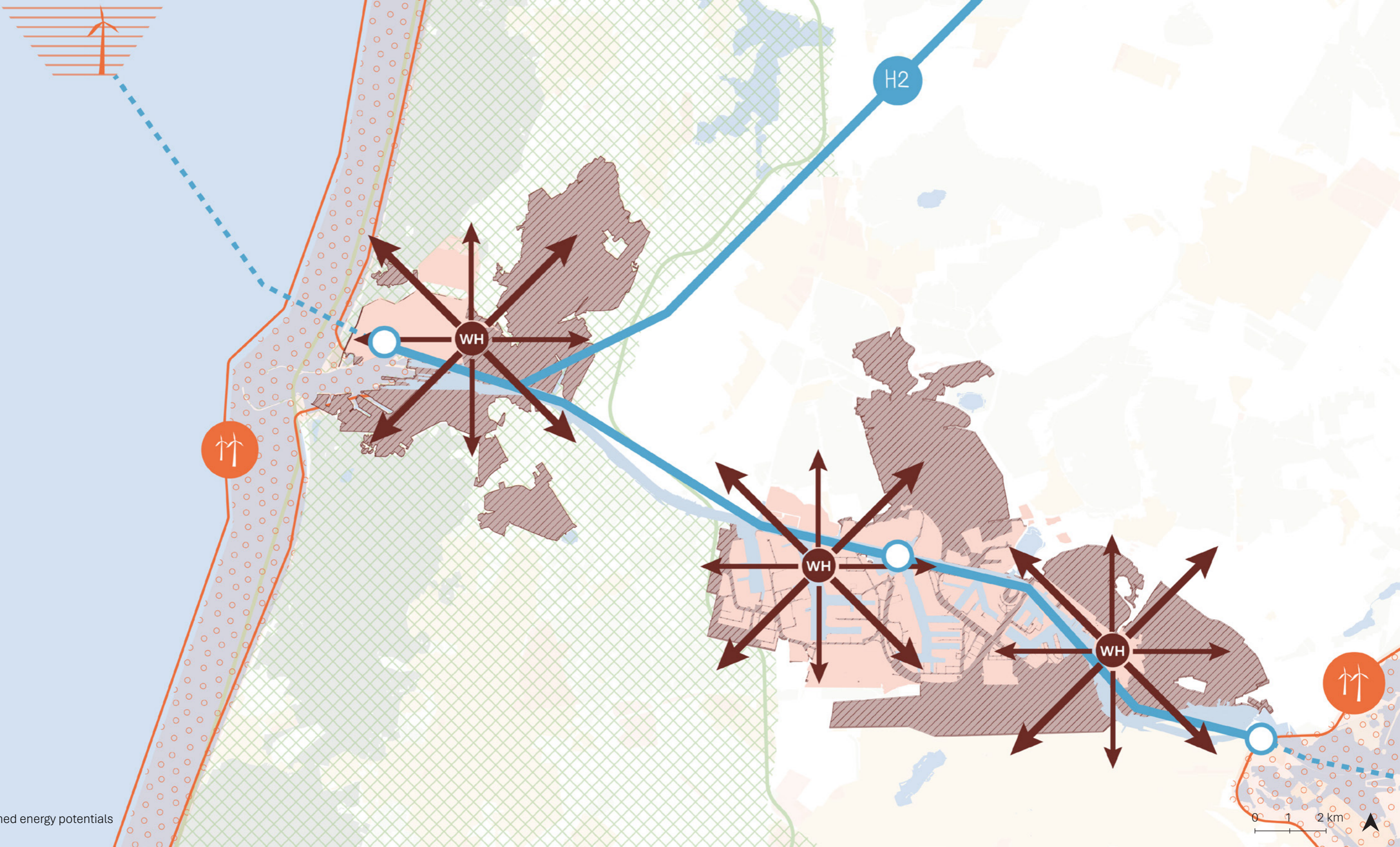


Figure 3.10: Combined energy potentials

### 3.2.3 Combined potentials

The synthesised potential for renewable energy shows the numerous possibilities and projects regarding the energy transition within the IJmond region and along the North Sea Canal. However, these energy projects require space and ask for a change in the environment. According to the report Nationale energie-infrastructuurprojecten

in Nederland by the Ministerie van klimaat en groene groei (2024), it is unfortunately inevitable that vulnerable Natura 2000 areas, such as the dunes, must be considered to provide the space required to realise the energy transition.

- Industry
- Potential residential area with industrial waste heat
- WH

 Potential industrial waste heat distribution
- Offshore wind energy potential (7,17-8,76 m/s)
- Solar panel potential (2,949-3,071 kWh/kWp per day)
- Hydrogen network potential
- Hydrogen projects

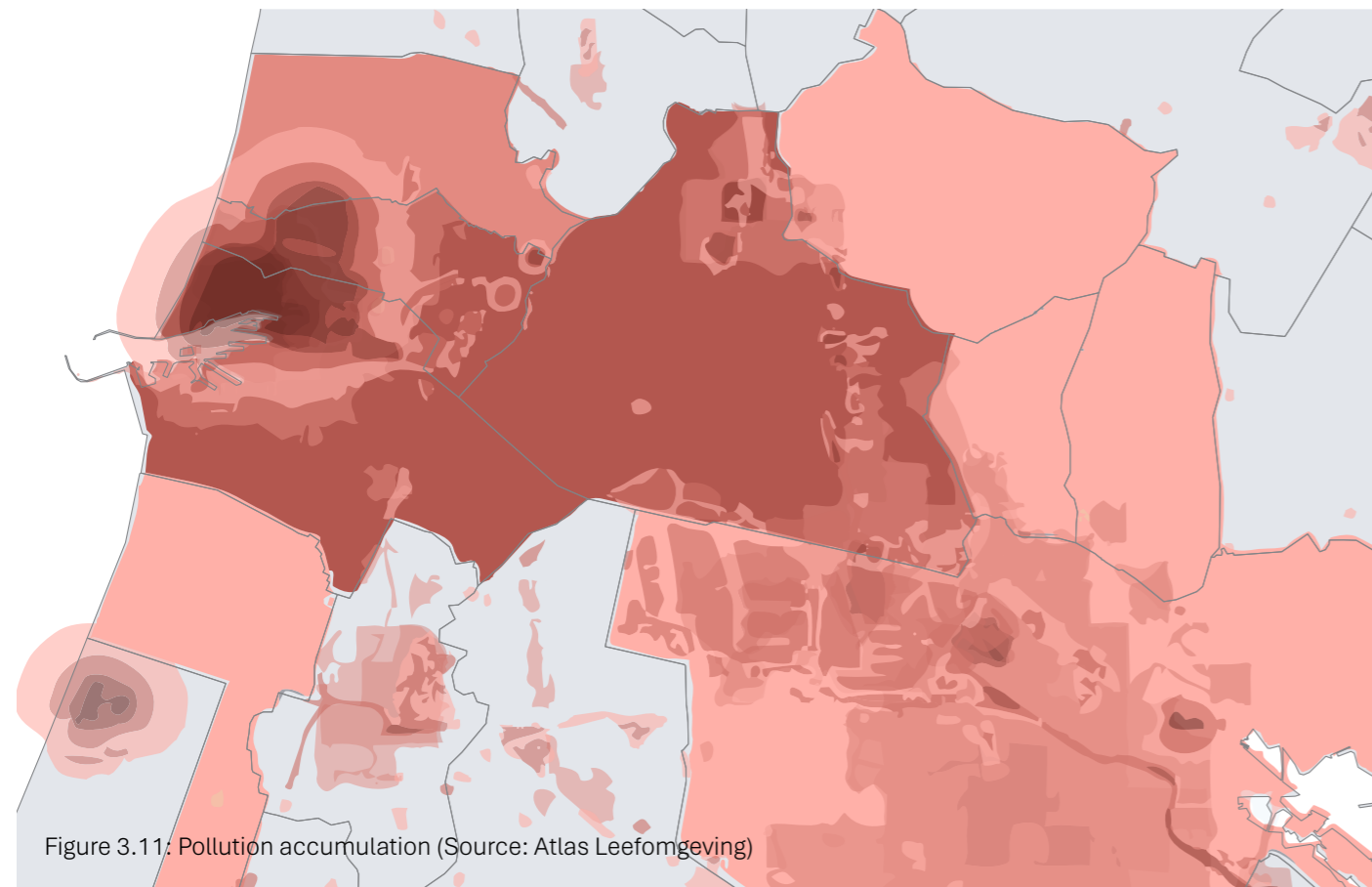
### 3.3 The structure of IJmond

#### 3.3.1 Environment & environmental impact

The region is shaped not only by industry, but also by nature. Natura 2000 is strongly present here. At the same time, the North Sea Canal and the industry split two important dune areas apart, breaking their connection.

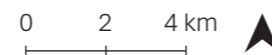
Not only does the industry affect flora and fauna by disconnecting nature, it also causes pollution. The industry produces CO2 emissions, and pollutes with PM2.5, PM10, noise, and odour. On the map, the last four of these types of pollution are layered on top of each other, creating an overview of the areas with the highest levels of nuisance, defining the community living under the shadow of industry.

When compared with other industrial sites along the North Sea Canal, it becomes evident that Tata Steel is by far the biggest polluter. Even Westpoort, one of the largest industrial areas in the Netherlands, does not come close to the amount of pollution Tata Steel causes.

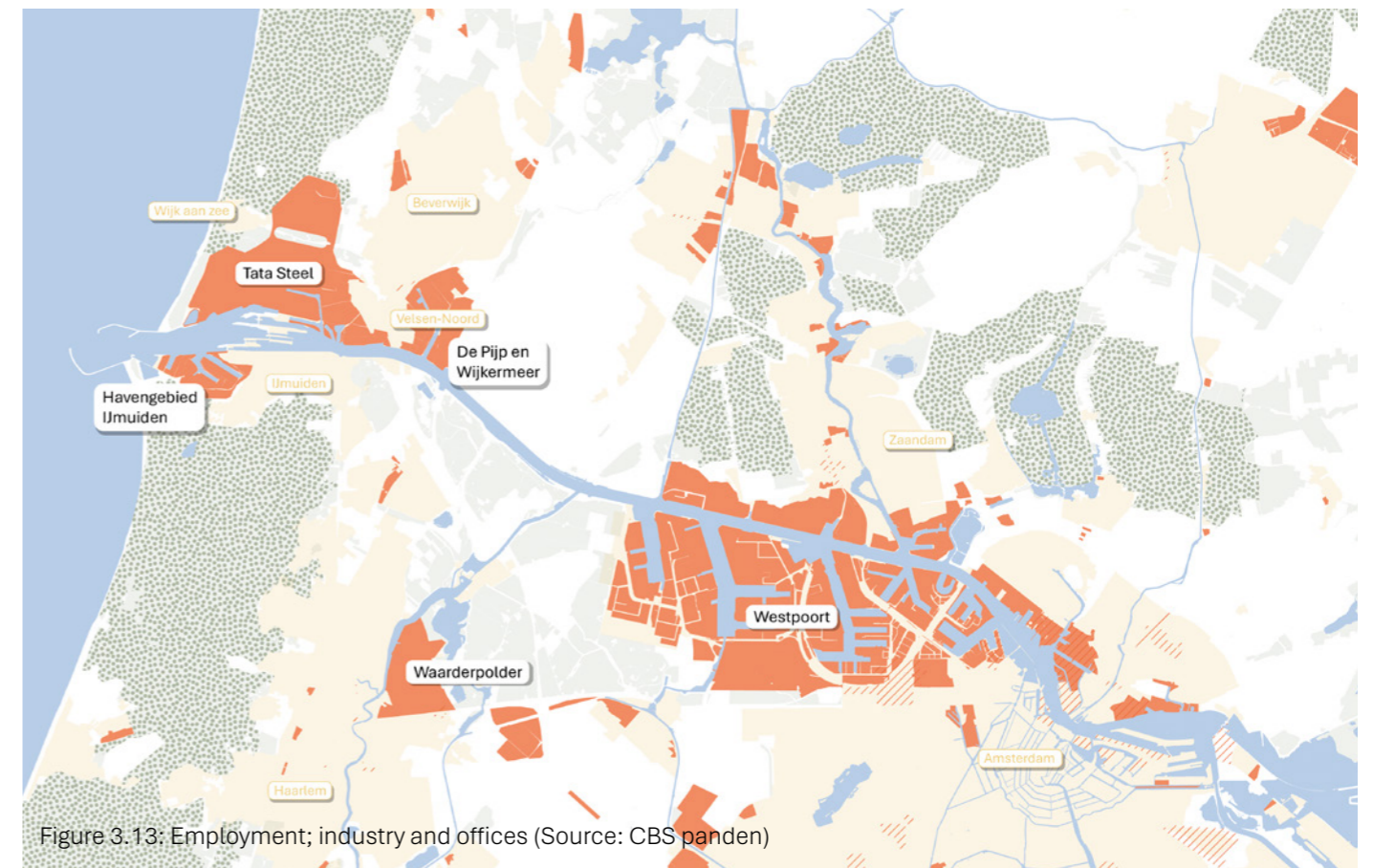


**Pollution accumulation**  
PM 2.5, PM10, odour, sound

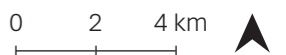
- Very high pollution
- Lower pollution



- Spatial Area of Conservation  
Sites designated under the Habitats Directive
- Special Protection Area  
Sites designated under the Birds Directive



- Industrial park
- Office park
- Natura 2000
- Other qualitative nature
- Residential area



### 3.3.2 Mobility at national scale



Figure 3.14: Train network in the Netherlands (Source: OpenStreetMap)



Figure 3.15: Road density in the Netherlands (Source: OpenStreetMap)

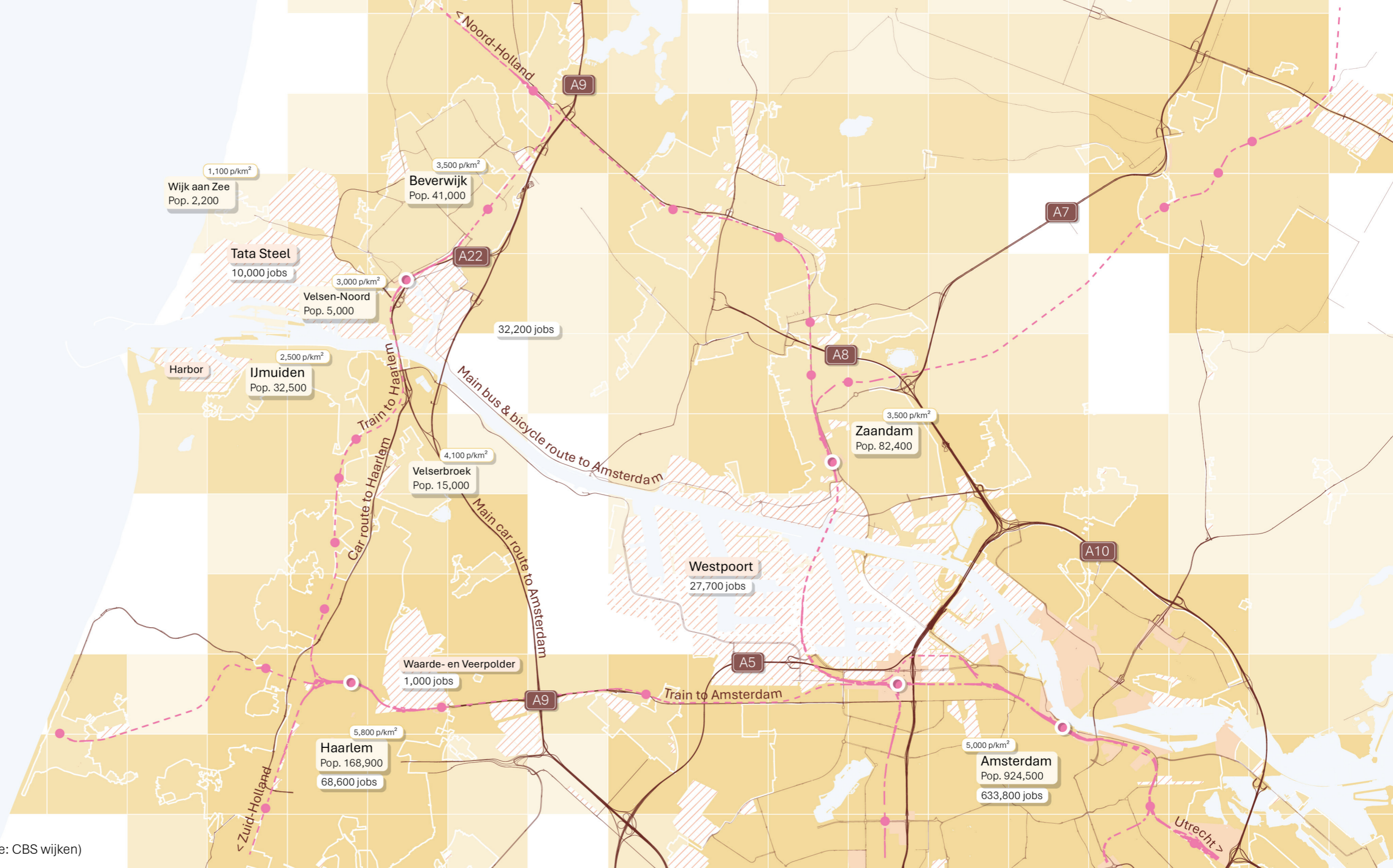


Figure 3.16: Peri-urban character (Source: CBS wijken)

### 3.3.3 The Peri-Urban character

The IJmond region is a peri-urban area located on the outskirts of the Amsterdam metropolitan region. As illustrated on the map, the region's location along the North Sea Canal is a key geographic advantage, positioning it as a central point for international trade and shipping. Because of its strong industrial base and proximity to other industrial areas, IJmond offers a high density of employment opportunities. As the industrial site

formed itself as an extension of the metropole of Amsterdam, communities were drawn towards the area.

- Urban
- Semi-urban
- Peri-urban
- Rural
- Major road
- Train route
- Intercity station
- Station

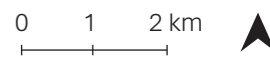
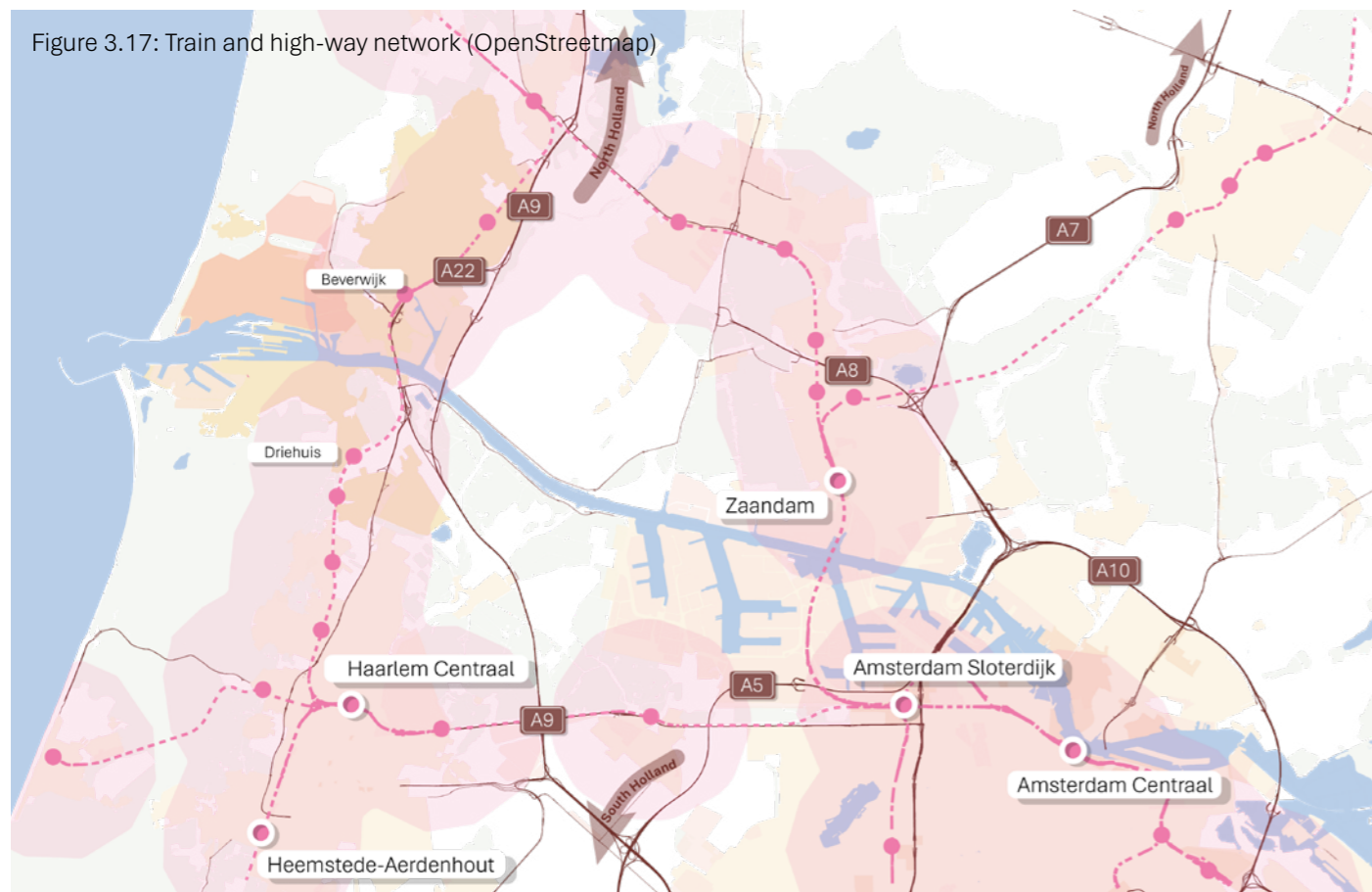
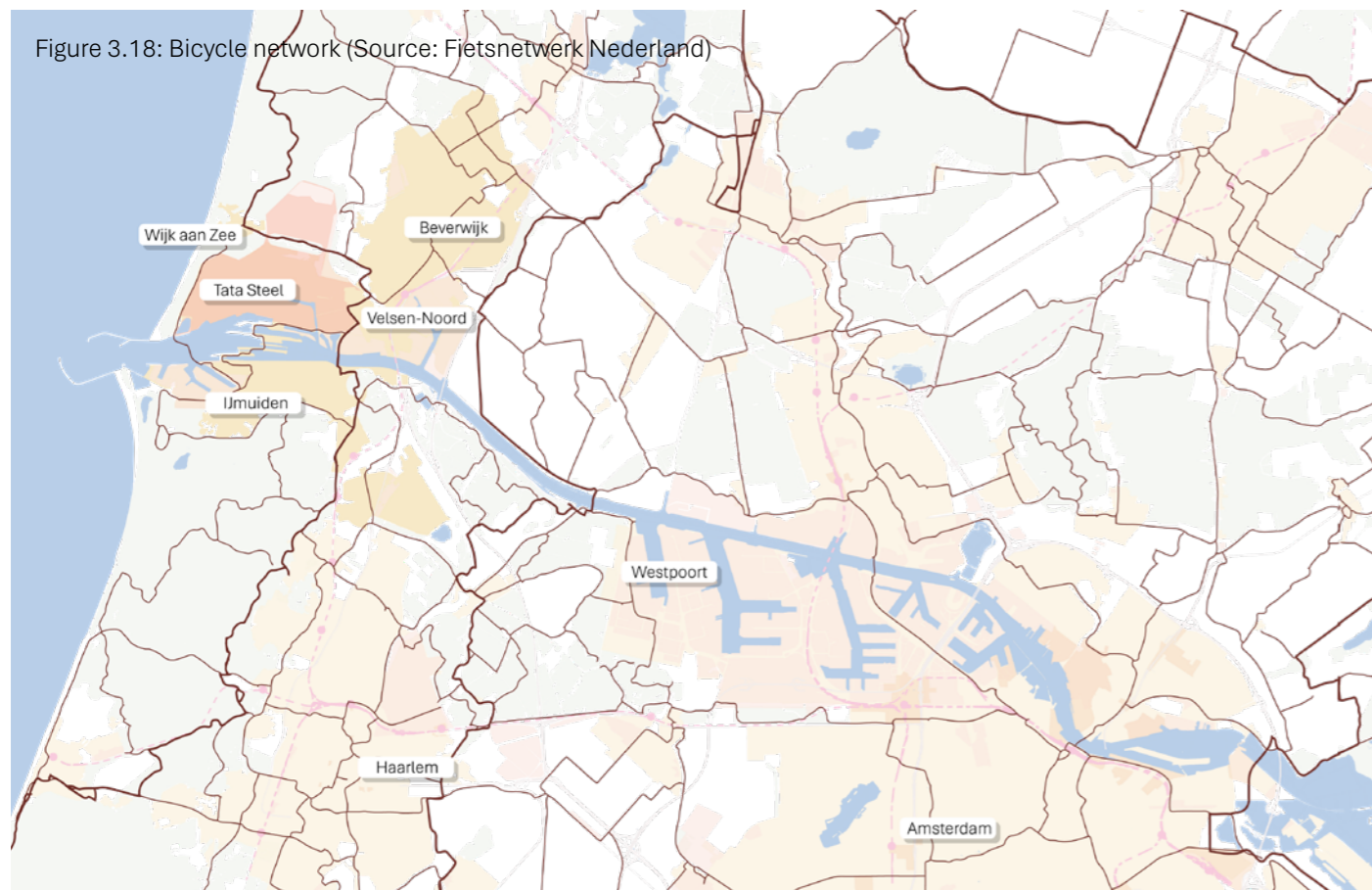


Figure 3.17: Train and high-way network (OpenStreetmap)



- Residential area
- Industry
- Major road
- Train route
- Intercity station
- Station
- 15-minute cycling radius
- Ferry Noordzeekanaal

Figure 3.18: Bicycle network (Source: Fietsnetwerk Nederland)



- Residential area
- Industry
- Province bicycle network
- Local bicycle network



### 3.3.4 Mobility at Noordzeekanaal scale

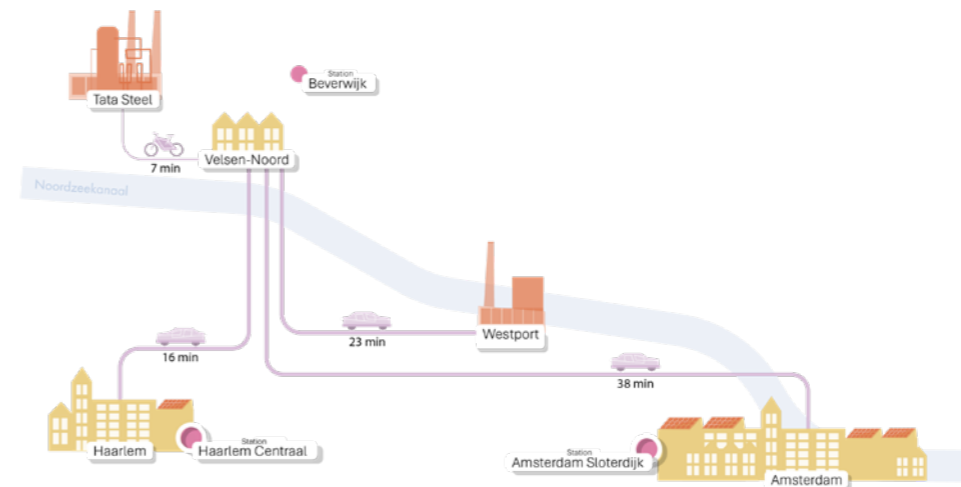


Figure 3.19: Accesibility by car

The daily patterns of the community are shaped by and dependent on their transportation possibilities. As shown in the maps, the current system is very car oriented. The threshold to take public transport or slow-traffic options is too high due to high transportation time. However, with the energy transition, the focus must shift toward (electrical) public transport and slow traffic accessibility.

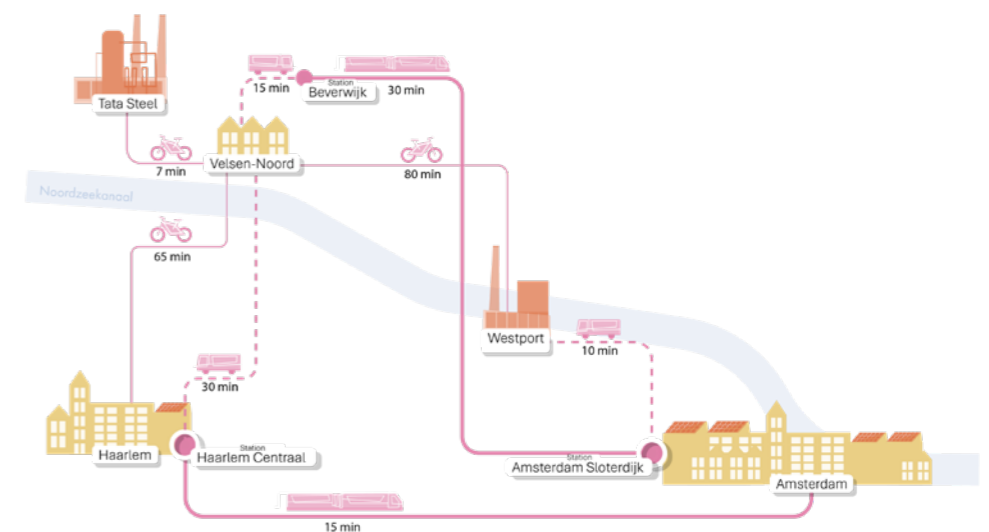


Figure 3.20: Accesibility by public transport

The mobility system in IJmond consists of different modes. This system features a slow-traffic network for accessibility by bicycle and pedestrian travel. The highways A22 & A9 link the region with Haarlem and extend all the way to South-Holland and the rest of the Netherlands. There are various options to reach the region of IJmond by public transport. There is a train station in Beverwijk, which connects the region to Hoorn and Amsterdam with a sprinter train. There is also a bus service which connects the region to Haarlem, Zaandam, Heemskerk and Amsterdam. The train from Haarlem to Beverwijk stops 4 times before

arriving in Beverwijk and takes about 25 minutes. The bus from Haarlem takes 25 to 30 minutes to reach IJmuiden. Most buses and trains leave once every 30 minutes, which is not very flexible. (9292, n.d.) It is quite a long commute for the residents to travel to urban areas by public transport. While the car takes only 20 minutes and offers a lot more flexibility, so people are not inclined to choose the public transport over the car. The bicycle network is not very well connected, which makes the choice of slow mobility an inefficient option as well.

### 3.4 Living in the IJmond region

Who lives in the area affected by pollution?

#### Lowering purchasing power

% per neighbourhood

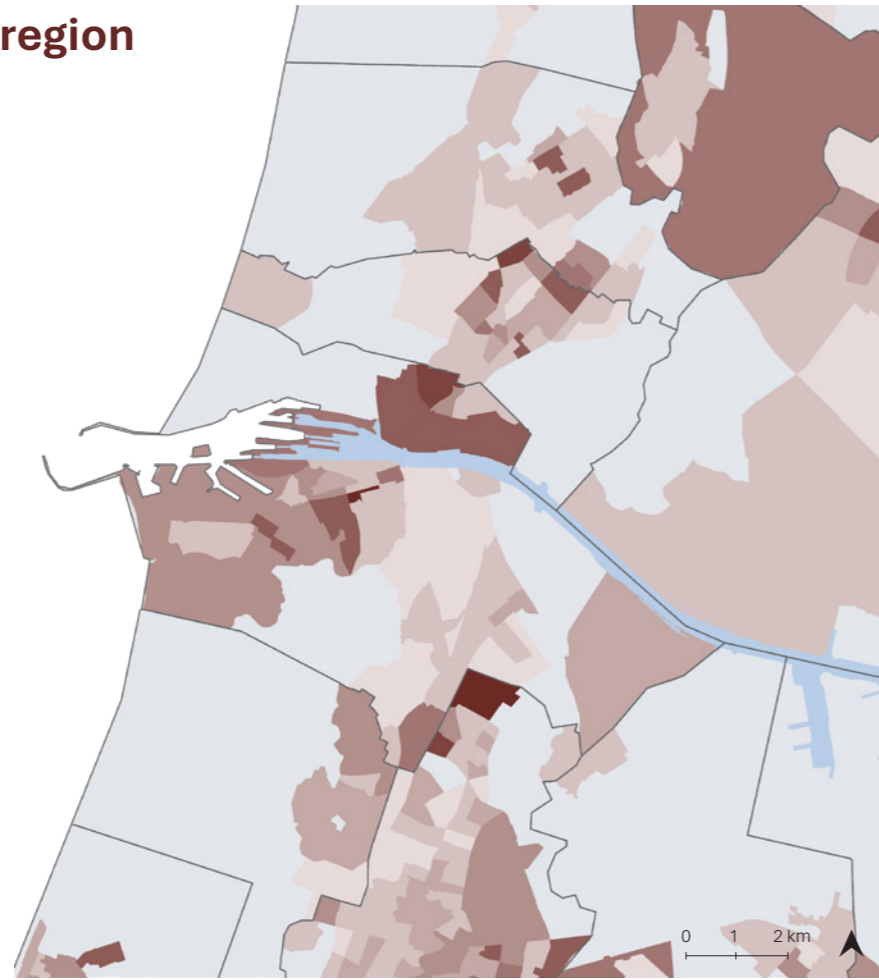
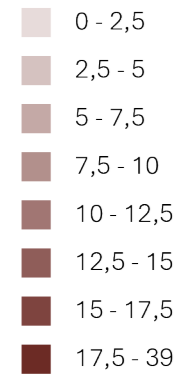


Figure 3.21: Lowering purchasing power (Source: CBS buurten)

#### Liveability

in comparison to average of NL

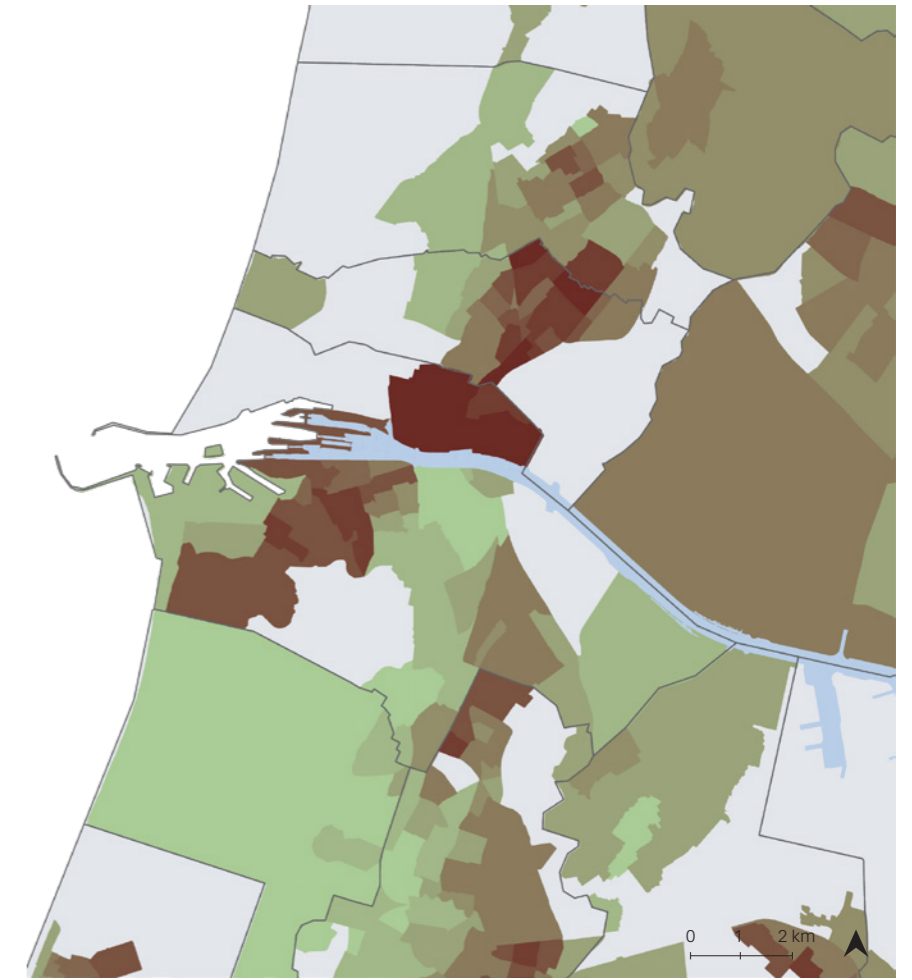
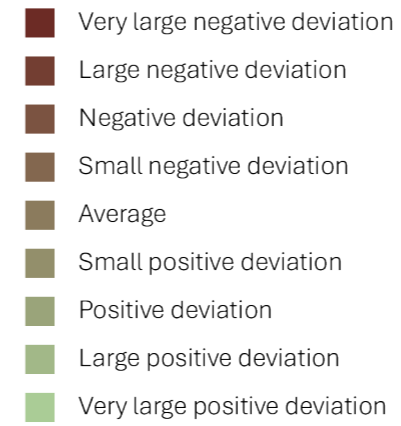


Figure 3.23: Liveability (Source: Leefbarometer)

#### Home value

x €1.000

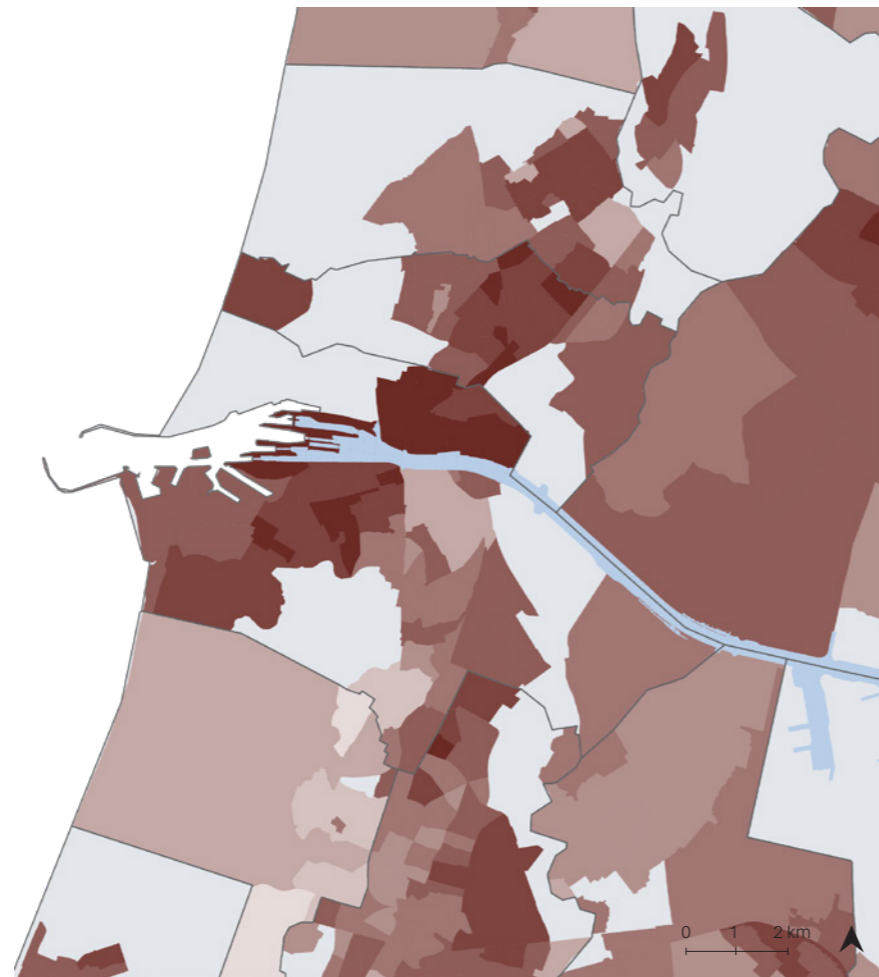
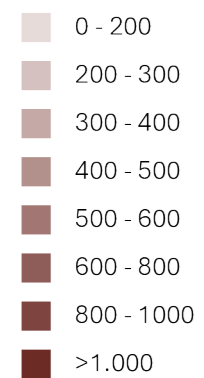


Figure 3.22: Home value (Source: CBS buurten)

#### Perceived health as good

% per neighbourhood

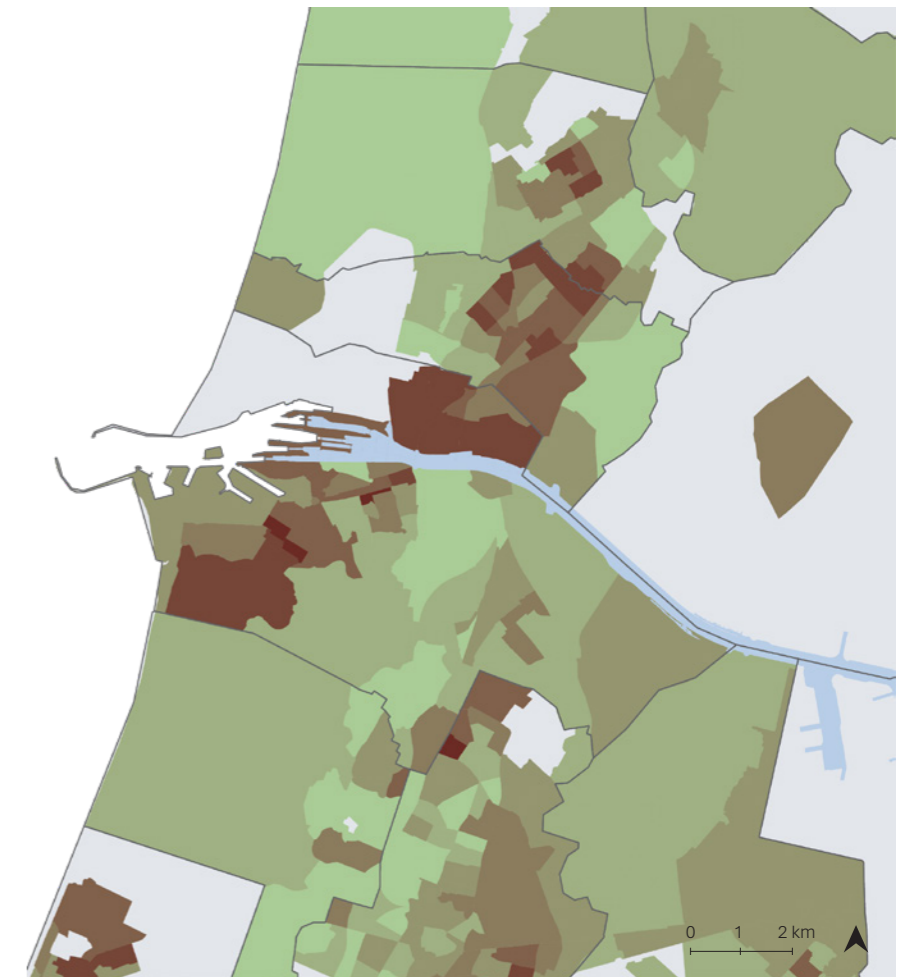
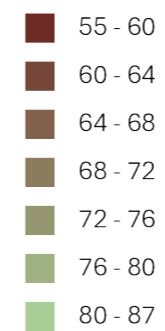


Figure 3.24: Perceived health as good (Source: GGD Kennemerland)

**Social housing**  
% per neighbourhood

- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100

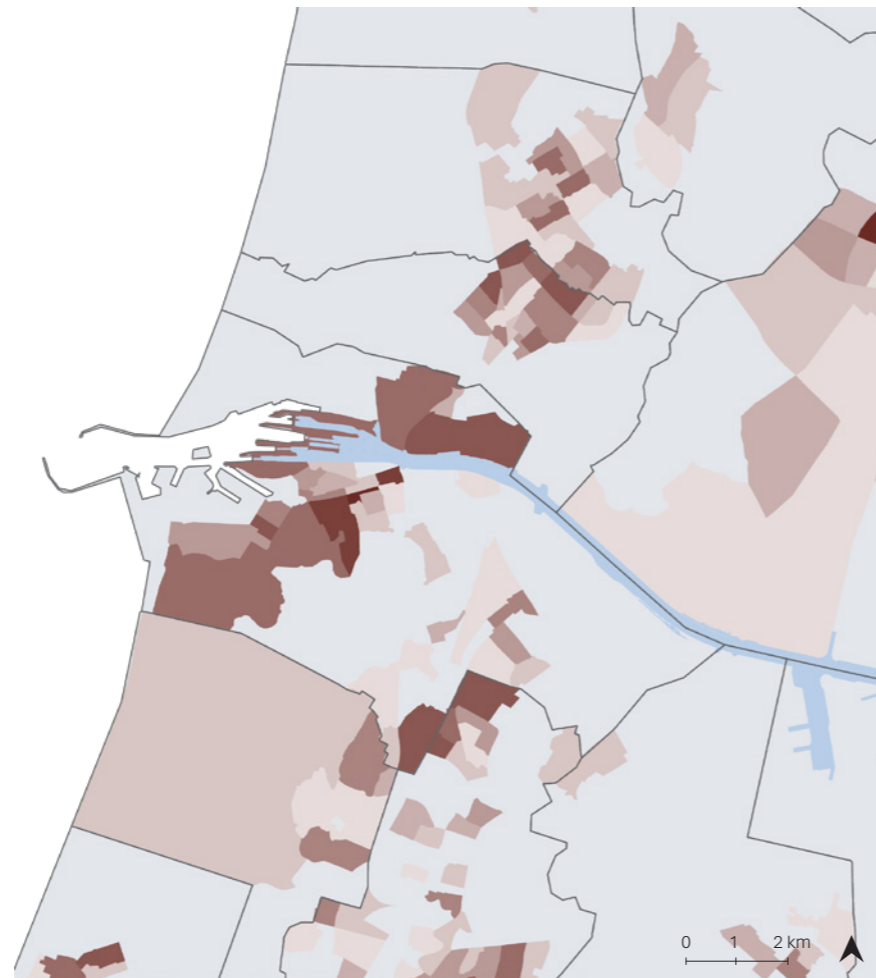


Figure 3.25: Social housing (Source: CBS buurten)

**Year of construction**

- 2005-2025
- 1990-2005
- 1975-1990
- 1963-1975
- 1952-1963
- 1925-1952
- 1908-1925
- 1865-1908
- before 1865

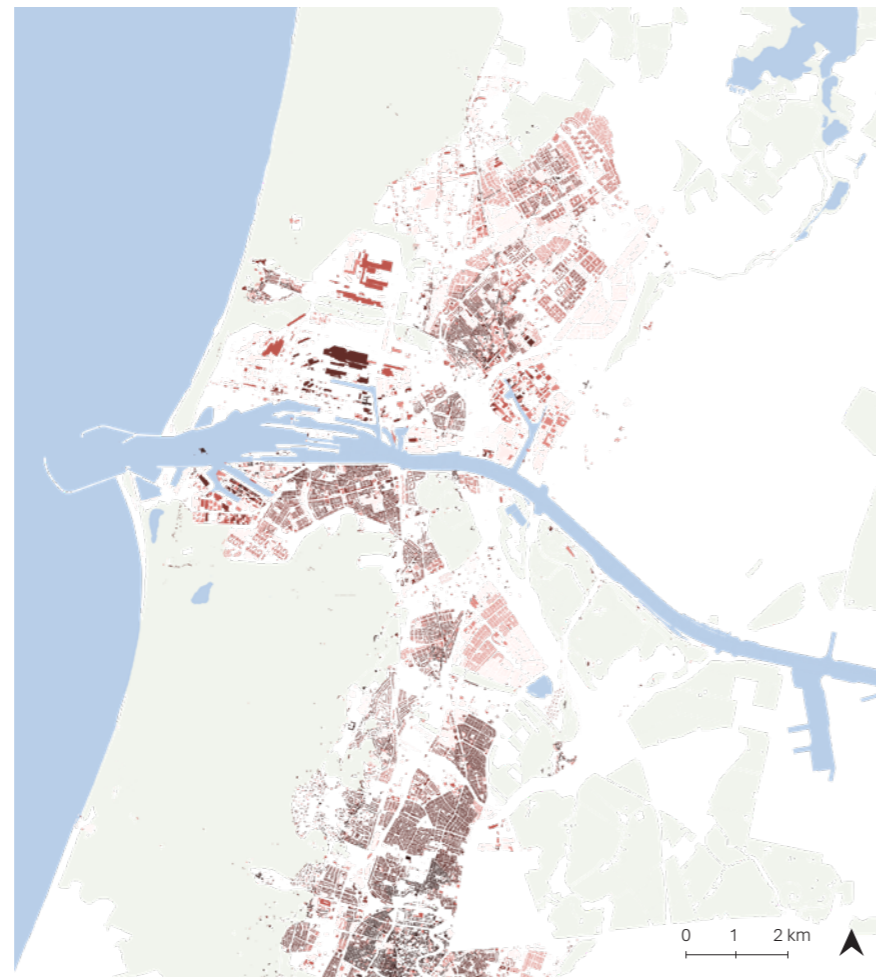


Figure 3.26: Year of construction (Source: BAG-pand)

- Very large clustering of challenges
- Large clustering of challenges
- Industry
- Residential area
- Nature

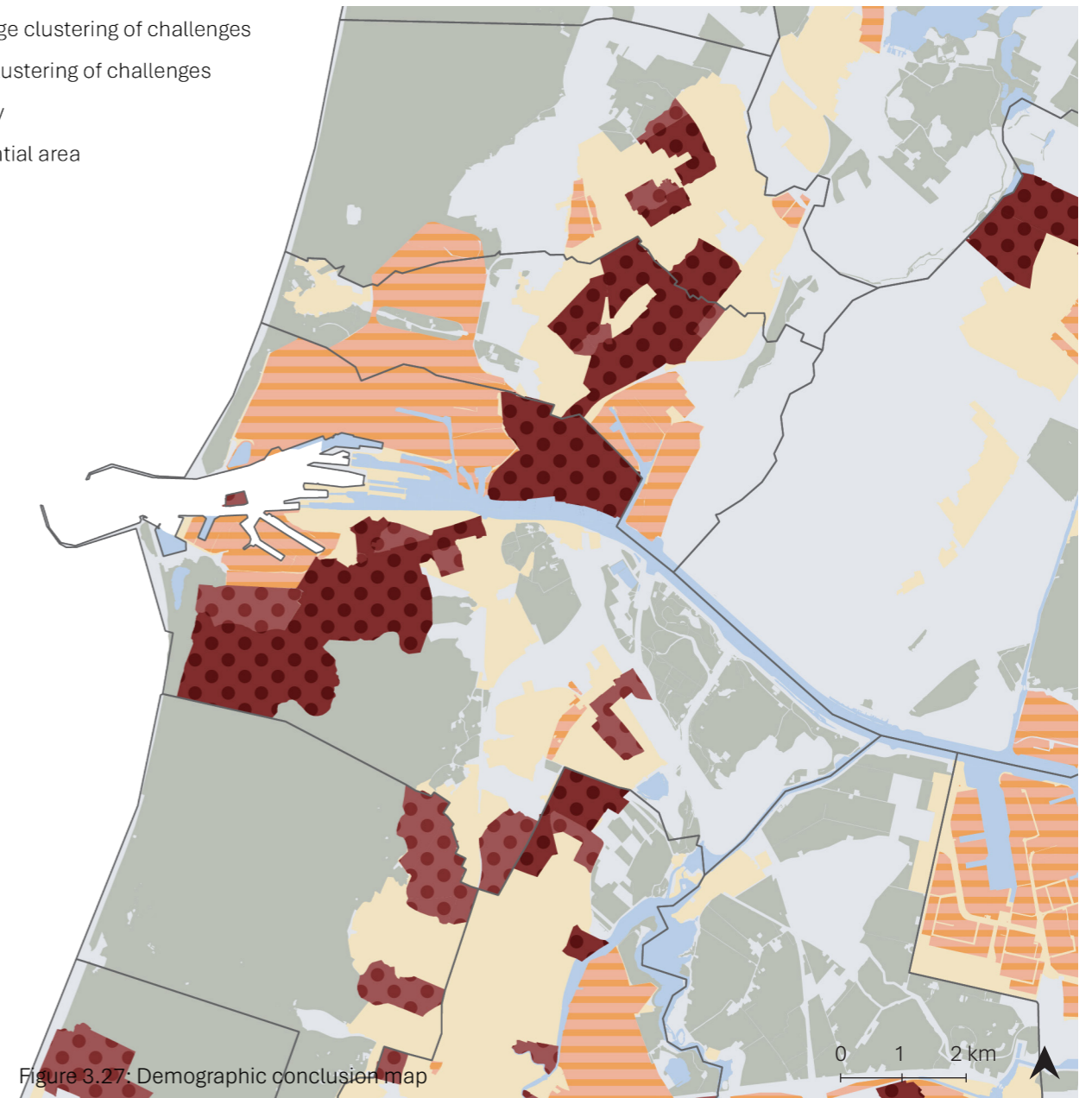


Figure 3.27: Demographic conclusion map

**3.4.2 Conclusion**

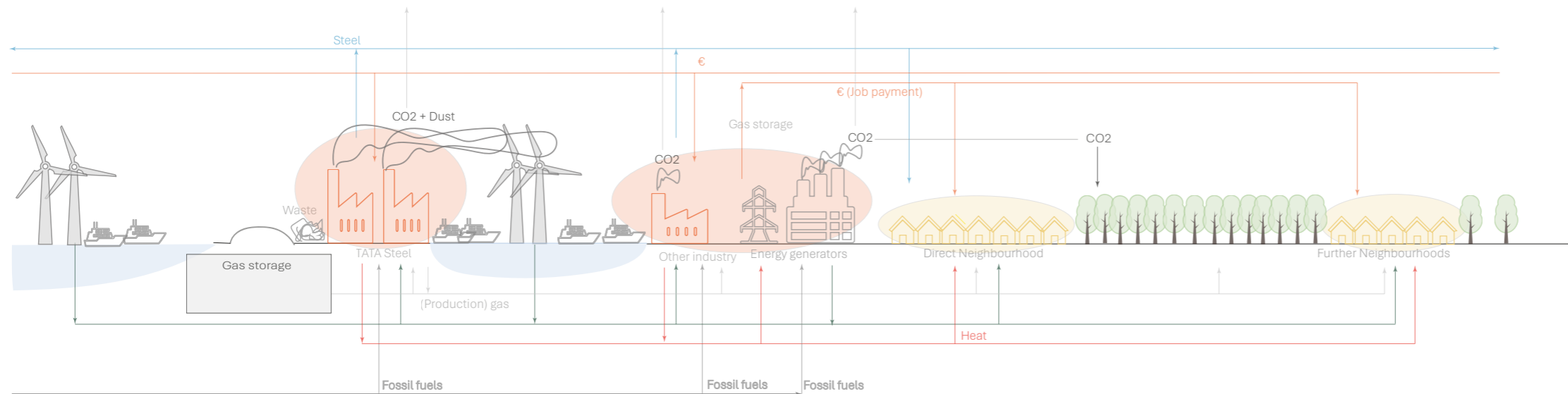
This pollution covers a large part of the IJmond region, which consists of the municipalities of Heemskerk, Beverwijk, and Velsen. The strongest pollution is mainly found in parts of Velsen and Beverwijk.

Velsen, in particular, is a municipality of strong contrasts. It contains both poverty and wealth, and there are clear differences between neighbourhoods in how health is experienced. The neighbourhoods directly surrounding Tata Steel face the worst liveability and the highest rate of social problems. In terms of household type, age, or gender, no major differences stand out. In the areas that are least accessible and closest to the industry, property values are lowest, and social housing is most present. This makes these

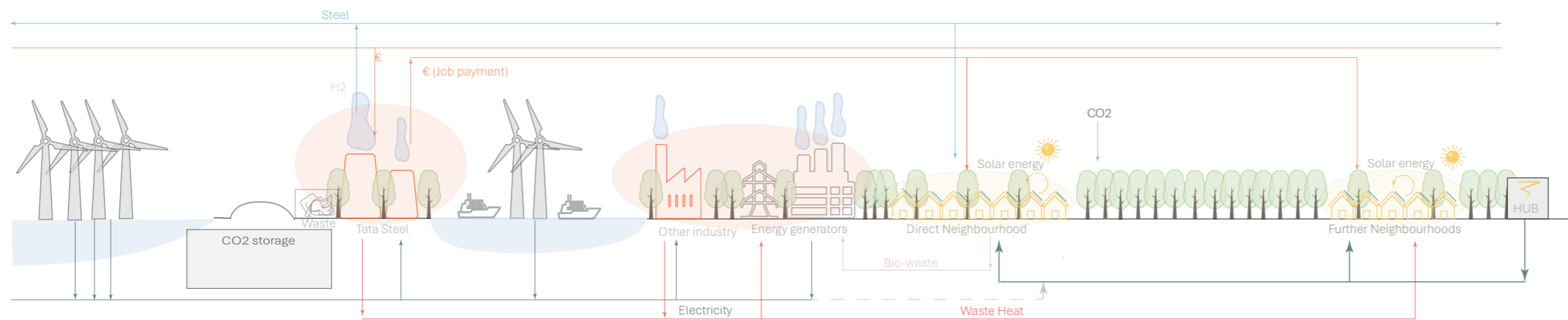
areas more likely to attract vulnerable residents. This is also reflected in the perceived health situation. It is not possible to say with certainty whether people with health problems move to these areas, or whether more people become ill because of the pollution. What is clear, however, is that more vulnerable people live around Tata Steel. This also creates a responsibility to provide a good living environment with proper amenities and good accessibility. Liveability is also lower in these areas, showing a strong contrast between different districts within the municipality.

Looking at purchasing power, it is also clear that many residents in these areas have fewer resources. For some, the energy transition and home renovation are not in their own hands, but depend on housing corporations. Others may simply not be able to afford renovation themselves.

### 3.5 The toxic relationship



**Current IJmond** Figure 3.28: Section region IJmond current situation



**Transition chances IJmond** Figure 3.29: Section region IJmond future situation

#### 3.5.1 The toxic energy system

**Current IJmond**  
As illustrated, both the community and the industry of IJmond are very dependent on fossil fuels. A significant portion of the energy supply comes from fossil fuel generation, and most of the community still uses gas for heating. While the industry provides essential employment opportunities and economic benefits, the community remains deeply dependent on the industrial sector in various capacities.

**Transition chances IJmond**  
In this vision, the community will receive the resources and knowledge to support them in necessary renovation, the installation of solar panels, the insulation of their homes and to transition from gas to a fully electric system. With the new energy hubs, the community will also reduce its dependence on the strained regional grid of North-Holland. Residents will only need to rely on the main grid during periods when the local energy hub does not generate sufficient power.

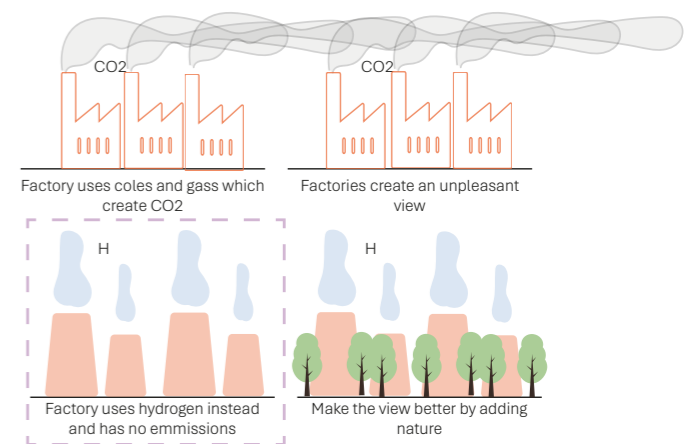
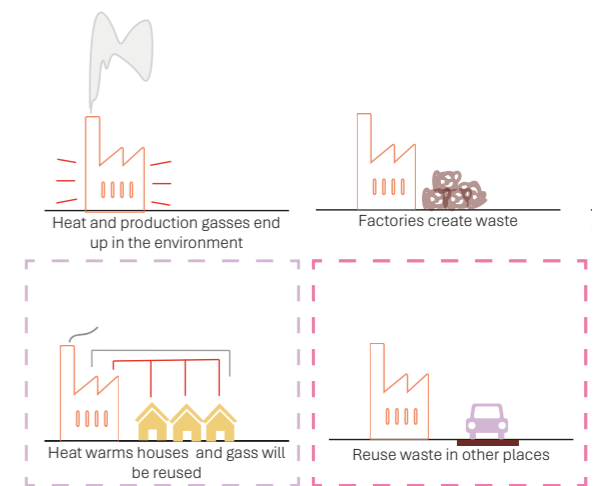
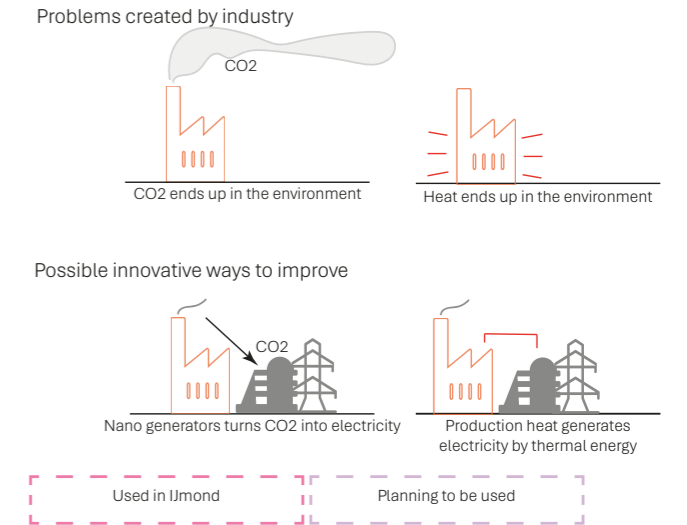


Figure 3.30: Problems created by industry and innovative ways to improve

### 3.5.2 Interviews with the community

On March 3, several interviews took place in IJmuiden. The conversations confirmed some key worries people have while living so close to heavy industry but also showed how tied they feel to their surroundings.

Air quality was an important topic for everyone. People worry about Tata Steel's pollution and want straightforward information about what they are breathing. Several mentioned the black particles piling up on windowsills, especially bad in Wijk aan Zee due to wind patterns.

Home renovations and lower energy bills came up frequently. A social housing tenant wanted to insulate to cut costs but felt held back by her housing corporation. They promised to renovate for a while now. Others had already tackled upgrades like insulation, mainly for financial reasons rather than climate ones. It shows residents are open to change when it is financially beneficial. One even said personal green efforts feel pointless next to a major polluter like Tata Steel.

Car dependency surfaced repeatedly. An older woman, who had lived sustainably her whole life, recently bought a car because the train station felt unsafe: too isolated, poorly lit, and sometimes a hangout for homeless people. Others agreed they drive everywhere.

Every participant of the interviews talked about their connection with nearby nature. The beach, dunes, and other nature are visited regularly. Despite frustrations with Tata Steel, no one was thinking of leaving the area. Fishing heritage and steel industry are as much part of their identity as the dunes and sea. They value the jobs and know closure would just shift problems elsewhere in the world.

In short, it is a complex picture: genuine health and pollution worries alongside strong pride in their industry and nature identity. People do not use public transport, partially because it does not feel safe. Most people seem to be willing to participate in the energy transition if it benefits them financially

In Velsen-Noord a lot of people were notably hostile, so it was not possible to take any interviews here unfortunately. All the interviews took place in IJmuiden with residents residing in other parts of the region.

#### An interview with an intern at Tata Steel

Significant data was gathered regarding the position and plans of Tata Steel in an interview with a company intern of Tata Steel. His job was to support the company with their plans for green steel. He told us Tata does not have the financial needs, and Tata Steel India, the parent company, wants to focus more on the Asian market instead of investing in Tata Steel Netherlands. This hinders Tata Steel IJmuiden from realising its plans for transitioning. He said that Tata Steel IJmuiden is willing to renovate and is committed to meeting the environmental targets. He added: 'I do believe that if there were no rules about the environment and health, they would not transition.' This suggests that their willingness is driven by regulatory compliance rather than intrinsic motivation. Crucially, he concluded: 'Tata Steel has great plans for green steel, this will make a huge difference, but the process of making steel can never be clean.'

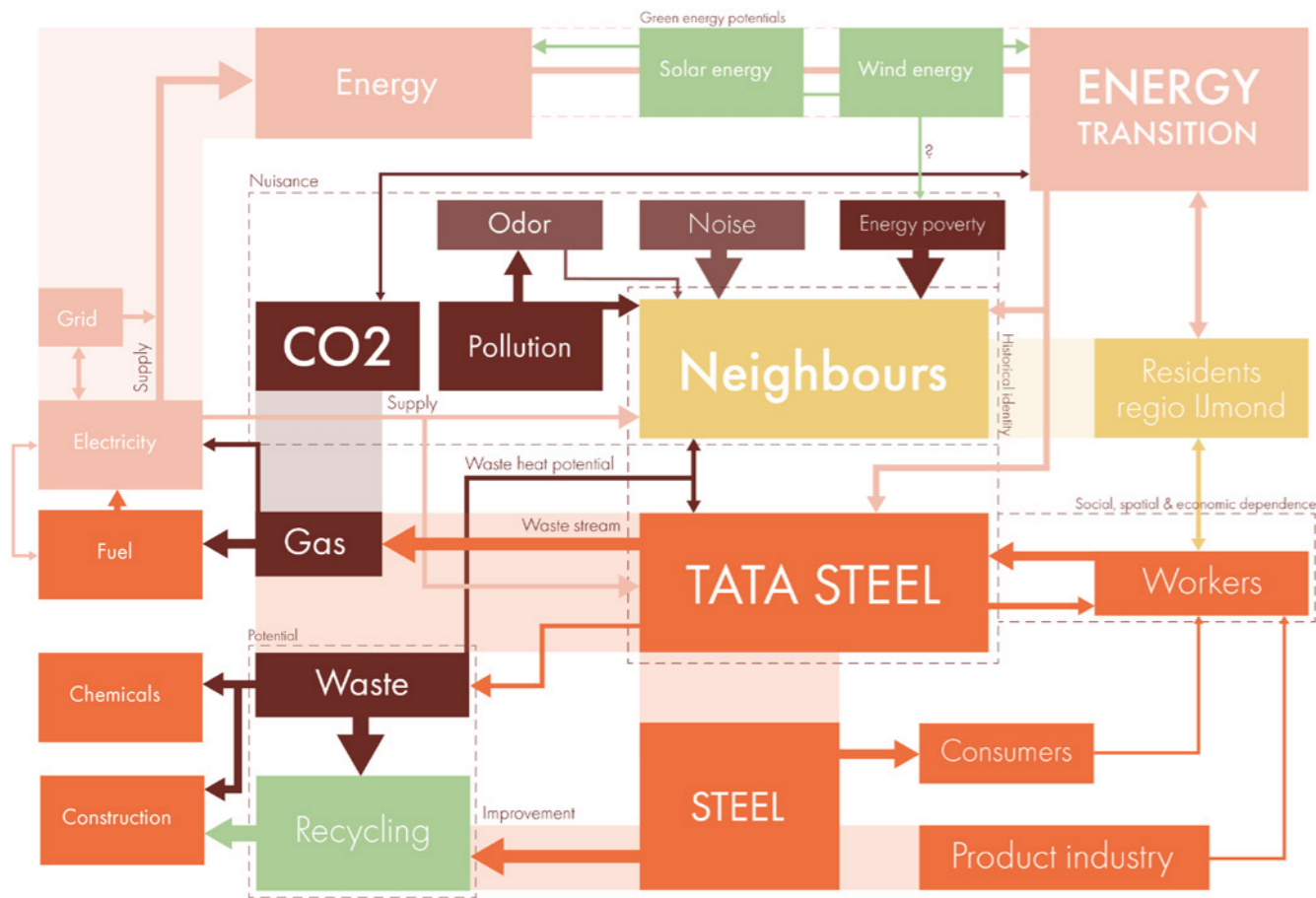


Figure 3.31: System map of energy, industry and community

Tata Steel represents a complex industrial system within the IJmond region. The facility consumes significant quantities of fossil fuels and materials, resulting in substantial emissions and waste production. Conversely, Tata Steel provides extensive employment opportunities and delivers significant economic benefits to the area and the country. The neighbourhoods also experience a lot of nuisances because of the neighbouring industries, due to their proximity to these industries. The situation requires urgent

improvement. There are numerous ways to repurpose industrial waste. Tata Steel is currently planning to improve the situation in IJmond and already reuses the waste; these solutions have been marked. Ultimately, Tata Steel has the potential to contribute significantly to the surrounding neighbourhoods.

**'I choose to live here, so it would be unfair to complain about Tata Steel'**

**'I have to clean the windows regularly because of the dust.'**

**'I want to renovate, but the social housing corporation keeps delaying.'**

**'I don't think a lot of people live environmentally cautiously here. When they look at Tata Steel, what difference do you think you are going to make?'**

**'I don't want to use the car, but the station area is really unsafe, so I have to.'**

### 3.5.3 Community challenges

The community often lack environmental awareness to know what they need and what they could benefit from. While many express an interest in renovation, several systemic and personal barriers prevent them from taking action. Different reasons are:

- Investment Recovery: Given the high average age of the population, many homeowners are reluctant to invest in long-term renovations, as they do not expect to see a return on investment within their lifetime.
- Lack of Awareness: Without a clear understanding of the long-term benefits, residents often struggle to see the immediate value of a sustainable transition.
- Tenancy Constraints: A significant portion of the community is dependent on housing associations, leaving renters without the legal authority to make structural changes to their own home.
- Financial Limitations: Many households lack the financial means to cover the investment costs of energy transitions.

To ensure a successful transition, the community requires structured guidance and financial support. Providing clear information on the benefits and offering financial support will be essential to making these investments both accessible and worthwhile for all residents.

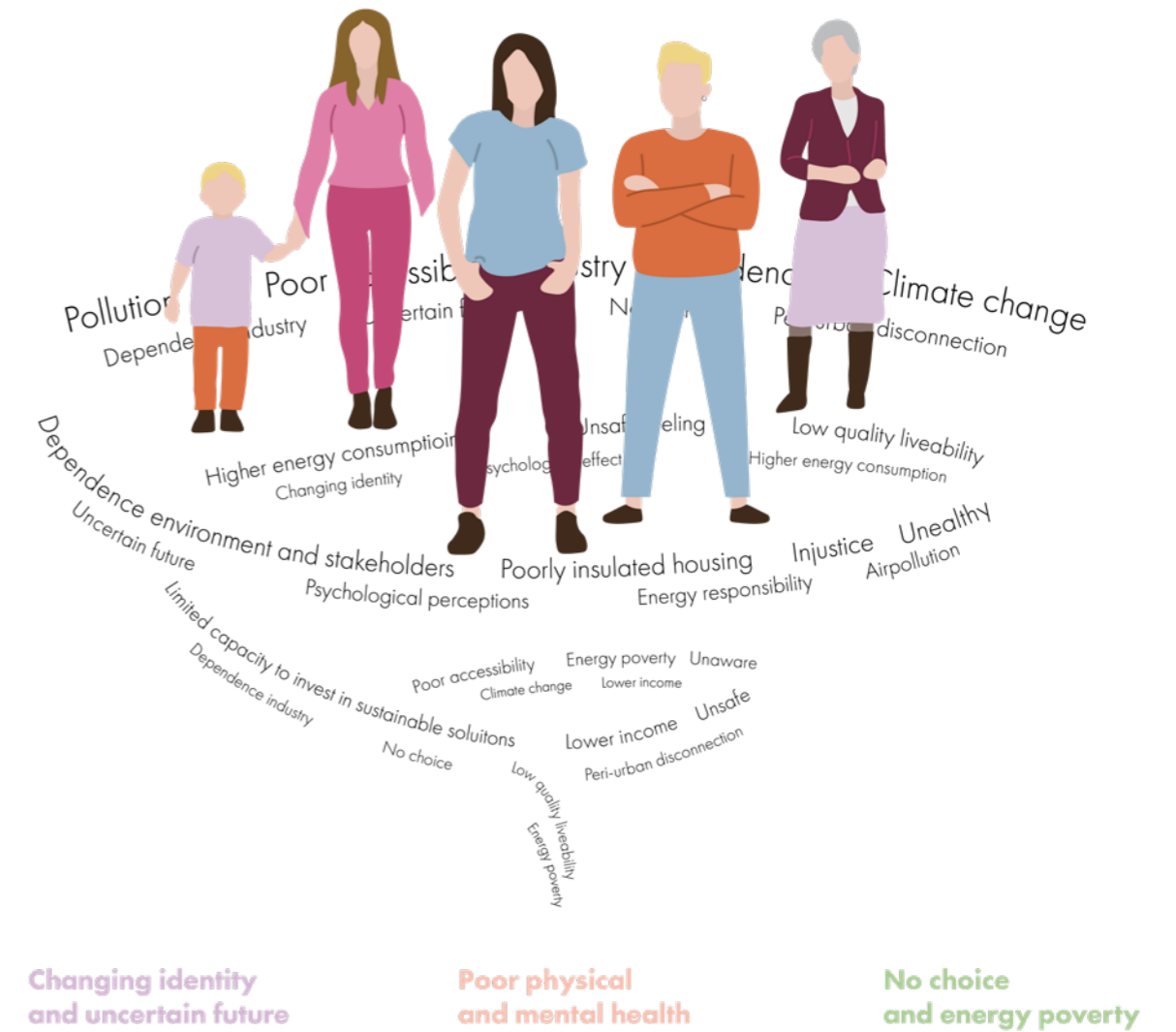


Figure 3.32: The challenges of the community

<b>CHALLENGES</b>	Low quality liveability	Uncertain future	Job insecurity	Dependence on the industry - on how the infrastructure is designed	Pollution unhealthy air	Climate awareness
	Unsafe feeling	Economic injustice	Changing identity	Poor accessibility by public transport, bike and pedestrian	Mental and physical health problems	
	Climate change problems with heat & extreme weather	No choices	Limited economic capacity to invest solutions	Peri-urban disconnection	Economic insecurity causes stress	
	Poor housing quality	Unaware of climate change	Low income energy poverty			
		Unaware of area risks	Unaware of consumption patterns			
		Higher energy consumption				
	Dependence on other stakeholders					

### 3.5.4 Stakeholders

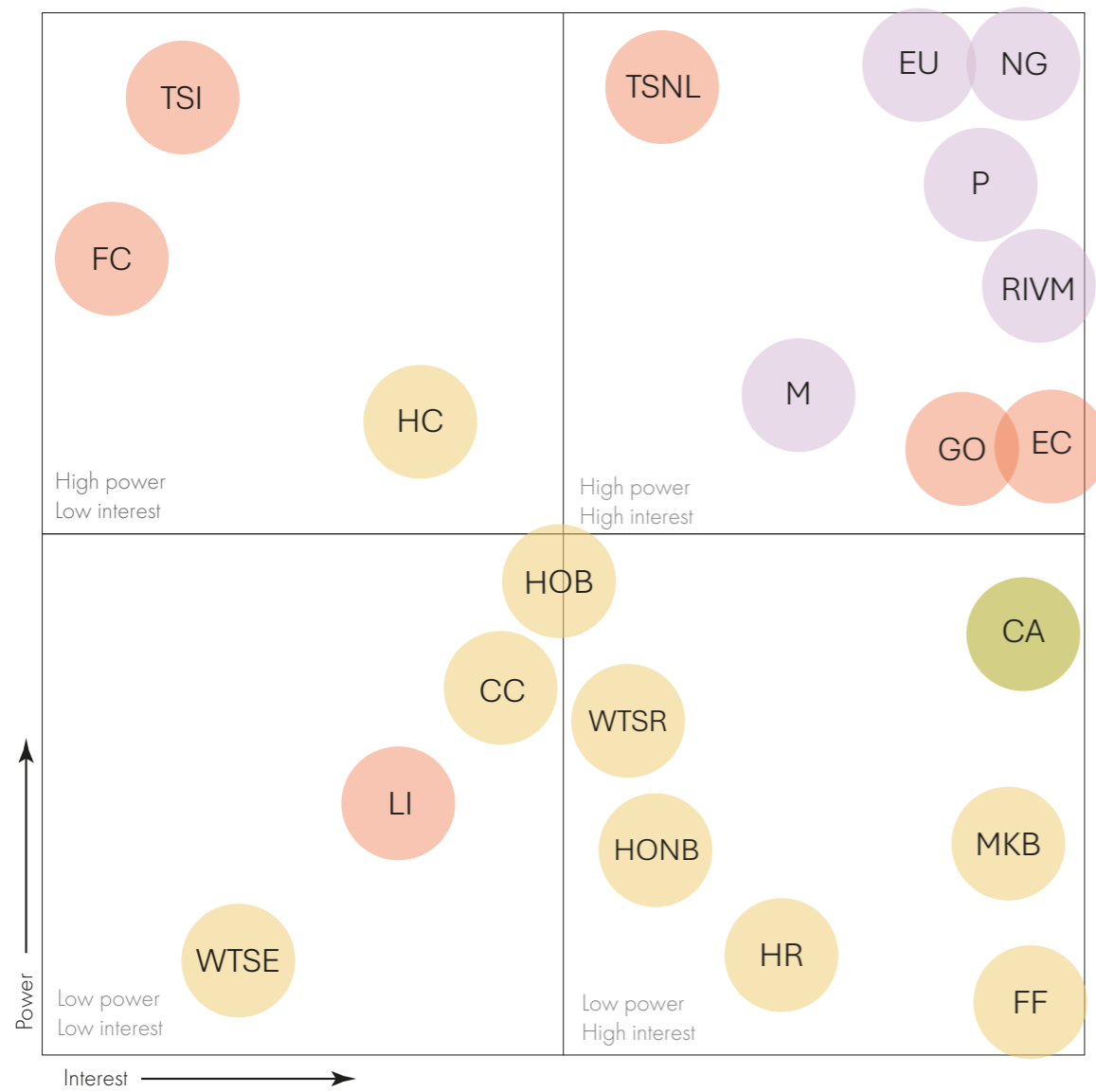


Figure 3.33: Power interest Matrix

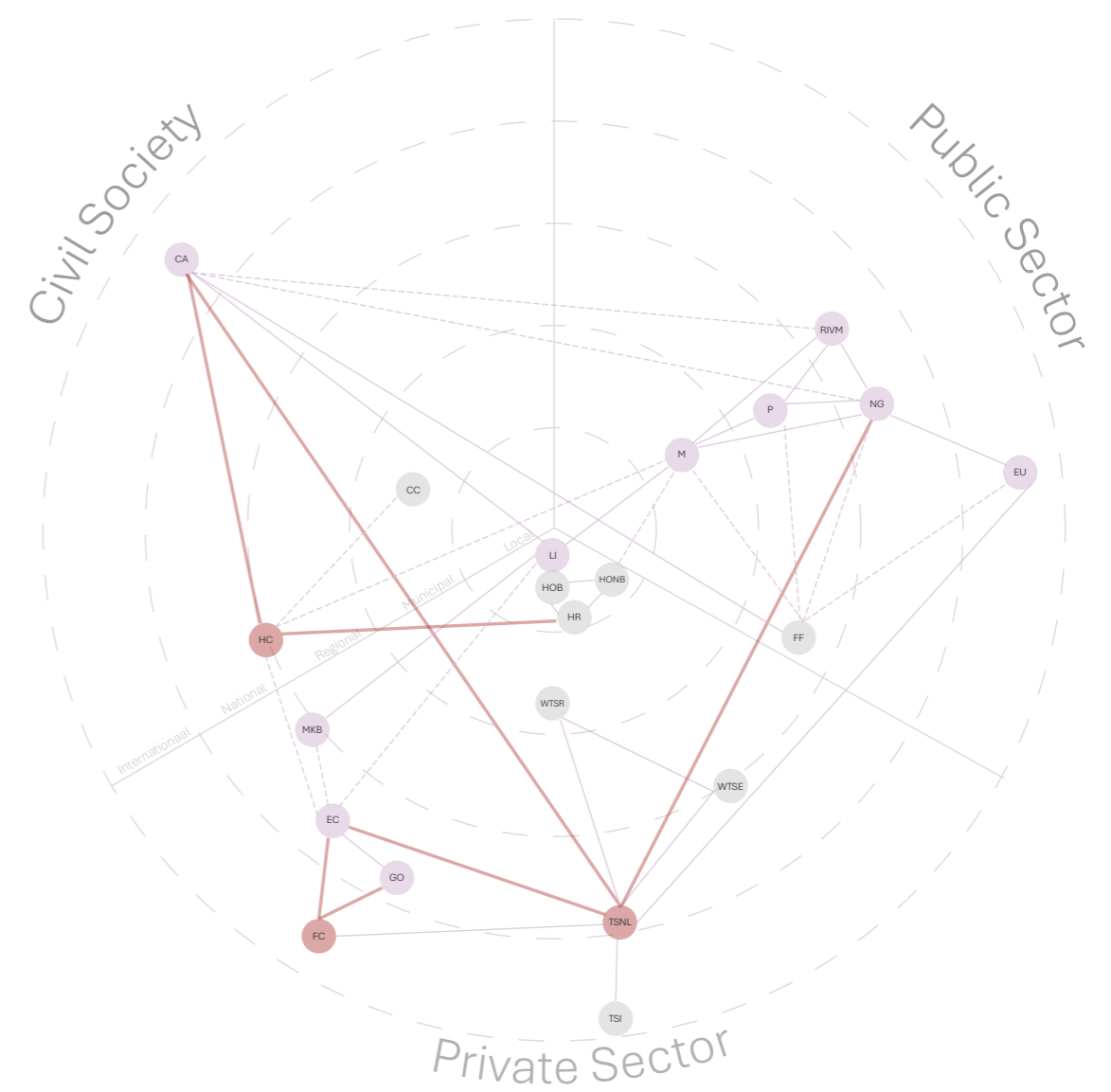


Figure 3.34: Stakeholder onion-diagram

Currently, the community holds very little power over its environment. While residents have a strong interest in the future of their region, the lack of awareness prevents them from effectively advocating for their interests. At the same time, the energy transition has created a landscape of conflicting interests. While some stakeholders are pushing for a shift in the energy transition, others are reliant on fossil fuels. It will take a lot of investment for Tata Steel to transition, but without it, they cannot keep producing. The fossil fuel

companies will not be able to keep existing and will experience great consequences of the energy transition. Because of these high stakes, smaller stakeholders and the community are often left out of the conversation. The community's wellbeing needs to be a priority, and the residents need to be empowered to make sure they stop being fence-sitters. By increasing awareness and providing the possibility to participate, the community can move from being passive observers to active participants in the energy transition.

- Promoter
- Fence-sitter
- Blocker
- Conflict
- - - Synergy
- · · Missing connection

Stakeholder	Abbreviation	Priorities and necessities	resources
European Union	EU	The EU wants environmental improvement and economic autonomy	Policies & regulations
National Government of the Netherlands	NG	The Dutch government wants and environmental improvement and	Policies & regulations
RIVM	RIVM	The RIVM wants healthy environment for the	Policies & regulations
Province of North-Holland	P	The Province of North- Holand wants better mobility and a better energy grid with green	Policies & regulations
Municipality of Velsen	M	The municipality of Velsen wants the community to have a healthy environment,	Policies & regulations
Homeowners with budget	HOB	Homeowners with budget can renovate but don't always want to or have enough	A voice & a vote
Homeowners without budget	HONB	Homeowners with budget often want to renovate but cannot make that investment.	A voice & a vote
Home Renters	HR	Home renters often want to renovate but are not allowed are too dependent on the housing	A voice & a vote
Housing corporations	HC	Do not always want to make such a large investment as they are not allowed to raise rent	Financial resources & buildings
Community centers	CC	Community centers are not really involved in the energy transition yet. They could bring a lot	A voice & a social connections
Tata Steel Netherlands	TSNL	Tata Steel Netherlands wants to renovate and participate in the energy transition to keep producing, but do not have the financial needs.	Economic power
Tata Steel International	TSI	Tata Steel international wants to keep Tata Steel Netherlands open but do not want to	Economic & Financial power
Workers Tata Steel from the region	WTSR	The workers from Tata Steel from the region want to keep their jobs and have benefits from	A voice & a vote
Workers Tata Steel from elsewhere	WTSE	The workers from Tata Steel from elsewhere also want to keep their job, but do	A voice & a vote
Local Industry	LI	The local industry often want to renovate and participate in the energy transition but are not always able to as they need the financial	A voice & a vote
MKBers (small and medium companies)	MKB	MKBers often want to renovate and participate in the energy transition but are not always able to as they need the financial	A voice & a vote
Electricity companies	EC	Electricity companies want to participate in the energy transition as they need to get off of fossil fuels and need more autonomy from import	Space, knowledge & materials
Gridoperators (Liander)	GO	The grid operators want to participate as the grid is overloaded.	Space, knowledge & materials
Fossil fuel companies	FC	Fossil fuel companies do not stand by the energy transition as this will make them go out	Materials
Flora en Fauna	FF	The nature of the region cannot really want or do anything but is affected by it. The impact on the environment will be a lot less due to the	
Climate Activists	CA	Climate Activists want to make sure the environment is not harmed any more by fossil	A voice & media attention

Figure 3.35: Stakeholder Profiling

### 3.5.5 Positions

The position of multiple large stakeholders have been researched about the topic. The position papers can be found in the appendix. The position is shortly described and for every stakeholder there is an important anecdote:

#### Climate activists

There are no other options, close down Tata Steel and don't invest. Tata Steel can never be clean.

*"The government should choose citizens and nature above the profit of one company, which is an Indian company."*

#### MKB

MKBs want to participate in the energy transition, but are hesitant because of complicated processes for fragmented subsidies, and the companies that do go through the energy transition can not be connected to the grid, making their transition useless

*"MKBs that have already been willing to start the transition now find themselves stuck with an electric car fleet that they cannot charge because of grid congestion."*

#### Liander

Energy Transition is necessary for everybody. Intensive cooperation is required to achieve the goal of complete transition within the infrastructure.

*"Liander seeks intensive cooperation with the municipality and the province to ensure that the expansion of the energy infrastructure aligns with future spatial plans for the IJmond region," specifically because "in many places, the electricity grid has reached its limits".*

#### Tata Steel

Tata Steel sees the urge to transition and wants to participate but is not financially able to without financial support from the government.

*"If Tata Steel India does not want to give financial support it is important... that the Dutch government will make an investment in these renovations."*

#### Province

The province is a mediator attempting to balance all factors at stake. Attempting to balance environmental and health goals with the preservation of the industrial identity and economic position.

*"The province prioritizes reaching environmental goals and improving public health by pursuing a Green Steel production with Tata Steel, while maintaining its economic value."*



Figure 3.36: Conclusion map analysis

### 3.5.6 Conclusion map

The local industry holds deep cultural and historical significance for residents, serving as a pillar of the community's identity. This connection comes from the heritage and labour. However, this bond is very one-sided, as the community sacrifices space, labour, and their physical wellbeing, while the industry negatively impacts

public health and the environment. This creates a toxic relationship where the community remains deeply connected to an entity that does not provide sufficient benefits in return, resulting in a significant imbalance between industrial growth and the quality of life for residents. The industry limits the chances and choices of the community on their own environmental future.

- Residential area
- Industry
- Year of construction <1963
- Solar panel potential (2,949-3,071 kWh/kWp per day)
- Major road
- Train route
- Intercity station
- Station
- Green corridor
- Blue corridor
- Potential industrial waste heat distribution
- Hydrogen network potential
- Hydrogen projects
- Average property valuation < €200.000
- Average property valuation < €200.000 - 400.000
- Average property valuation €400.000+
- Positive liveability
- Negative liveability
- Amount of pollution by industry (particulate matter, odor (% serious hinderance), noise (% serious hinderance))

# 4

## 4.1 Transitioning community: Stepping out of the shadow A Dreaming community

- 4.1 Transitioning community: Stepping out of the shadow
- 4.2 Scenarios
- 4.3 The just transition

### 4.1 Transitioning community: Stepping out of the shadow

*A dreaming community*

#### 4.1.1 The energy transition as a driver of change to step out of the shadow of industry

The energy transition is essential to sustain our planet and fight climate change. This transition brings unique challenges for the communities living near heavy industry in peri-urban areas. These communities already face significant challenges concerning their wellbeing, identity, chances and choices, as stated above. The

community is living in the shadow of the industry. It is vital that the energy transition does not further disadvantage the community but instead prioritises them by putting the community first. The energy transition can become the driver of change for this community. To empower the community to step out of the shadow of industry.

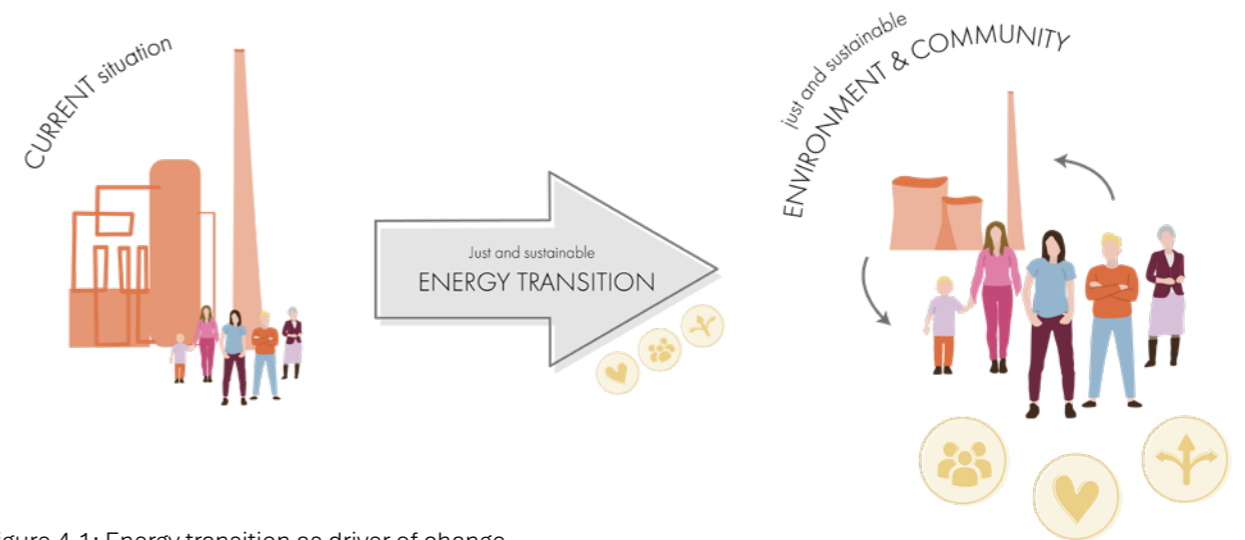


Figure 4.1: Energy transition as driver of change

The community dreams of a just and sustainable future. By recognising the different needs within this community, the community can be actively involved in the decision-making process, and the resources can be equitably distributed to complete the energy transition. A future where they do not need to be concerned about the air they breathe

or the security of their employment. The future empowers the community to make sustainable decisions and live in sustainable housing where they use affordable and clean energy.

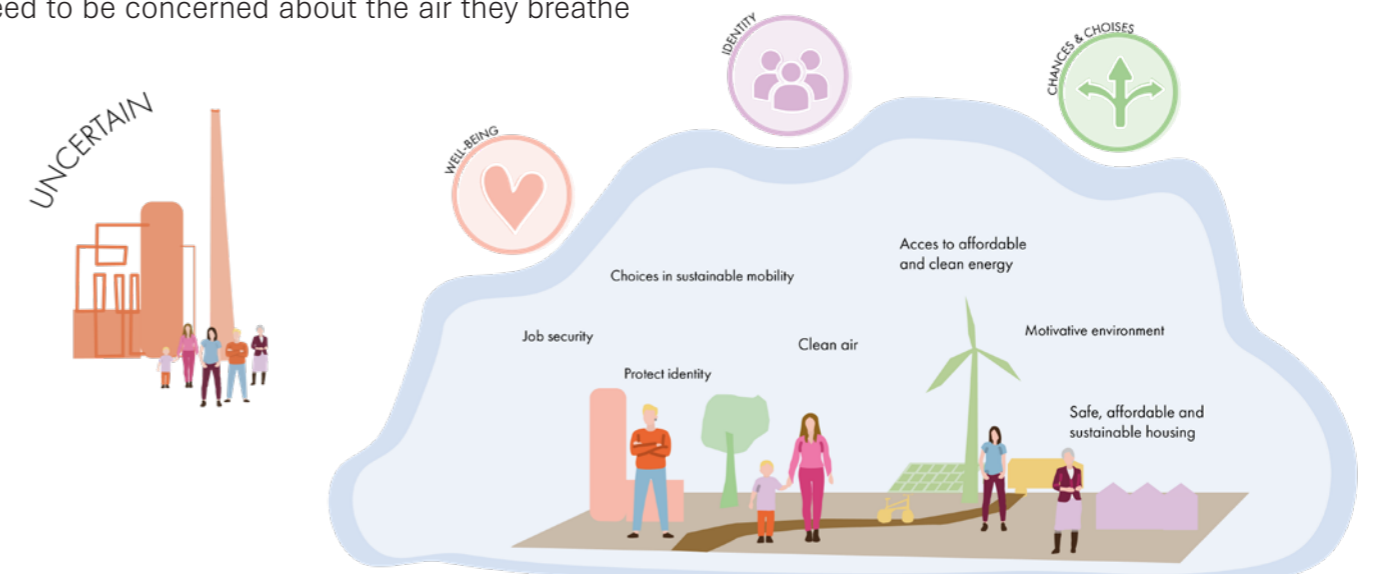


Figure 4.2: Dreaming community

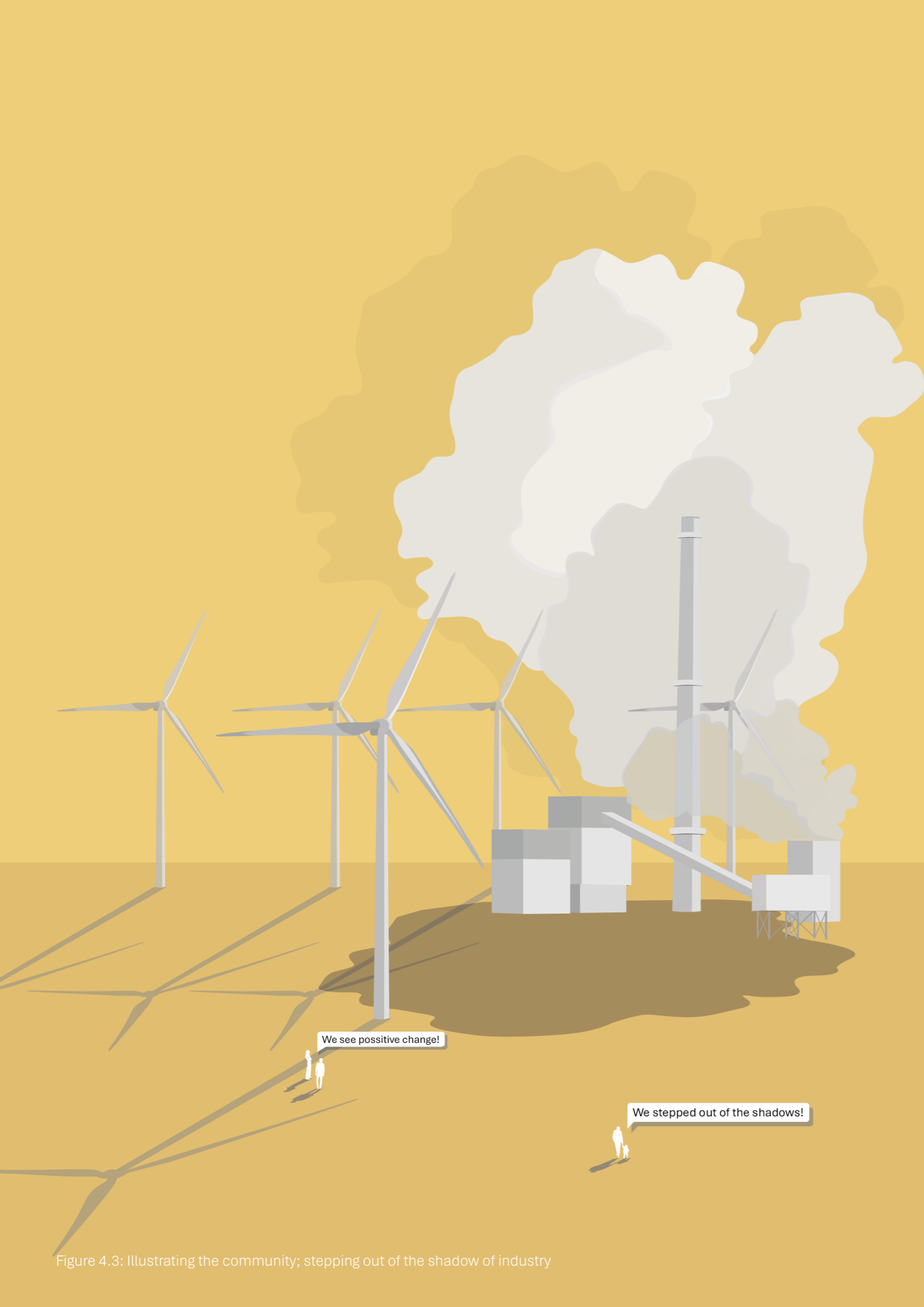


Figure 4.3: Illustrating the community; stepping out of the shadow of industry

## 4.2 Scenarios

As the future of Tata Steel, and therefore the future of the region, is uncertain. The possible outcomes must be explored to make a flexible and resilient strategy.

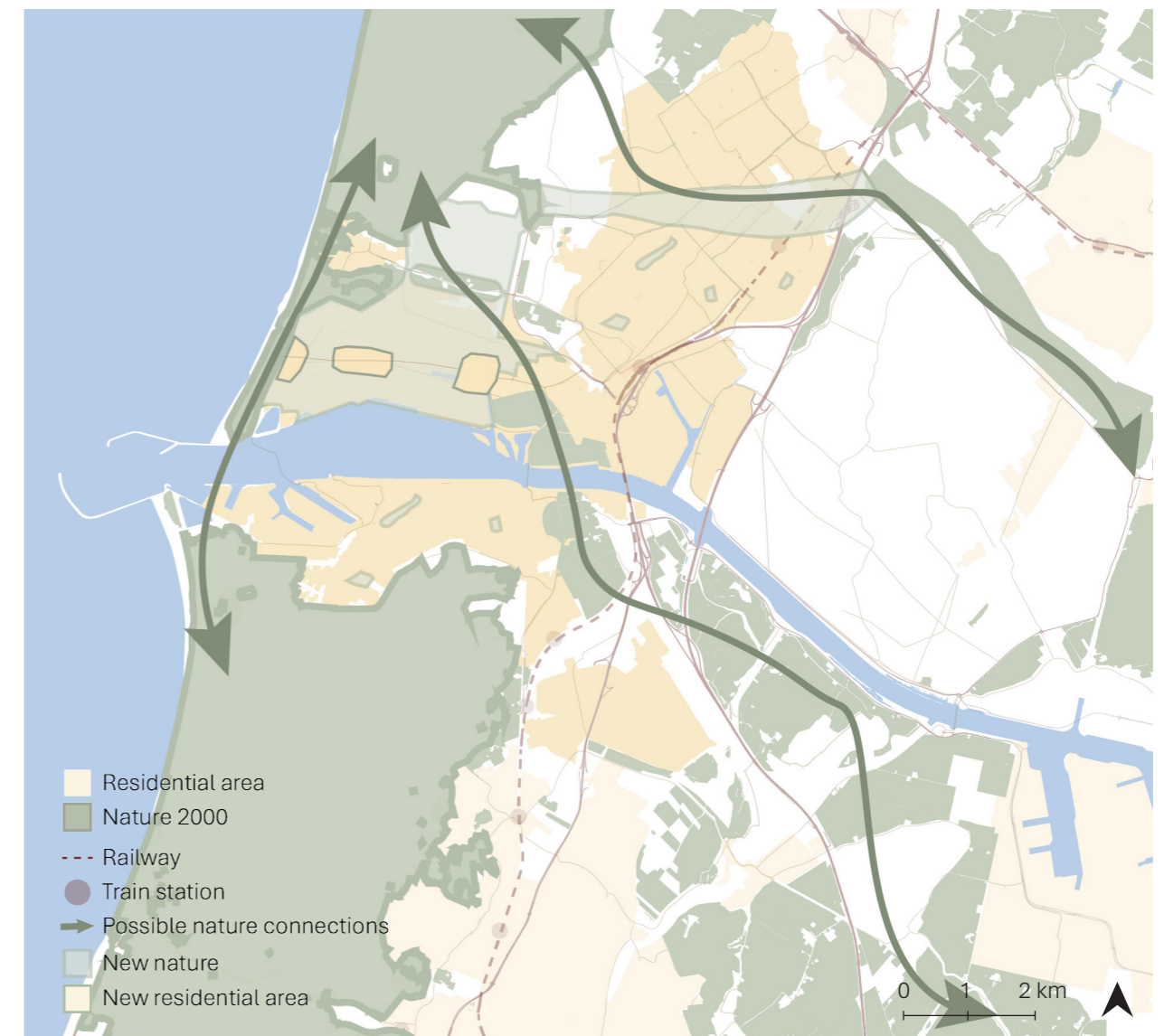


Figure 4.4: Map scenario Nature's dream



Figure 4.5: Timeline scenario Nature's dream



### 4.2.1 Scenario Nature's Dream

This scenario explores the impact of Tata Steel closing and becoming a 'ghost town', similar to the situation in Wales. Without a clear plan, the site might be repurposed solely for flood mitigation measures which could lead to social fragmentation. Residents will move away from the region, and the community will fall apart.

To prevent this, the strategy must prevent the community from being forced to relocate. The scenario shows that the existing Natura 2000 preserves need a better connection.



Figure 4.6: Map scenario City's dream

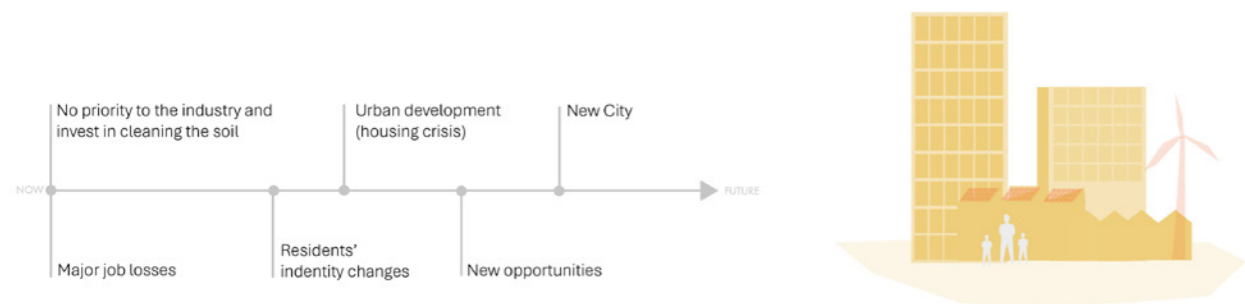


Figure 4.7: Timeline scenario City's dream

#### 4.2.2 Scenario The City's Dream

In this scenario, the site of Tata Steel will be transformed into a high-density residential area to meet the growing housing demand. The primary challenges involve cultural preservation and making sure the region does not become excessively urban. Housing prices must remain affordable.

The community must work to maintain its industrial- small town identity while ensuring that new developments do not inflate housing prices and displace current residents. This scenario shows the potential to connect the urban areas of IJmond with the metropole region of Amsterdam to meet the needs of expansion.

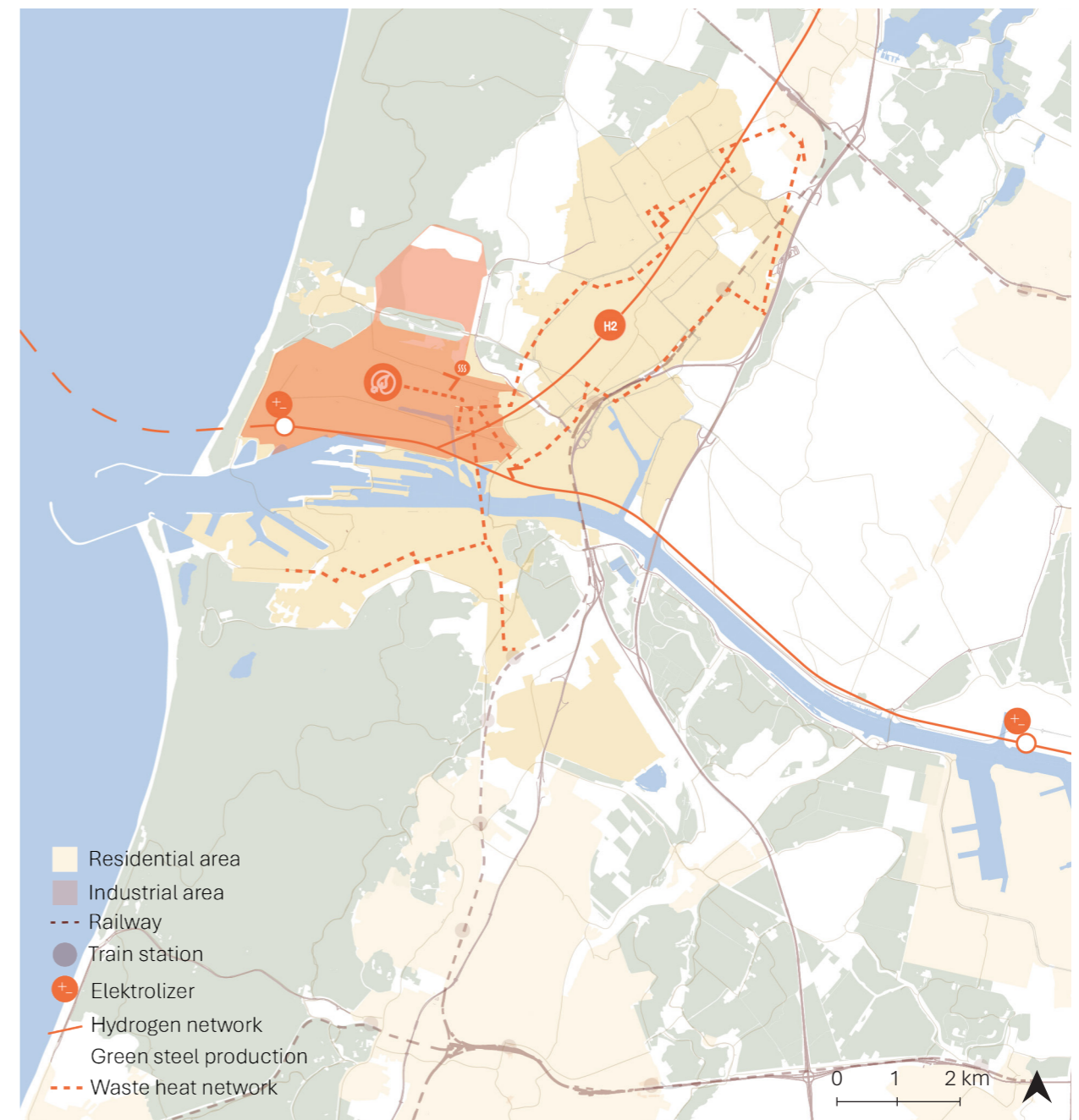


Figure 4.8: Map scenario Tata Steel's dream

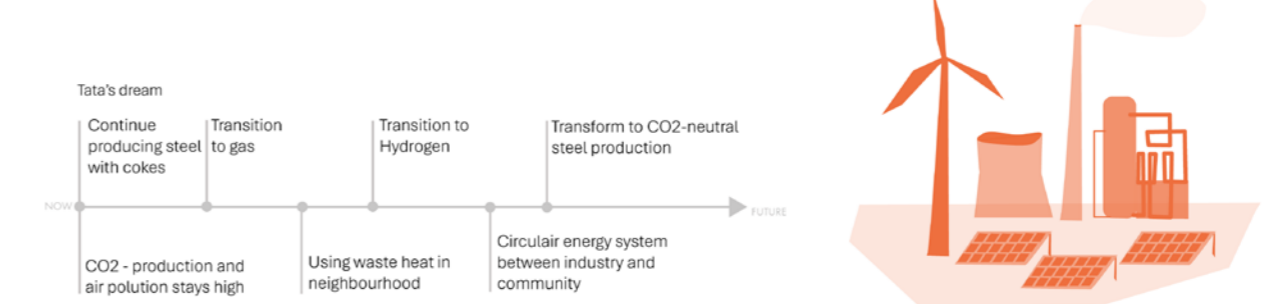


Figure 4.9: Timeline scenario Tata Steel's dream

#### 4.2.3 Scenario Tata Steel's Dream

In this scenario, Tata Steel secures the necessary capital to transition to 'green steel' production. Since the industrial identity remains intact and the environment improves, the community needs the least amount of adaptation. This scenario gives potential to use the industry in the energy system of the community.

This scenario allows to lay the focus entirely on how residents can actively participate in the energy transition.

#### 4.2.4 From scenario to vision

Each scenario has provided insights into the potential future scenarios of the region. Recognising that the future is uncertain, these extremes help to develop a robust strategy to ensure the community is resilient, regardless of which outcome unfolds.

From these various scenarios, the following strategic priorities have been identified:

1. The rich nature needs to be preserved and expanded.
2. The community relies on the industry, for the employment but also for its identity. Therefore, the area must maintain an industrial function. One that does not harm the environment and its residents.
3. We need to make sure the community has access to affordable housing and energy.
4. The community needs a good connection to the metropolitan area of Amsterdam.



## 4.3 The just transition

By focusing on three different themes derived from the challenges and wishes of the community.

### 4.3.1 Vision goals

The first vision goal is identity. The community identifies itself with the industry, as this has historically been the economic driver and major employer of the region. The 'Hoogovens' are part of the historical heritage and pride of the region, so this identity should be protected. However, this historic relationship is slowly changing; the polluting industry is no longer something to be proud of. Therefore, the community will be softly introduced to new spaces with which it can identify and be proud of. By introducing new commons that are self-governed by the community. This change will happen by putting the community central in the transition.

The second goal is wellbeing. The mental and physical health of this generation and the future generations of this community will be improved. This means clean air, healthy soil, and no noise and odour pollution. This can be achieved by

providing clean energy and transforming to a clean industry. A healthy community also living in good and sustainable housing, they must feel safe when at home and in public spaces. The housing and public spaces are ready for the energy transition. Producing public goods, like clean air and public parks, that improve the wellbeing of residents.

The third goal is chances and choices. This community deserves to have equal opportunities and more power over changing their own future. Sustainable energy will be accessible to every resident, and the decentralized system will provide autonomy. The benefits and burdens of the new energy infrastructure are equally distributed. The spatial environment and sustainable mobility options will inspire residents to make climate-conscious choices and promote behaviour change.



Figure 4.10: Vision goal identity



Strong and sustainable identity

- Protecting history
- Space for changing identity
- Community central

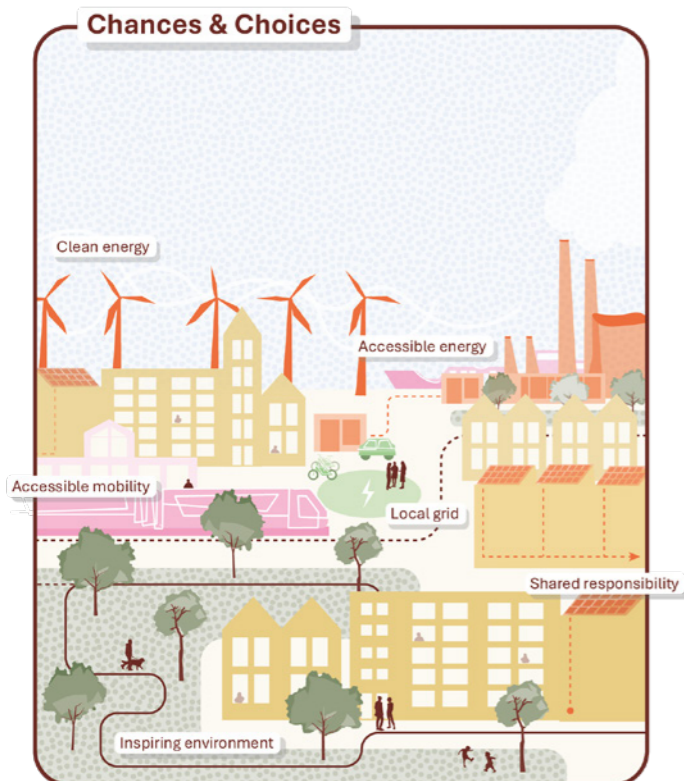


Figure 4.12: Vision goal chances & choices



Equal opportunities and control

- No energy poverty
- Accessible mobility and energy
- Inspiring environment



Figure 4.11: Vision goal wellbeing



Physical and mental wellbeing

- Clean air, no pollution
- Safe and peace of mind
- Sustainable housing

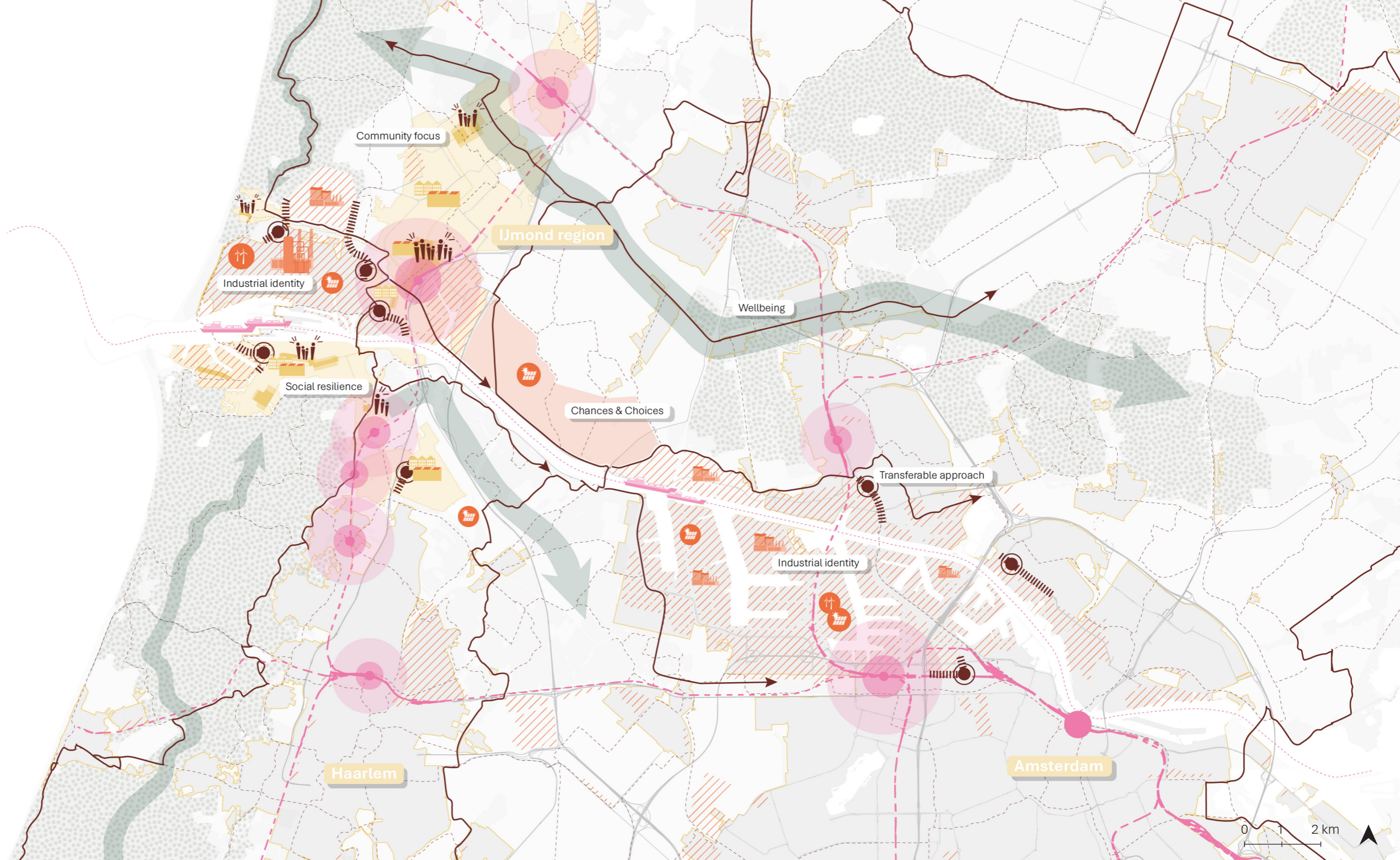


Figure 4.13: Vision map

### 4.3.2 A spatial vision

This map is a spatial representation of our vision, which takes the community one step closer to a just and sustainable future

- |                                       |   |                            |
|---------------------------------------|---|----------------------------|
| Community                             | Water connection                            | Makers district & hubs     |
| Residential areas                     | Existing train rails                        | Community building         |
| Urban cores                           | Train stations                              | Improving residential area |
| Industrial transition                 | Improved station area                       | Sustainable housing        |
| Creating space for new green industry | Slow mobility focus                         | Renewable energy landscape |
| Natura 2000                           | Bicycle network                             |                            |
| Connecting green                      | Province bicycle network                    |                            |
| Core connection                       | Connecting through extended bicycle network |                            |

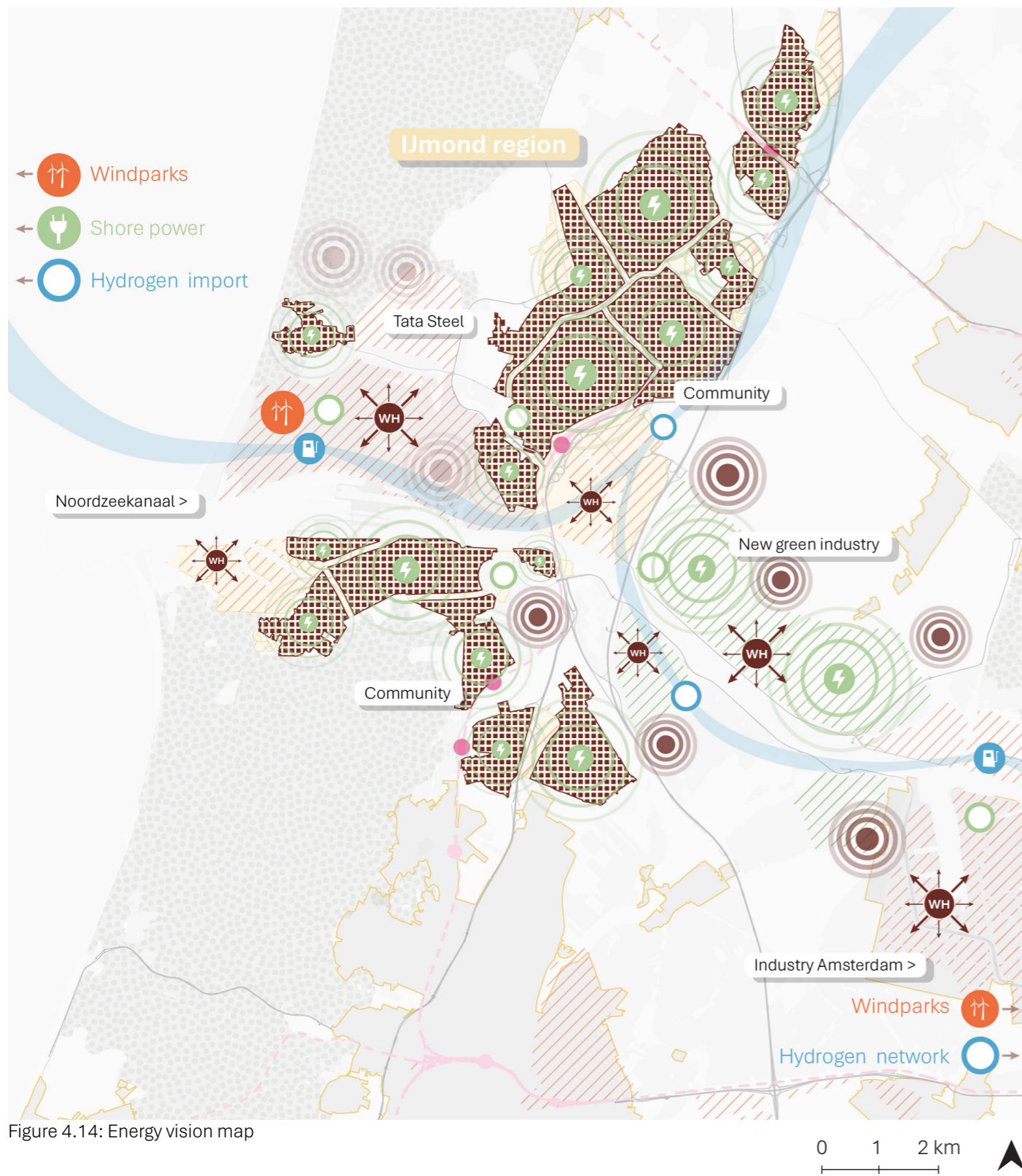


Figure 4.14: Energy vision map

A new energy system combines wind energy, solar energy, waste heat of the industry and hydrogen power to supply the region of electricity and heat. The waste heat and electricity will function in decentralized systems per neighbourhood. Having a community governed energy system will enable the community to be autonomous and independent from the uncertain future of the industry.

- |                    |                                    |
|--------------------|------------------------------------|
| Community          | Local energy hub                   |
| Residential areas  | Grid connected (future) energy hub |
| Industry           | Industrial waste heat distribution |
| New green industry | Hydrogen projects                  |
| Local energy grid  | Hydrogen refueling station         |
| Future solar parks |                                    |
| Solar parks        |                                    |

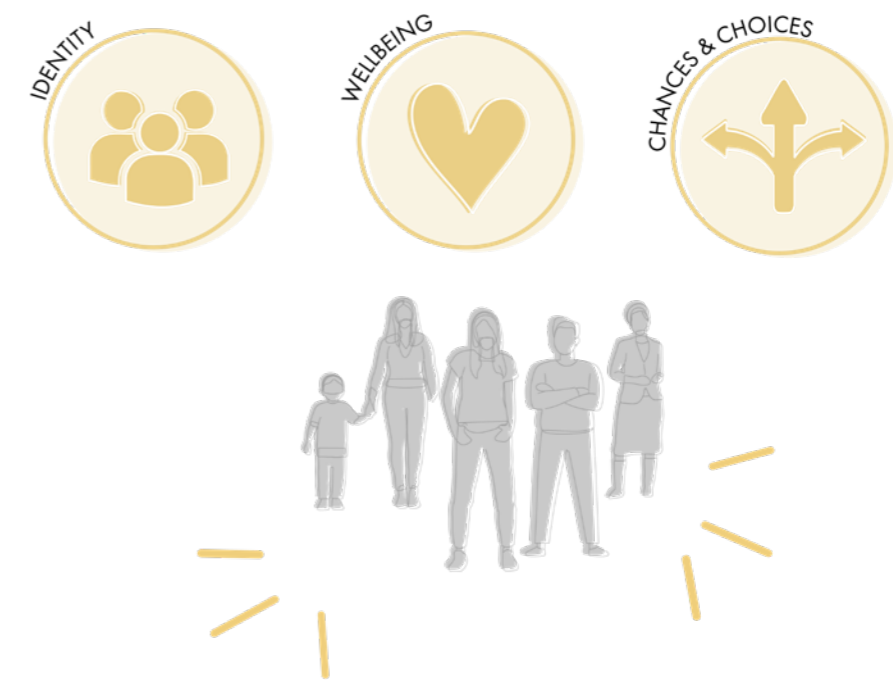


Figure 4.15: Community vision goals

# 5

- 5.1 The strategy towards 2050
- 5.2 Powering the neighbours
- 5.3 On the border of industry
- 5.4 A green active network
- 5.5 Connecting peri with urban
- 5.6 Timeline
- 5.7 Zoom-in
- 5.8 A strategic energy system
- 5.9 Stakeholders

## Stepping out of the shadow

*Over the course of multiple years, different kinds of interventions will make the vision real. These interventions will take place in different projects in different phases over the timeline. With the involvement of different stakeholders, the vision becomes real.*

## 5.1 The strategy towards 2050

Text

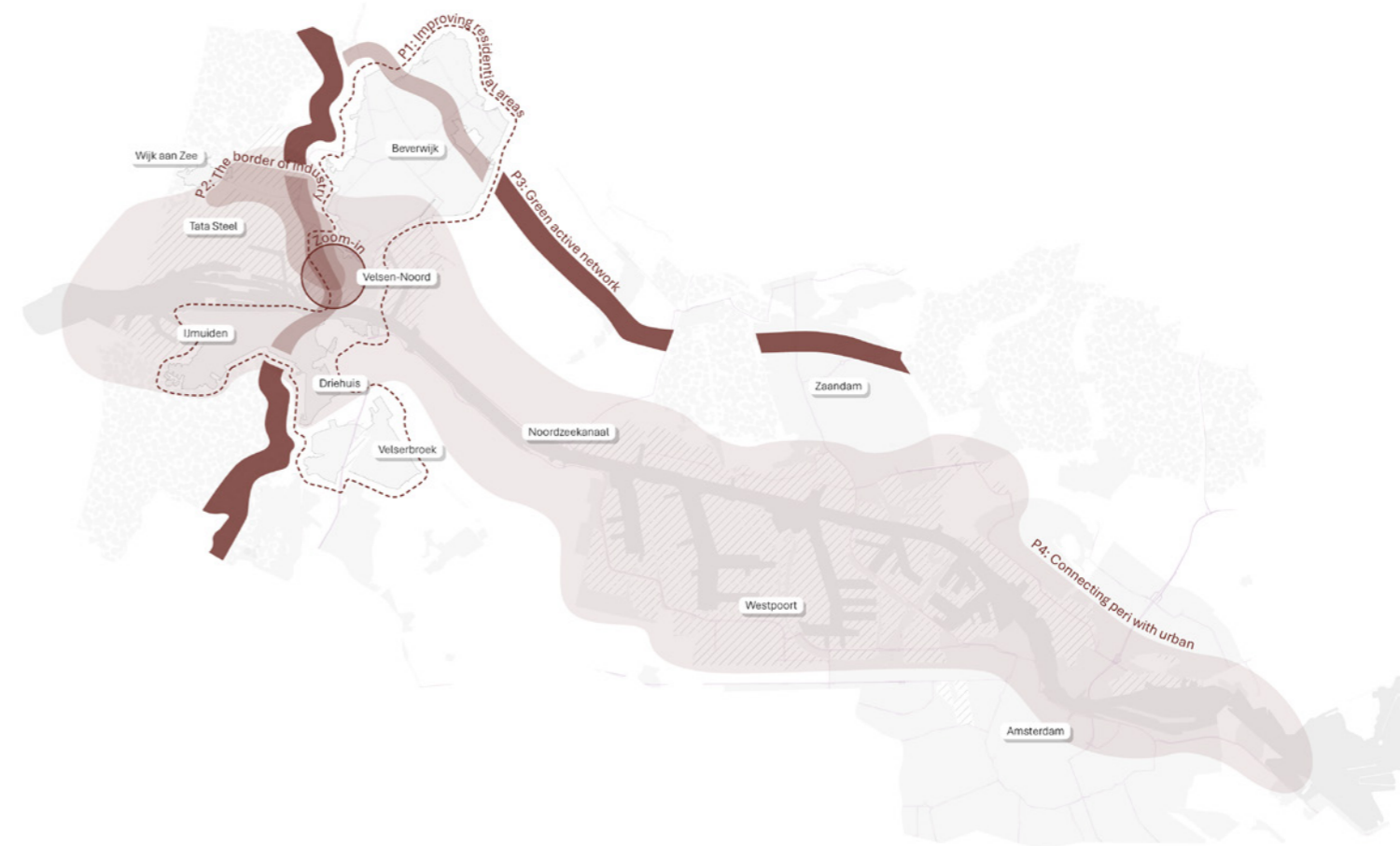


Figure 5.1: Overview strategy projects

### 5.1.1 Introduction

A vision alone is not enough to get the community out of the shadow of industry; it requires a strategy of concrete actions. Each vision point is broken down into two principles, resulting in six core principles that form the foundation of our strategy:

1. Social resilience
2. Strong local identity
3. Economic and financial resilience
4. Active mobility
5. Healthy environment & lifestyle
6. Sustainable housing & energy

These six principles house all the interventions and principles forming the complete strategy. These principles house all interventions, forming

the complete strategy. Later, these principles and interventions are combined into “projects”. These projects are packages where related policies and actions reinforce each other. These projects are then placed on a timeline to show their relationships and sequencing. How the interventions manifest will become clear in the project chapter. The policies do need some further explanation.

### 5.1.2 Interventions & policies

In the project, policies are used next to the spatial interventions to form a complete strategy. The complete policy framework consists of existing policies and new policies. Five new policies were made. One focuses on awareness, one on affordability, one on industrial quality, one on material transition, and one on participation. This makes these policies complementary and supportive of the strategy.

#### New policies

##### Neighbourhood Energy & Renovation Campaign (pS6.1)

This policy is about organising local events, information sessions, and practical workshops, which could include, but are not limited to, home retrofit advice, energy saving tips, subsidy guidance, and examples of simple measures people can take right away. The idea is [JJ1.1] to make energy transition feel concrete, visible, and approachable instead of distant or technical, and to make people aware of the existing help.

This policy is important because many residents do not automatically have the knowledge, time, or confidence to act on energy issues. Or even the knowledge about the presence of options. By meeting people in their own neighbourhoods, the campaign lowers the threshold to participate and creates awareness in a way that feels accessible.

##### Affordable Retrofit Access Policy via Community Centres (pS7.1)

This policy makes community centres the local access point for residents who need support with renovation and energy upgrades. It can include advice on insulation, heat pumps, subsidies, financing options, and step-by-step help for people who may not know where to start. The focus is especially on low-income households, renters, older residents, and people who are usually left out of technical transition processes.

This policy is important because affordability [JJ2.1]s one of the biggest barriers to energy transition. People may want to improve their homes, but lack money, time, ownership, or knowledge. By offering support through local places like community centres, the policy helps

reduce inequality and makes sure the transition does not only benefit people who already have resources.

##### Clean Industry Admission Policy (pIF5.24)

This policy is the most important in project 4, when talking about expanding the industry along the North Sea Canal (IF3.4). This policy sets criteria for any new industry that wants to locate in or around the project area [JJ3.1]and in the new industrial sites along the North Sea Canal. It means that new industrial activities should only be allowed if they meet strong environmental and health standards, such as low emissions, efficient resource use, circular production, and compatibility with nearby housing and nature. It also means that the new industry must not increase the burden on residents or reinforce the existing toxic relationship.

This policy is important because not every kind of economic development fits the area. If the region is already under pressure from pollution, health risks, and spatial conflict, then any new industry should actively contribute to improvement rather than add more damage. The policy helps steer the future of the area toward cleaner and healthier forms of industry, instead of repeating the same problems. It supports creating the future that fits the vision of this project, not only in the IJmond region, but along the whole North Sea Canal.

##### Circular Construction and Material Use Policy (pF6.2)

This policy promotes the reuse of materials, low-carbon building methods, and circular design principles in new construction and redevelopment. It can include using reclaimed materials, designing for disassembly, reducing waste, and choosing materials with lower environmental impact. [JJ4.1]

This policy is important because construction has a big impact on energy use, emissions, and resource consumption. In a transition area like IJmond, it makes sense to link spatial development to circularity, so the built environment also supports the wider sustainability goals. It also strengthens the logic of the project by showing that the transition is not only about energy, but about how the region is physically built and rebuilt. Lastly, it works well with the spatial interventions

of adding recycle and repair points (F4.12), so not only large companies, but also residents can fit the circular system.

##### Participation by co-production

This policy makes co-production the core participation strategy for all projects in the direct environment of the community. There are several participation levels according to the participation ladder (Arnstein, 1969). Co-production, or “Partnership” as it is called in the original document, is put under ‘degrees of citizen power’, which is exactly the goal of this policy. The goal is to empower communities with real influence over their surroundings and co-create solutions they can directly benefit from. This policy is used throughout the projects, since genuine participation is an important part of the project.

##### Existing policies

The project does not only use new policies, but also existing policies to support the strategy. Some of these policies mainly support the social side of the project, such as affordability, wellbeing, and equal chances. Others focus more on the spatial, technical, or environmental side, such as energy infrastructure, mobility, nature, or industrial transition. Together, they show that our interventions are not isolated ideas, but have policies to support in execution of the projects.

**Het klimaatakkoord gebouwde omgeving (pSIFE8.12)** supports our focus on housing, renovation, and energy saving in the residential areas around industry.

**Het Nationaal Plan Energysysteem (pIFE9.12)** helps us place the local strategy in a wider energy system, showing that energy, space, and infrastructure are closely connected.

**The poverty Agenda Velsen (pSE11.1) and the Velsen Housing Vision (pSE12.1)** are important because they show that not everyone has the same resources or possibilities to join the energy transition, especially in the more vulnerable neighbourhoods. They also contain actions related to participation of, and contact with, the more vulnerable residents.

On the industrial side, **the Green Steel policy (pIFH11.2)** around Tata Steel, the National

**Industry Greening Programme (pIF7.4)**, and the **Just Transition Fund IJmond (pIE6.2)** are important because they show that the region is already in transition. These policies support our clean industry intervention and the idea that industrial change should also benefit the local community. They also make clear that the future of the region depends on both a healthier industry and a fair transition for the people living nearby.

**Programma Energiehoofdstructuur (pIFE10.12) and MIEK2.0 (pE14.12)** are important because they show the spatial and technical limitations of the energy transition, especially in a region dealing with grid congestion. They help us understand why local energy hubs, storage, and smart energy solutions are needed. The Large-scale Battery Policy Framework (pE15.4) supports this by showing that energy storage can become part of the solution at neighbourhood and regional scale.

Mobility is supported through the **Action Agenda Active Mobility (pMH8.3)**, the **Regional Cycling Future Vision (pMH9.3)**, and the **Mobility Vision (pM10.4)**. These policies strengthen our interventions on active mobility and accessibility, especially in areas where car dependence is high and public transport is limited. They also fit our view that mobility is not only about transport, but also about access, health, and everyday choices.

Nature and public space are supported by the **European Green Deal (pH10.3)**, the **Green Structure Plan Velsen (pH12.23)**, and the **Nature Network Programme (pH13.3)**. These policies are important because they show that green areas are not only decorative, but also help with liveability, climate adaptation, biodiversity, and identity. In our project, this supports the idea that nature can help improve the relationship between people, place, and industry.

Finally, **NOVEX MRA (pFMHE16.12) and the Nationale Prestatieafspraken (pE13.1)** help position the project within a wider regional and housing context. NOVEX MRA links spatial development, economy, nature, and energy, while the performance agreements support the renovation side of the project and the role of housing corporations. Together, these policies make clear that the project works across scales: from neighbourhoods to the region, and from housing to industry.

# STRATEGY

	1 Social resilience	2 Strong local identity	3 Economical & Financial resilience	4 Active Mobility	5 Healthy environment & lifestyle	6 Sustainable Housing & Energy	
	S	I	F	M	H	E	
INTERVENTIONS	1	Enhance public space in the urban cores S1.1	Renovate and build industrial buildings to create a makers belt IF1.2	Intensify station areas M1.1	Improve existing pocket parks H1.3	Create the local grid and add energy hubs E1.124	
	2	Renovate & intensify buildings in the urban cores S2.1	Grow the makers belt IF2.2	Create shared mobility hubs M2.4	Create new pocket parks H2.3	Facilitate industrial waste heat to heat housing E2.1	
	3		Expand green industry along North Sea Canal, prioritising local industry IF3.4	Facilitate an ectrical water bus to Amsterdam M3.4	Create small scale green connections H3.3	Renovate housing, prioritising social housing E3.1	
	4		Create recycling and repair points F4.12	Extend provence bicycle network M4.34	Create a green barrier to air polluting particles H4.2	Facilitate renewable energy for housing E4.1	
	5		Clean industry admission policy pIF5.24	Connect existing bicycle lanes M5.1	Prioritise bicycle lanes in existing network H5.34	Construct district heating network E5.1	
	6	Neighbourhood Energy & Renovation Campaign pS6.1	Just transition fund IJmond pIE6.2	Circular construction and material reuse policy pF6.2	Enhance pedestrian and bicycle routes in residential areas M6.1	Create strong green corridors along bicycle network H6.3	Create local solar parks E6.4
	7	Affordable Retrofit Access policy via Community Centres pS7.1	National Industry Greening Programme pIF7.4		Build bicycle / eco bridge over the North Sea Canal MH7.3	Facilitate for PV panels industrial roof tops E7.4	
	8	Klimaatakkoord Gebouwde Omgeving pSIFE8.12		Action Agenda Active Mobility pMH8.3		Klimaatakkoord Gebouwde Omgeving pSIFE8.12	
	9	Nationaal Plan Energiesysteem (NPE) pIFE9.12		Regional Cycling Future Vision pMH9.3		Nationaal Plan Energiesysteem (NPE) pIFE9.12	
	10	Programma Energiehoofdstructuur (PEH) pIFE10.12		Mobiliteitsvisie pM10.4	European Green Deal pH10.3	Programma Energiehoofdstructuur (PEH) pIFE10.12	
	11	Poverty Agenda Velsen pSE11.1	Green Steel & Letter of Intent pIFH11.2		Green Steel & Letter of Intent pIFH11.2	Poverty Agenda Velsen pSE11.1	
	12	Housing Vision Velsen pSE12.1			Green Structure plan Velsen pH12.23	Housing Vision Velsen pSE12.1	
	13			Program Nature Network pH13.3	Nationale Prestatieafspraken pE13.1		
	14					MIEK 2.0 pE14.12	
	15					Large scale Battery Policy Framework pE15.4	
			NOVEX MRA pFMHE16.12				
	Participation by co-production pSIFMH17.2						

SPATIAL

POLICIES

## 5.1.3 The projects

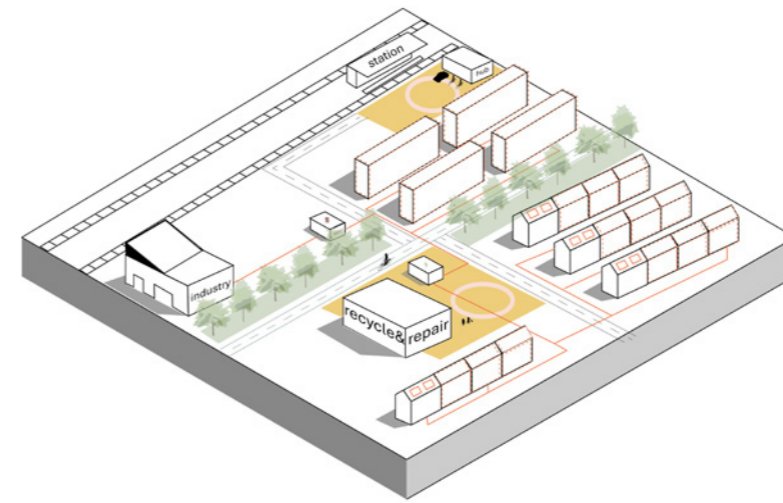


Figure 5.3: Powering the neighbours

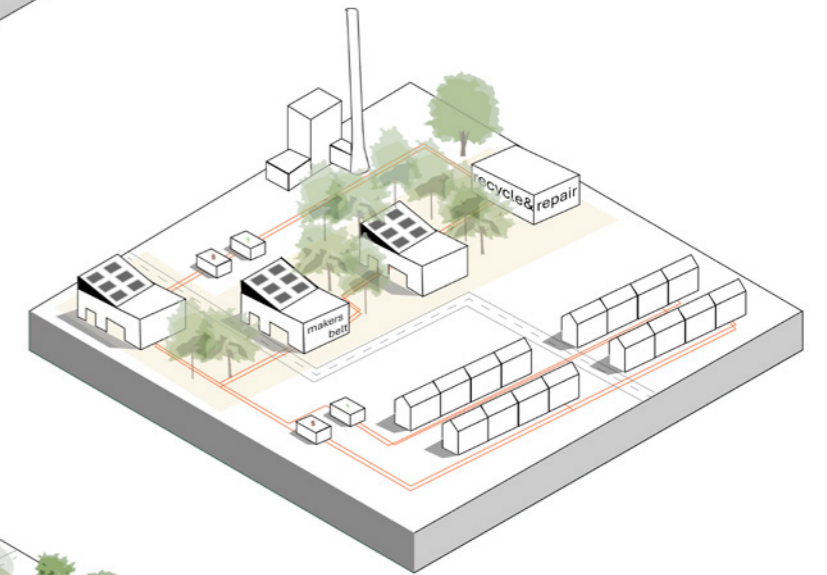


Figure 5.4: On the border of industry

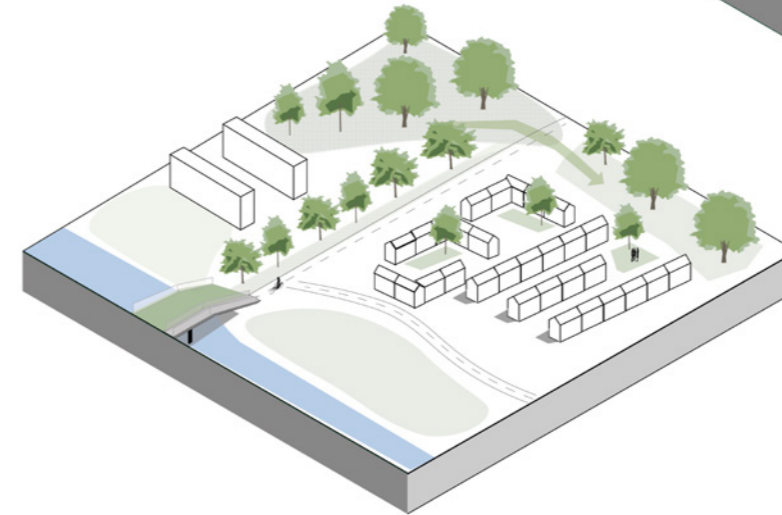


Figure 5.5: A green active network

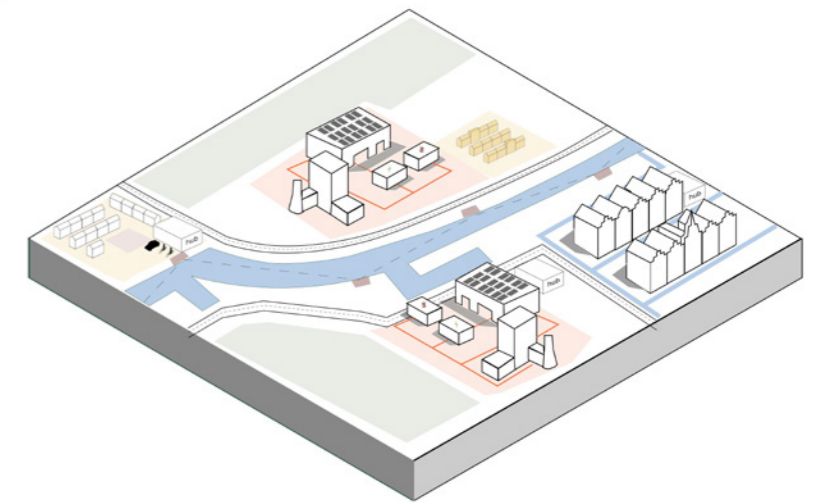


Figure 5.6: Connecting peri with urban

## 5.2 Powering the Neighbours

### Strategy project 1

#### 5.2.1 Introduction

This project focuses directly on the community, their living environment, and their transition to renewable energy.

First, a local grid and energy hub (E1.124) will be built so the energy transition can start quickly, independent of national grid expansion. At the same time, district heating (E5.1) will be constructed to build a base for industrial waste heat (E2.1) for neighbourhood heating.

Housing stock renovation (E3.1) starts as soon as possible, in phases. Social housing gets priority, as it must be completed before 2030 (Nationale Prestatieafspraken (pE13.1)). Later phases prioritise lower-income residents and homes with poor energy labels.

Recycle and repair points (F4.12) will be set up in existing buildings to introduce residents to circular living, especially helping lower-income households repair belongings. These centres will be a collaboration between residents, municipality, and industry, where industry can contribute with clean, safe waste products. This creates opportunities to make sustainable choices.

Not only waste heat, also other renewable energy sources will be supported or facilitated (E4.1). Homeowners get help with knowledge, resources, and subsidies, supported by new and existing policies.

Bicycle lanes will be connected and improved, and pavements broadened (M5.1 & M6.1), creating safe space for cyclists and pedestrians to encourage active transport.

To boost liveability, neighbourhood cores will be intensified with housing and amenities (S2.1). Existing buildings in the urban core will be renovated simultaneously to become future proof (S2.1), while public spaces are improved with greenery and urban furniture (S1.1).

Station area intensification (M1.1) will improve these areas, making stations feel safer.

#### Public goods

The public goods that are created in this project are the public spaces with urban furniture and the bicycle paths. The energy hubs and solar panels are commons that should be self-governed within the community.

#### 5.2.2 Interventions

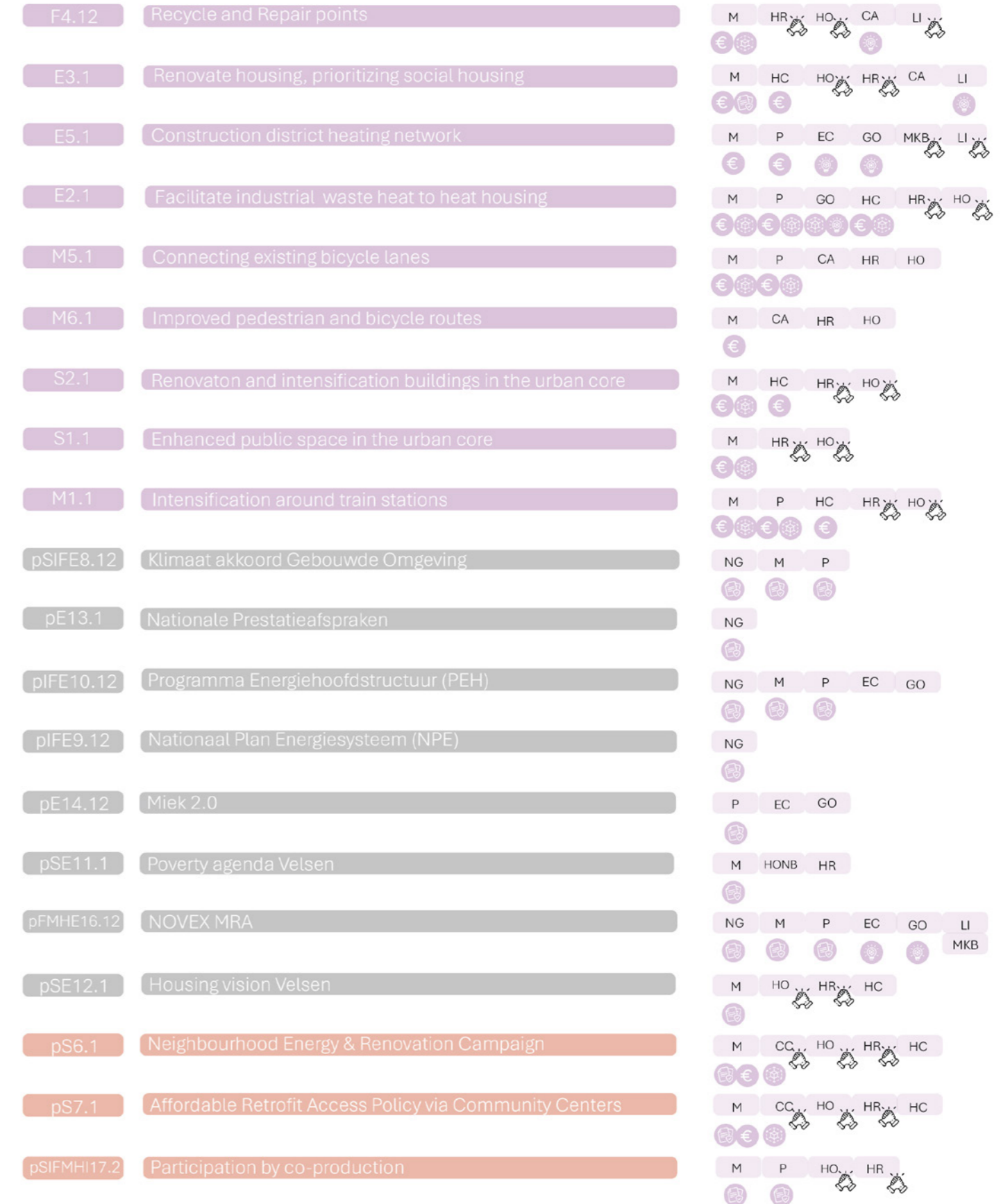


Figure 5.7: Interventions and stakeholders

**5.2.3 The spatial project**  
*Powering the Neighbours*

IMPROVING RESIDENTIAL AREAS

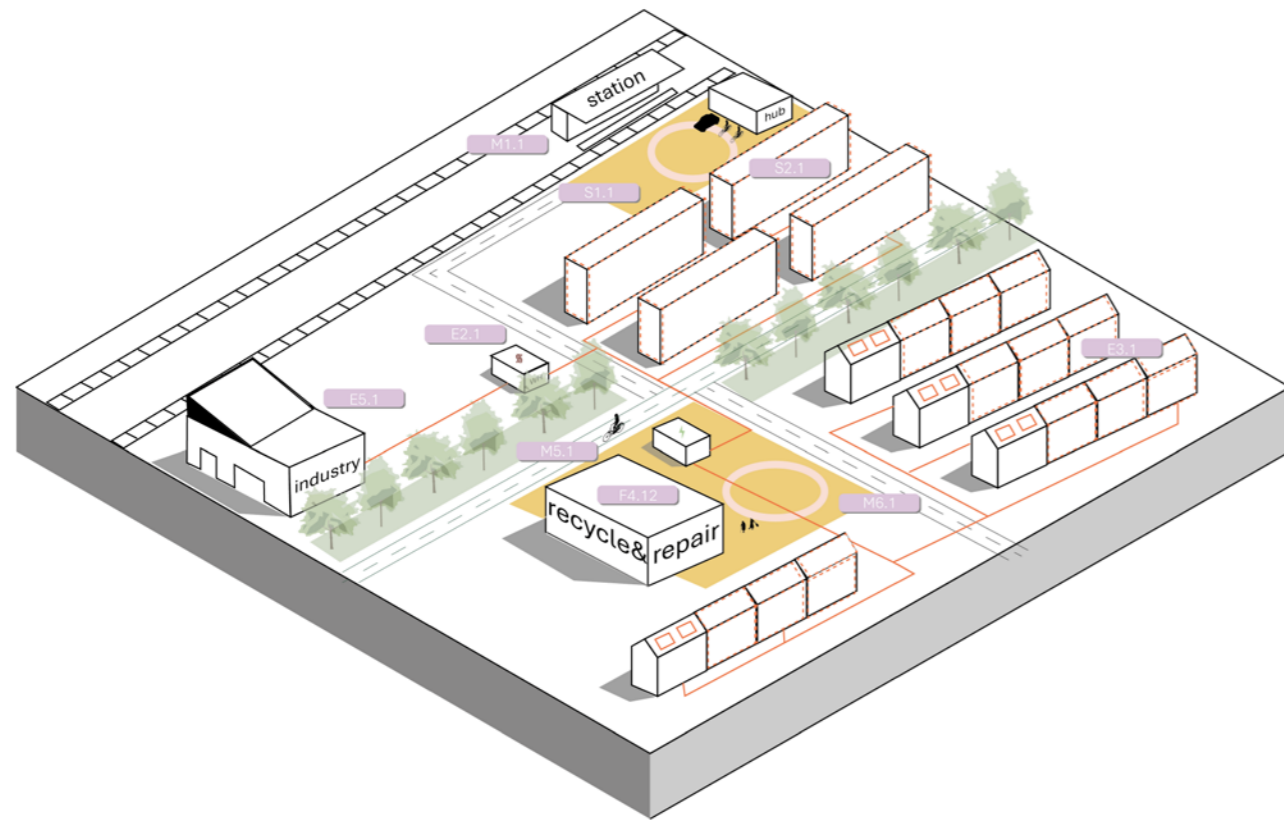
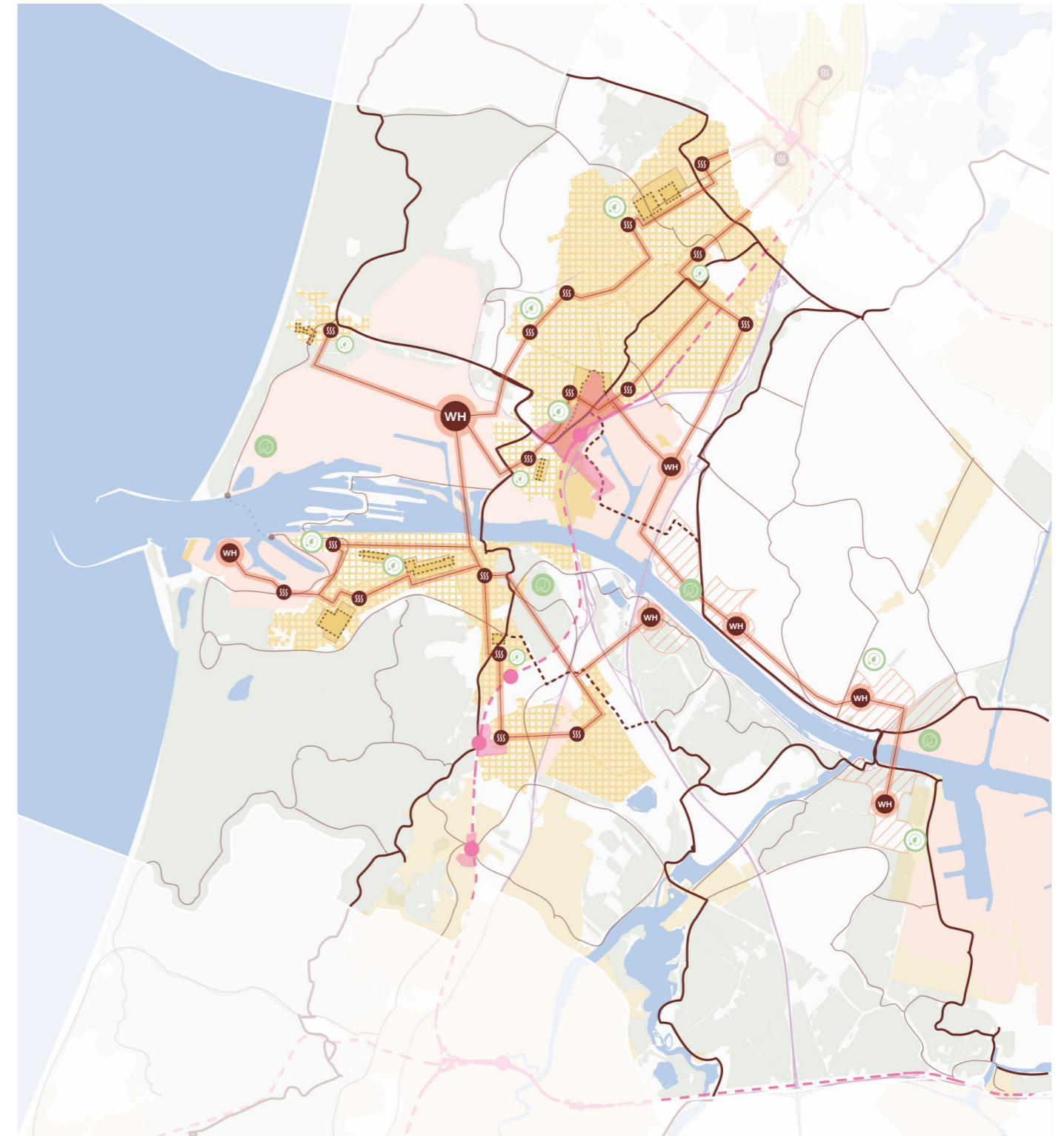


Figure 5.8: Axonometry powering the neighbours



- Residential area
- Renovation priority 1
- Renovation priority 2
- Renovation priority 3
- Urban cores
- Renovating & intensifying buildings in the urban core
- Enhancing public space
- Industry
- New industry
- Intensifying station area
- Bicycle priority lanes
- New bicycle lanes
- Bicycle network
- Waste heat injection station
- Thermal hub
- District heating network
- Active district heating
- Grid energy hub
- Energy hub microgrid 'Grid connected mode' & 'local/island mode'

Figure 5.9: Strategy map project 1

## 5.2.4 Phasing

The strategy towards 2050

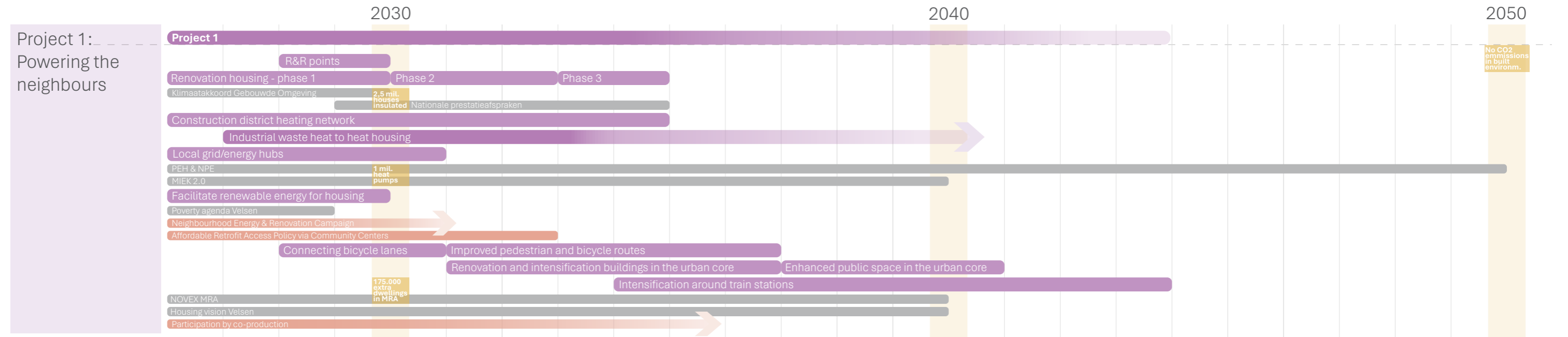
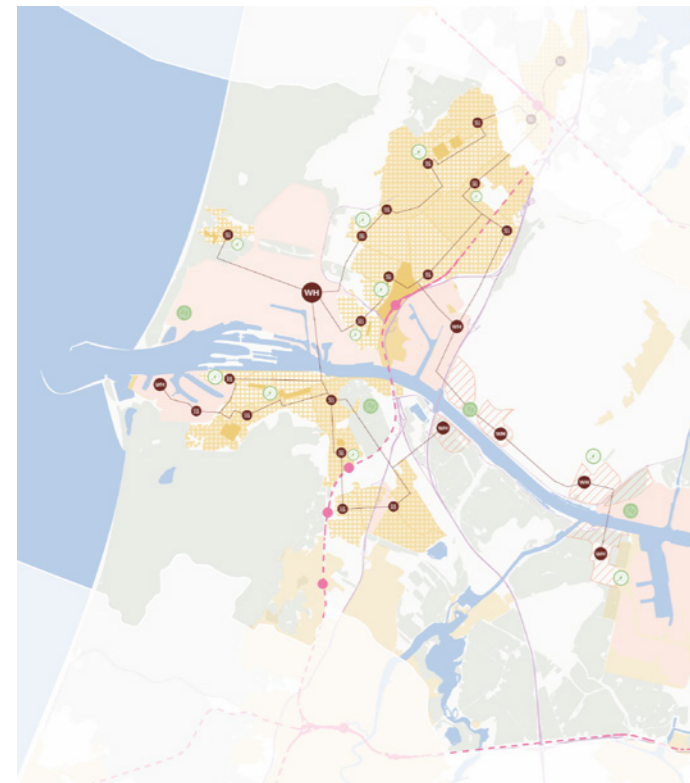
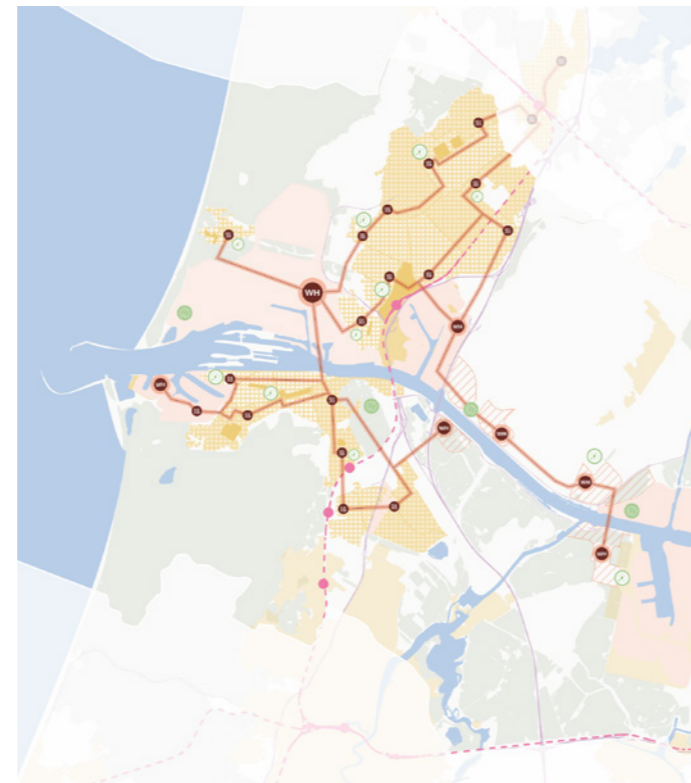


Figure 5.10: Timeline project 1

### Phase 1



### Phase 2



### Phase 3



### Phase 4

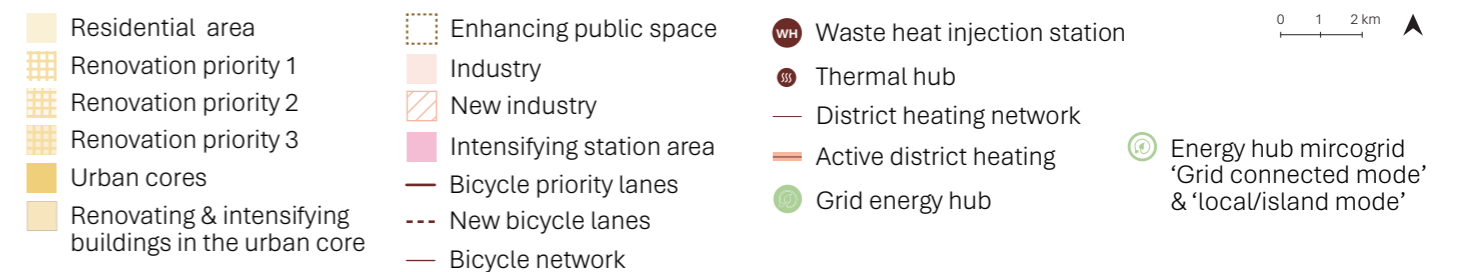
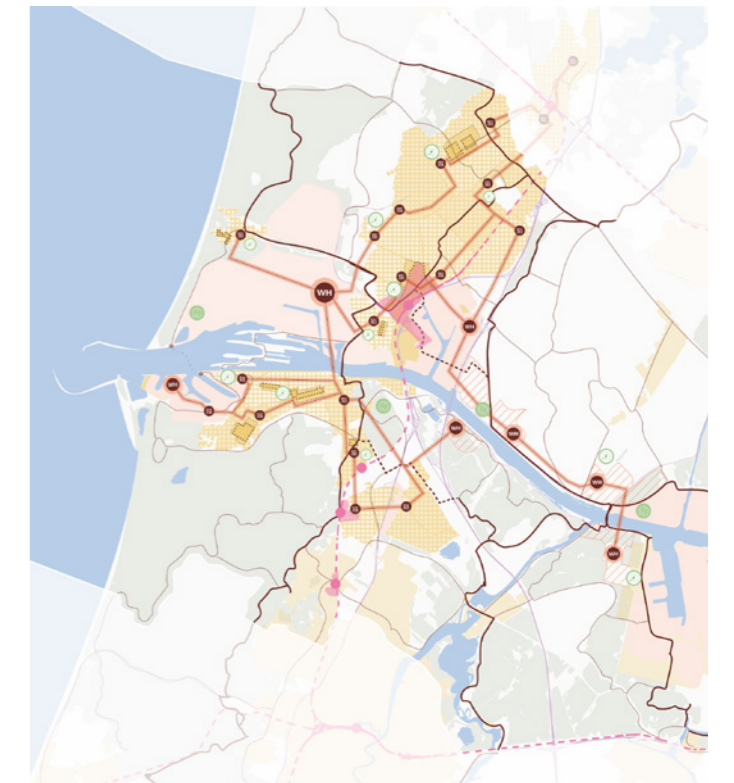


Figure 5.11: Phases of the strategy project 1

## 5.3 On the border of industry

### Strategy project 2

#### 5.3.1 Introduction

This project focuses on the industrial identity, while also literally softening the borders, and creating an opening to a new identity. Creating a non-toxic relationship with industry.

First, a local grid and energy hub (E1.124) will be built so the energy transition can start quickly, independent of national grid expansion.

Second, the renovation of existing, and the build of a few new industrial buildings (IF1.2) will start. These buildings will be equipped for industrial purposes, but at the same time will provide a space to sell their goods, attracting businesses that fit “the makers belt” vision: A belt where producing and selling comes together. The space should be inviting for visitors. This would create a new non-toxic relationship with industry and

soften the borders to the heavier industry behind this makers belt. After the build and the first start-ups, the growth of the makers belt (IF2.2) is facilitated, attracting new entrepreneurs.

As soon as possible the borders will be equipped with extensive greenery, to form a barrier against the air pollution. Later, when the buildings of the makers belt are renovated and built, this green barrier expands onto and around these buildings (H4.2).

#### Public goods

The public goods that are created in this project are the public spaces in the makers belt and the greenery in the public spaces.

#### 5.3.2 Interventions

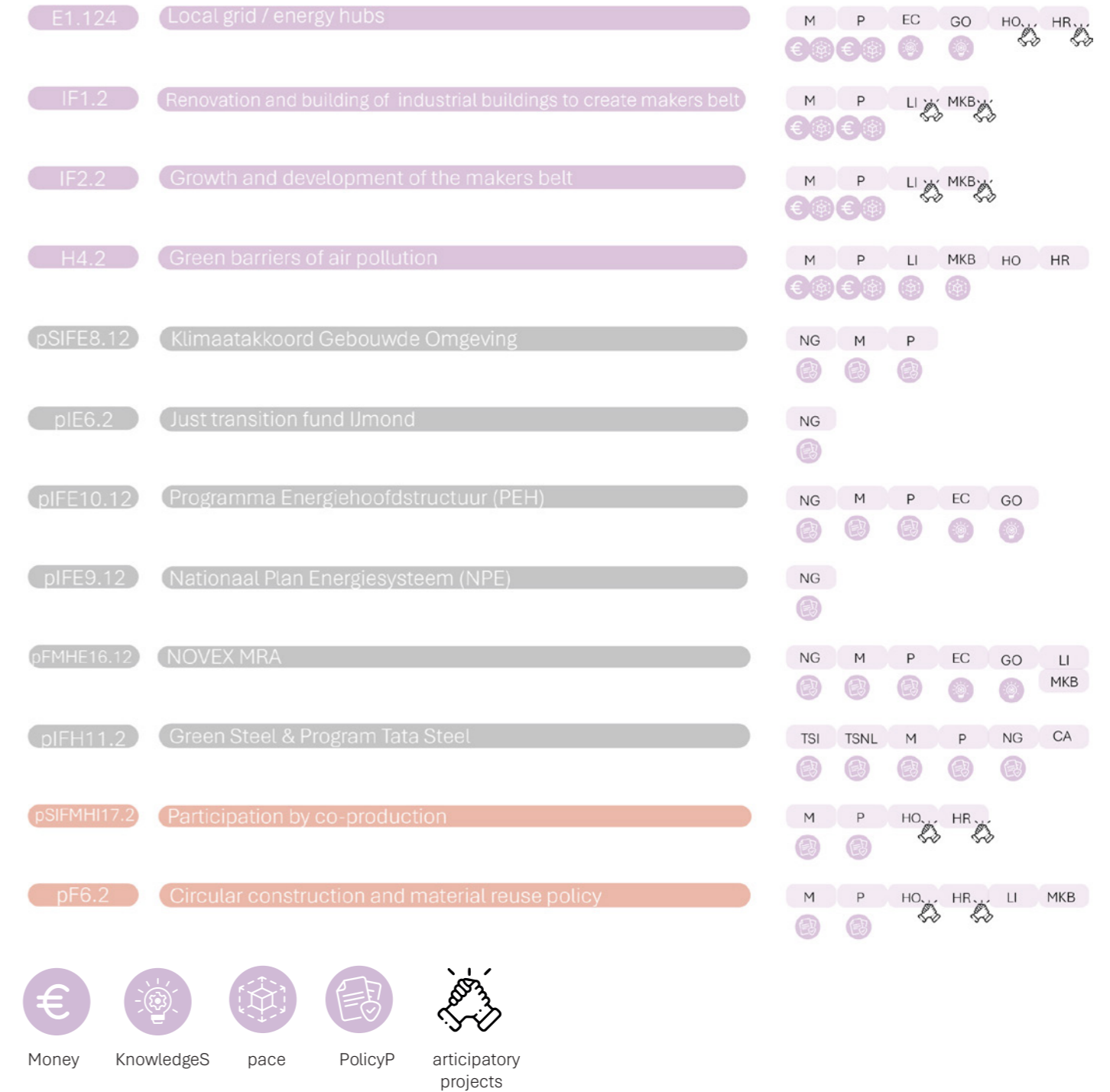
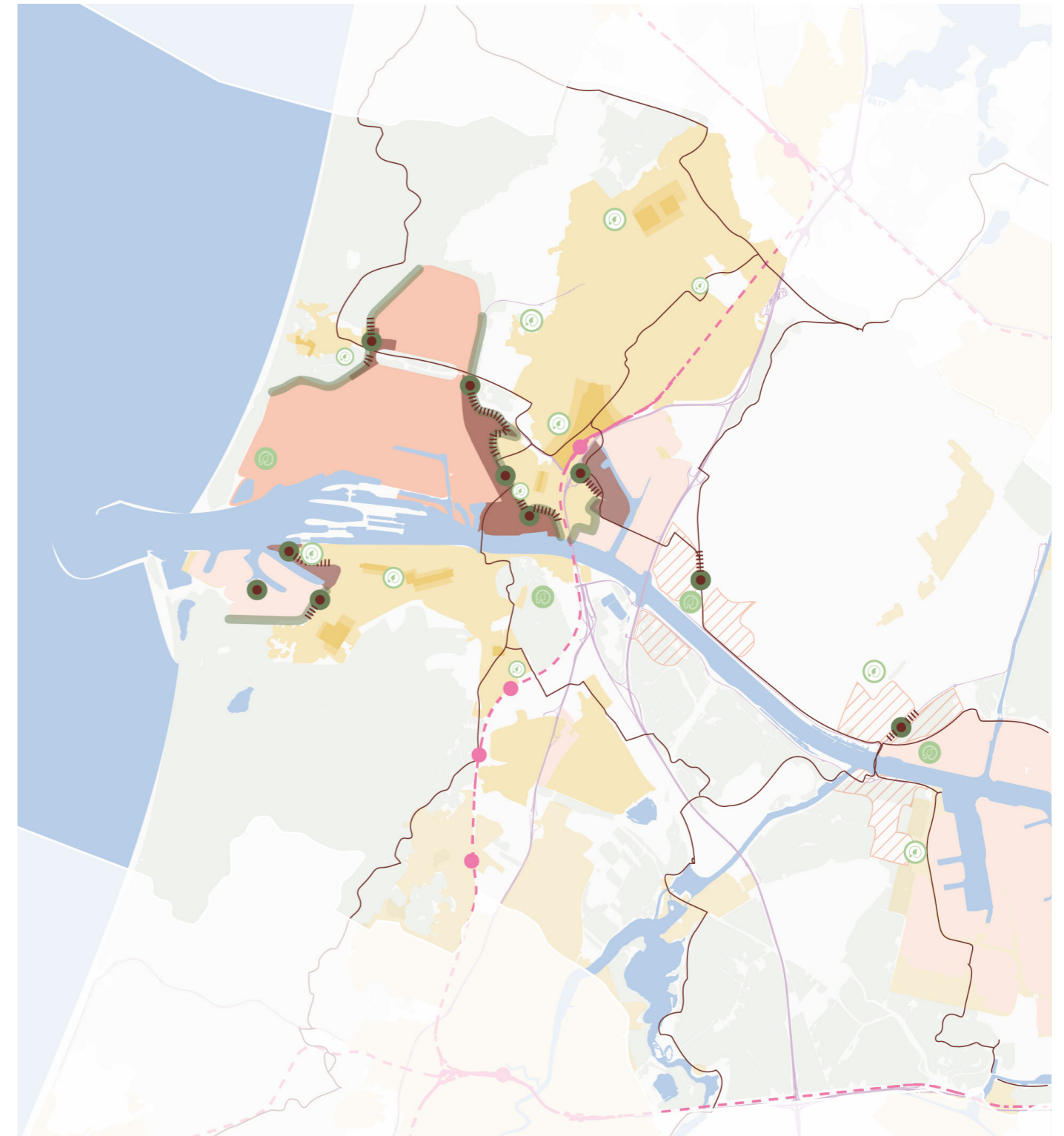
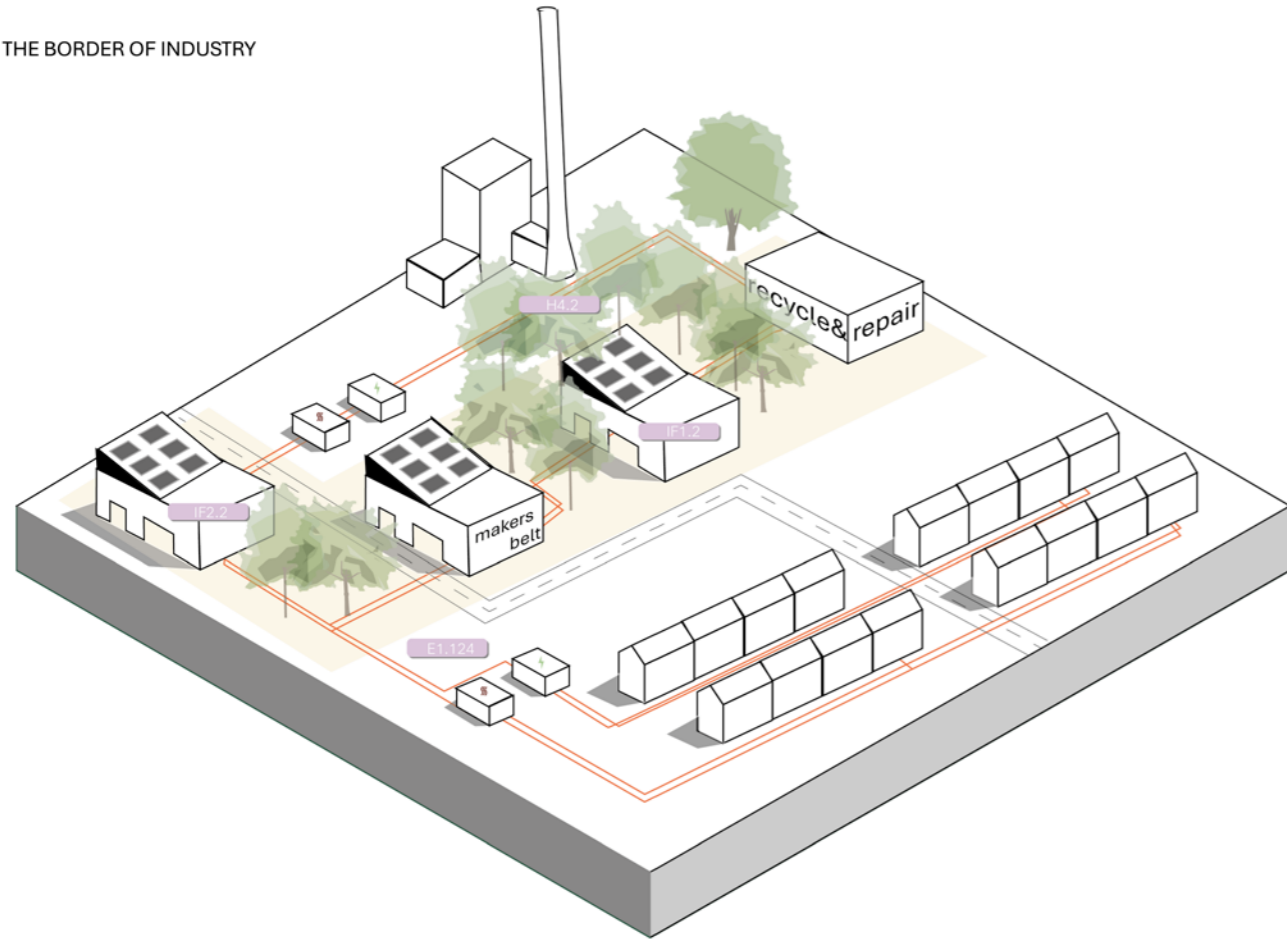


Figure 5.12: Interventions and stakeholders

**5.3.3 The spatial project**  
*On the border of industry*

THE BORDER OF INDUSTRY



- Tata Steel terrain
- Industry
- New industry
- Residential area
- Urban cores
- Renovating/building industrial buildings for makers belt
- Makers hubs
- Growing & connected makers belt
- Green makers hubs
- Grid energy hub
- Energy hub microgrid 'Grid connected mode' & 'local/island mode'
- Main bicycle lanes
- Train rails
- Train stations

0 1 2 km

Figure 5.13: Axonometry on the border of industry  
 100

Figure 5.14: Strategy map project 2

### 5.3.4 Phasing

The strategy towards 2050

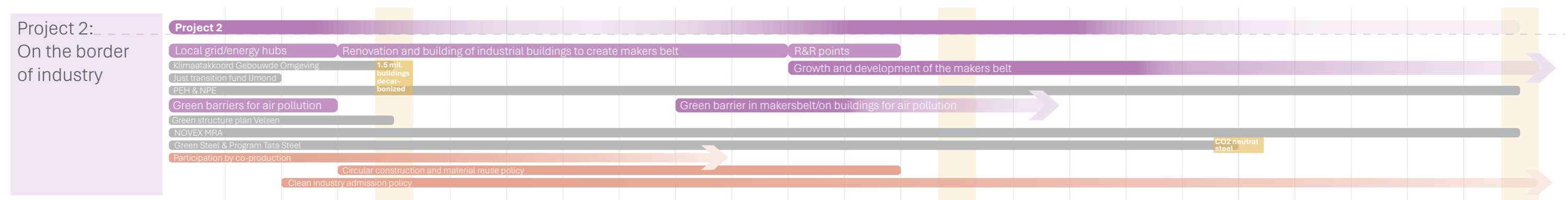
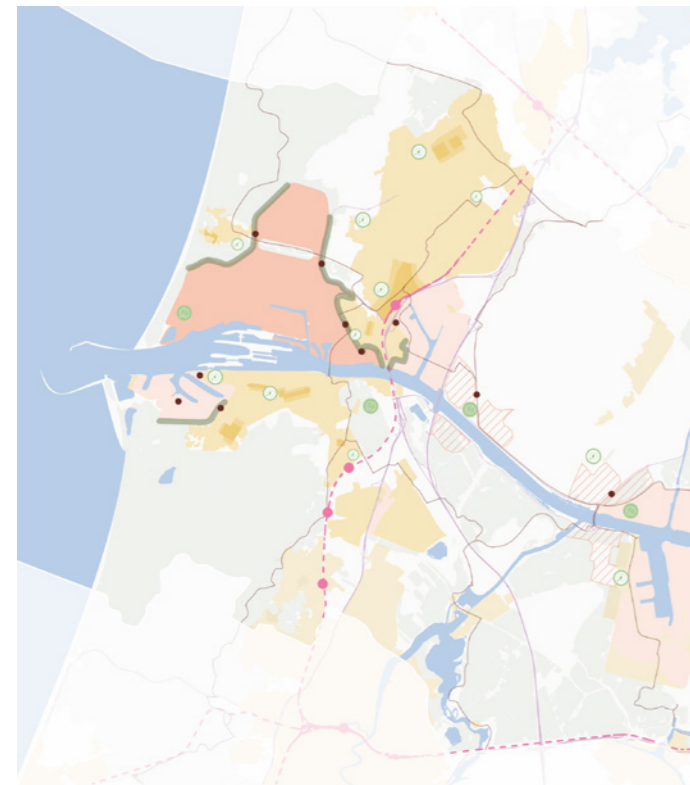
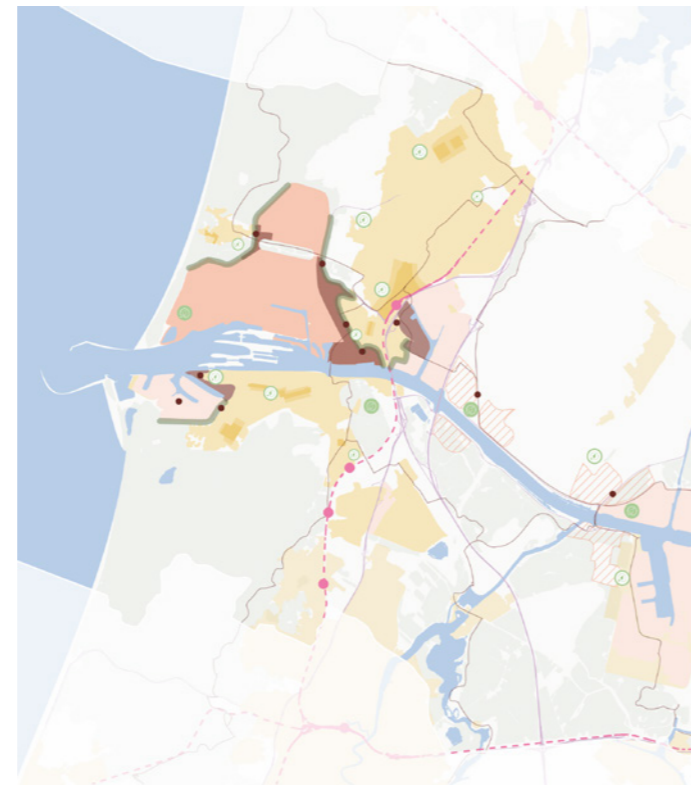


Figure 5.15: Timeline project 2

### Phase 1



### Phase 2



### Phase 3



- Tata Steel terrain
- Industry
- New industry
- Residential area
- Urban cores
- Renovating/building industrial buildings for makers belt
- Makers hubs
- Growing & connected makers belt
- Green makers hubs
- Grid energy hub
- Energy hub microgrid 'Grid connected mode' & 'local/island mode'
- Main bicycle lanes
- Train rails
- Train stations

0 1 2 km

Figure 5.16: Phases of the strategy project 2

## 5.4 A green active network

### Strategy project 3

#### 5.4.1 Introduction

This project focuses on creating green connections alongside active mobility networks to encourage walking and cycling in the community, while strengthening existing ties to nature and connecting nature areas around residential zones. This project focuses on creating green connections alongside active mobility networks to strengthen existing ties to nature and connecting nature areas around residential zones.

The project starts with improving existing pocket parks (H1.3) and adding new pocket parks (H2.3). With the small scale green connections (H3.3) a system of greenery is created to enhance biodiversity.

The province's bicycle network will be extended (M4.34), and within the existing network, cycling

will be prioritised (H5.34), encouraging the community to cycle, walk, and run, both as mode of transport and leisure, to reach nature areas beyond residential zones.

The construction of the bicycle bridge with ecoduct (MH7.3) and creating strong green corridors along the extended and existing bicycle network (H6.3), completes the greenery system to boost biodiversity.

#### Public goods

The public goods that are produced in this project are the public pocket parks and bicycle paths.

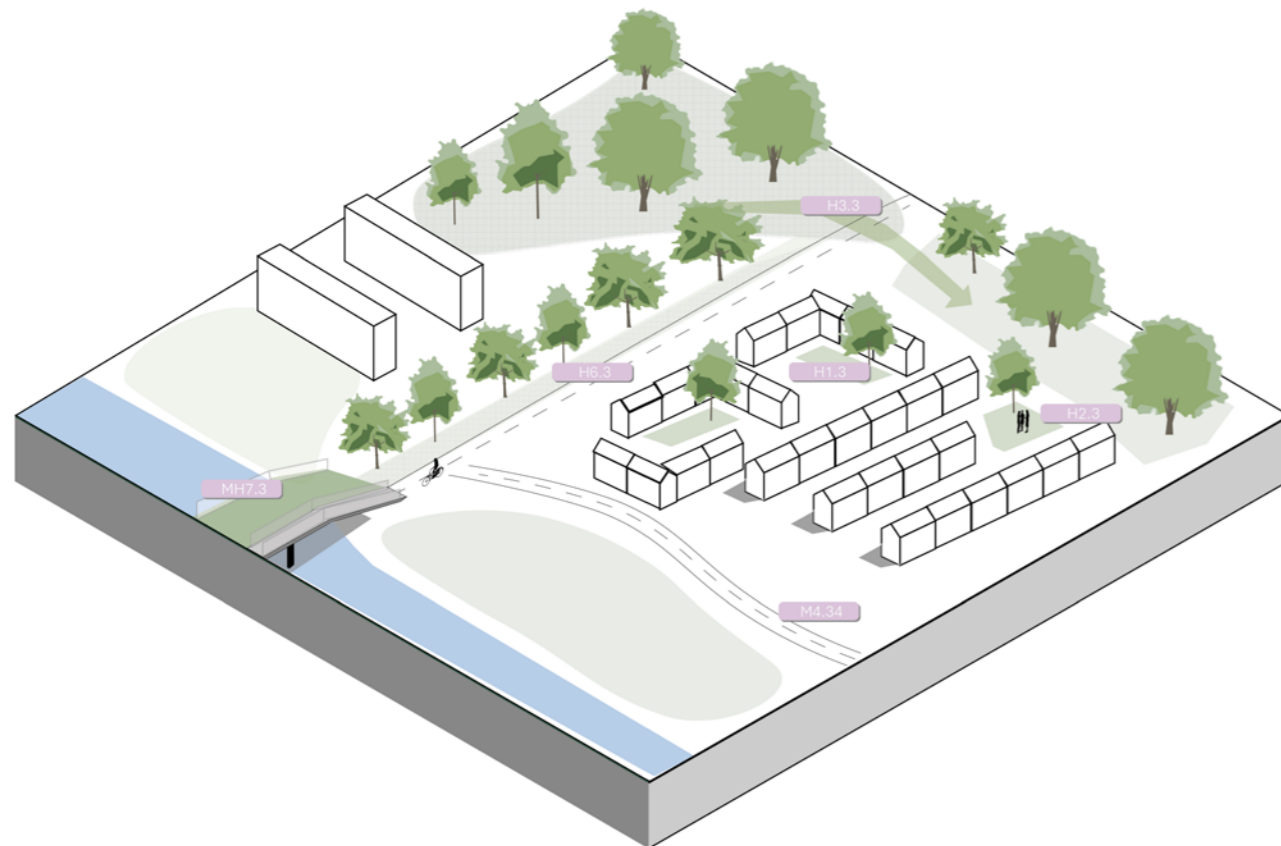


Figure 5.17: Axonometry the green active network

#### 5.3.2 Interventions

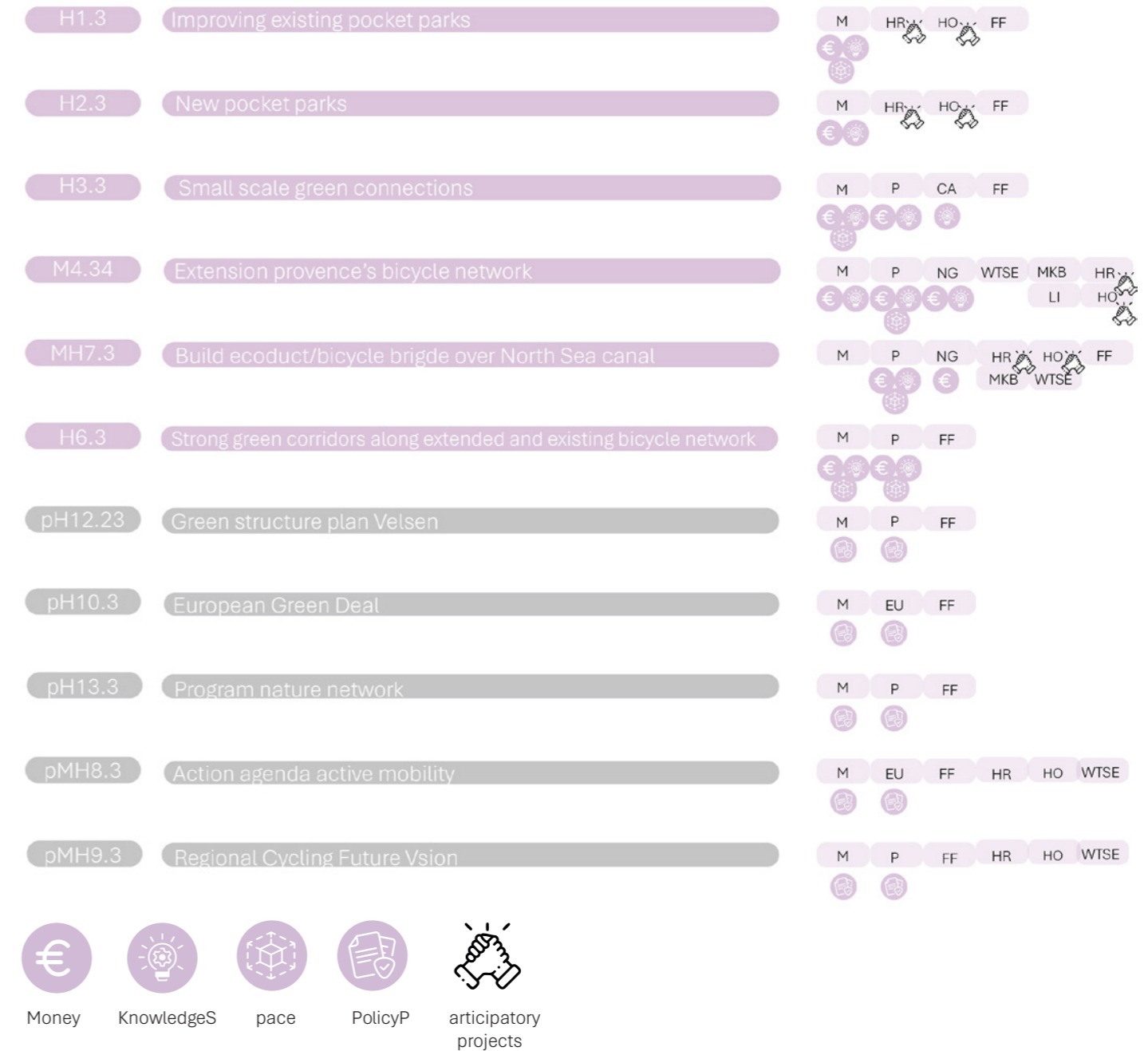
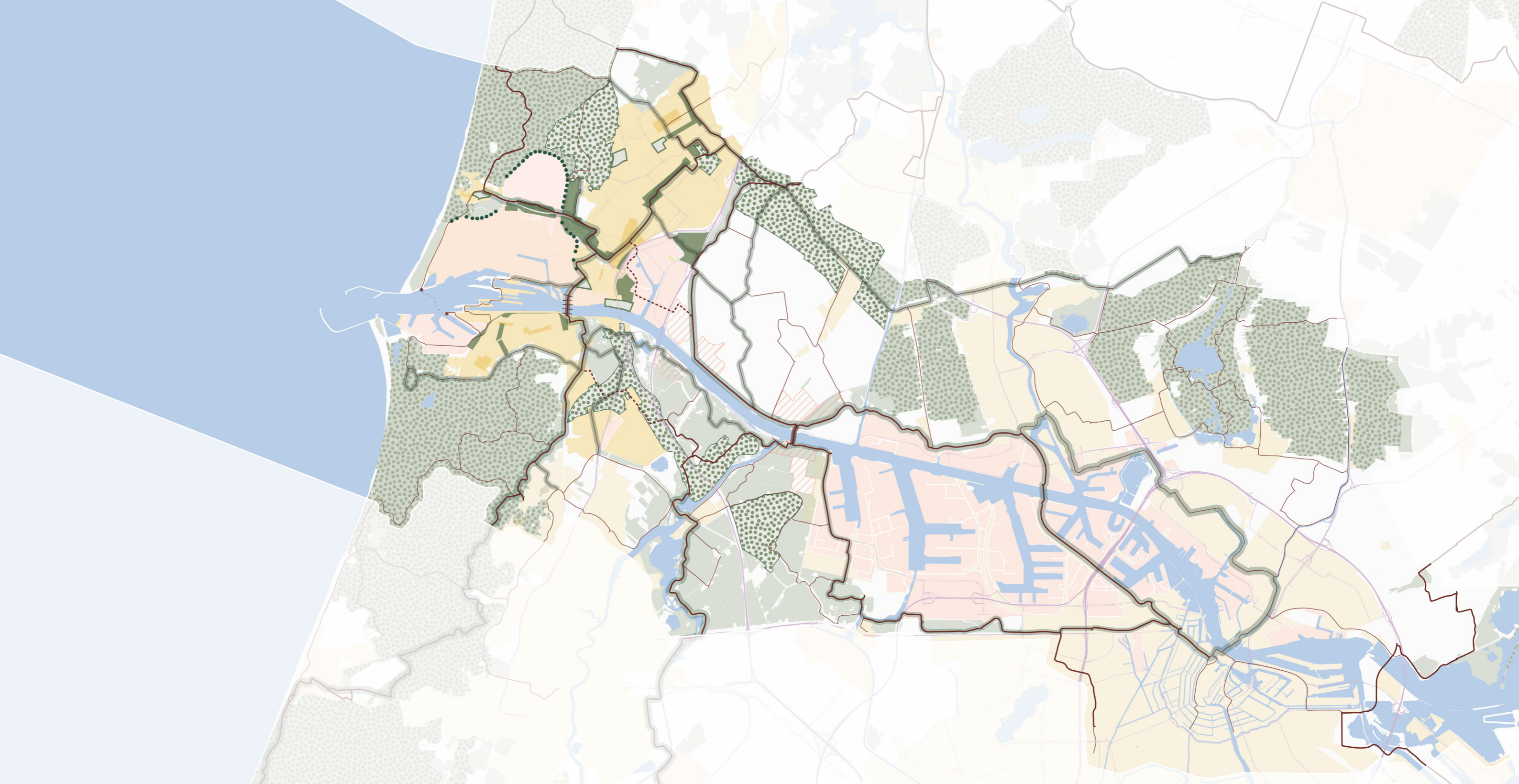
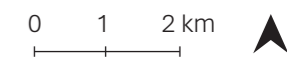


Figure 5.18: Interventions and stakeholders



**5.4.3 The spatial project**  
*The green active network*

- |   |                                |
|---|--------------------------------|
| Province green                            | Bicycle priority lanes         |
| Natura 2000                               | New bicycle lanes              |
| Protecting green & connecting natura 2000 | Bicycle network                |
| Pocket parks                              | Green connecting bicycle lanes |
| New pocket parks                          | Bicycle bridge                 |
| Green buffer                              | Bicycle bridge & ecoduct       |



### 5.4.4 Phasing

The strategy towards 2050

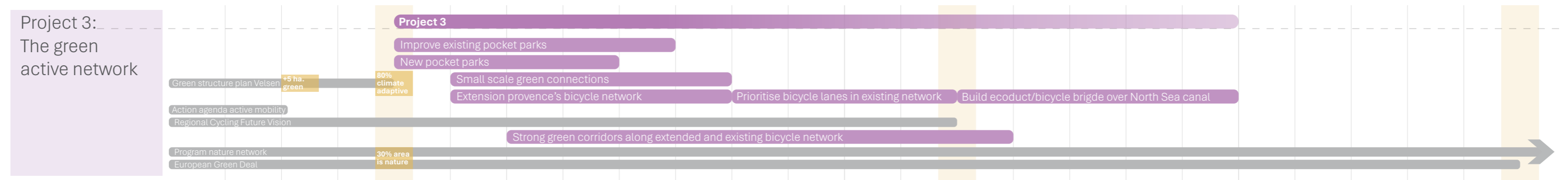
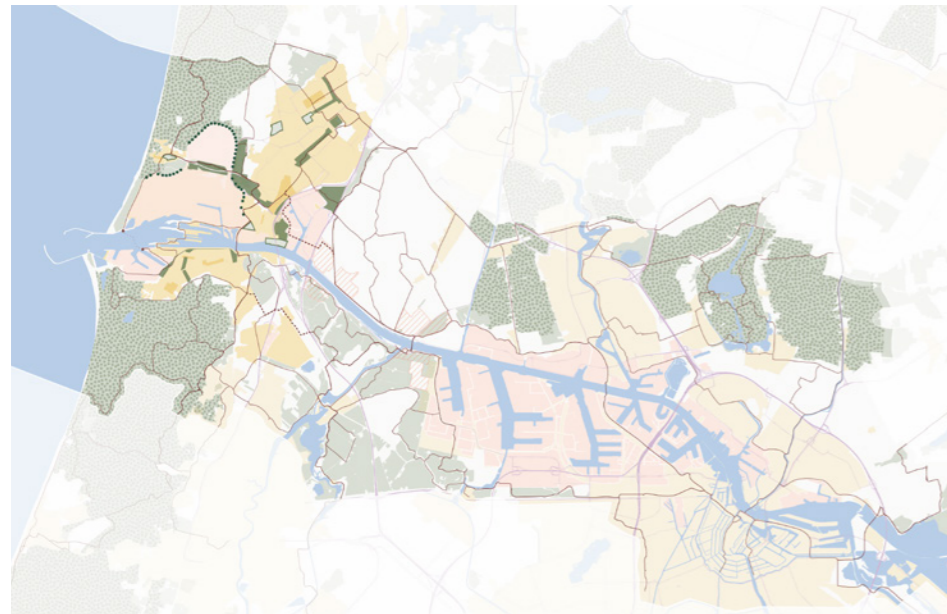
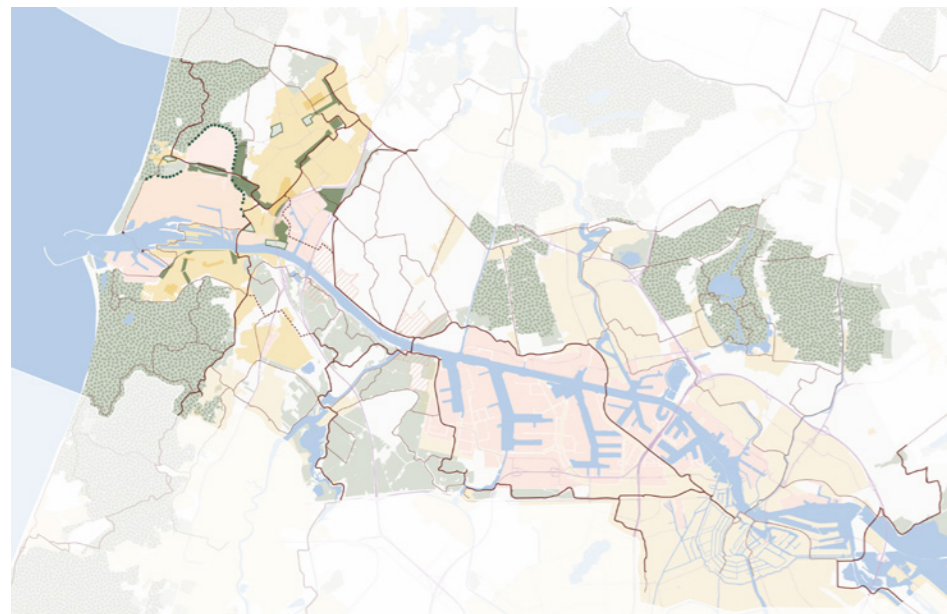


Figure 5.20: Timeline project 3

#### Phase 1



#### Phase 2



#### Phase 3

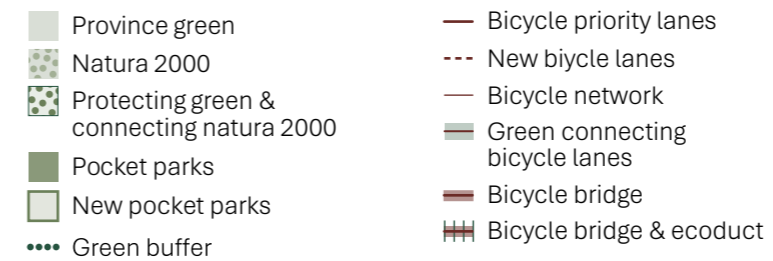
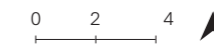
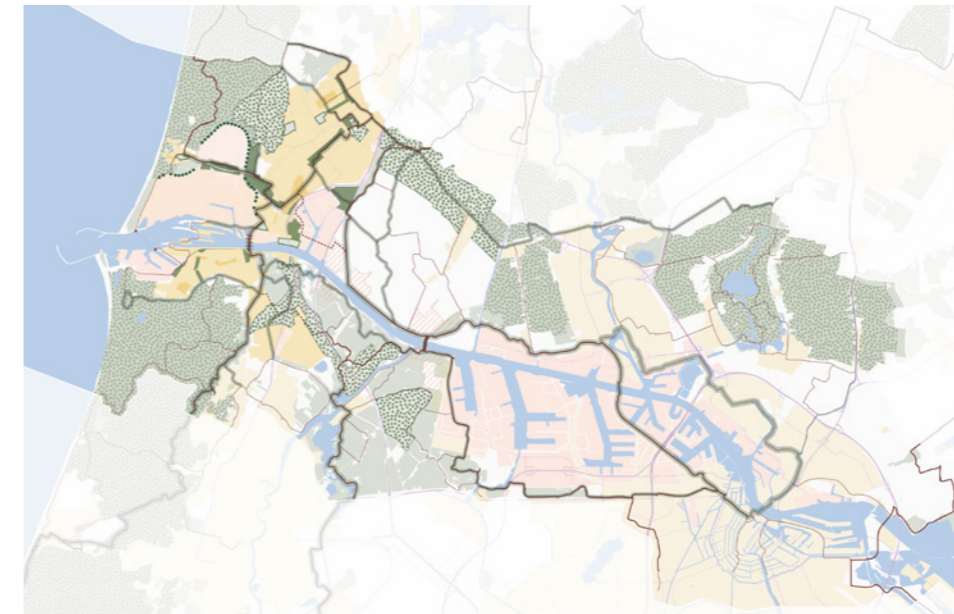


Figure 5.21: Phases of the strategy project 3

## 5.5 Connecting peri with urban

### Strategy project 4

#### 5.5.1 Introduction

This project will focus on making the connection between the region and the urban areas better. With improving the mobility and expanding the industry along the North Sea Canal the region will have a great economic position and can be more involved with the industry along the rest of the North Sea Canal. It will also make it easier for the residents to choose for better mobility than the car to improve the environmental awareness. The solar panels will give the industry more autonomy and make them less reliant on the overloaded energy grid. This project will mainly focus on the connection between the region and Amsterdam.

The project starts with building shared mobility hubs (M2.4), which will also house large-scale batteries (E1.124) for both the neighbourhood and the modes of transport in the hubs. Adding a water bus connection (M3.4) to Amsterdam and extending and improving the bicycle network to Amsterdam (M4.34 & M5.34), will strengthen regional links to Amsterdam for alternative

transport modes, reducing car dependency.

Expanding industry along the North Sea Canal (IF3.4) prevents current industrial areas from sprawling beyond their borders, while decentralising, and leveraging the canal's ideal location. These new areas will only accept clean industries. This expands the overall strategy: creating neighbourhoods with a healthy relationship to industry through mixed functions and softer borders, ensuring clean air and benefits from living near industry. Near the industry, solar parks (E6.4) will be built, connected first to the local grid and later to the national grid. PV panels on industrial rooftops complete the project (E7.4).

#### Public goods

The public good that are created in this project are the new public transport like the waterbus. The shared mobility hubs are commons that should be self-governed within the community surrounding the specific hub.

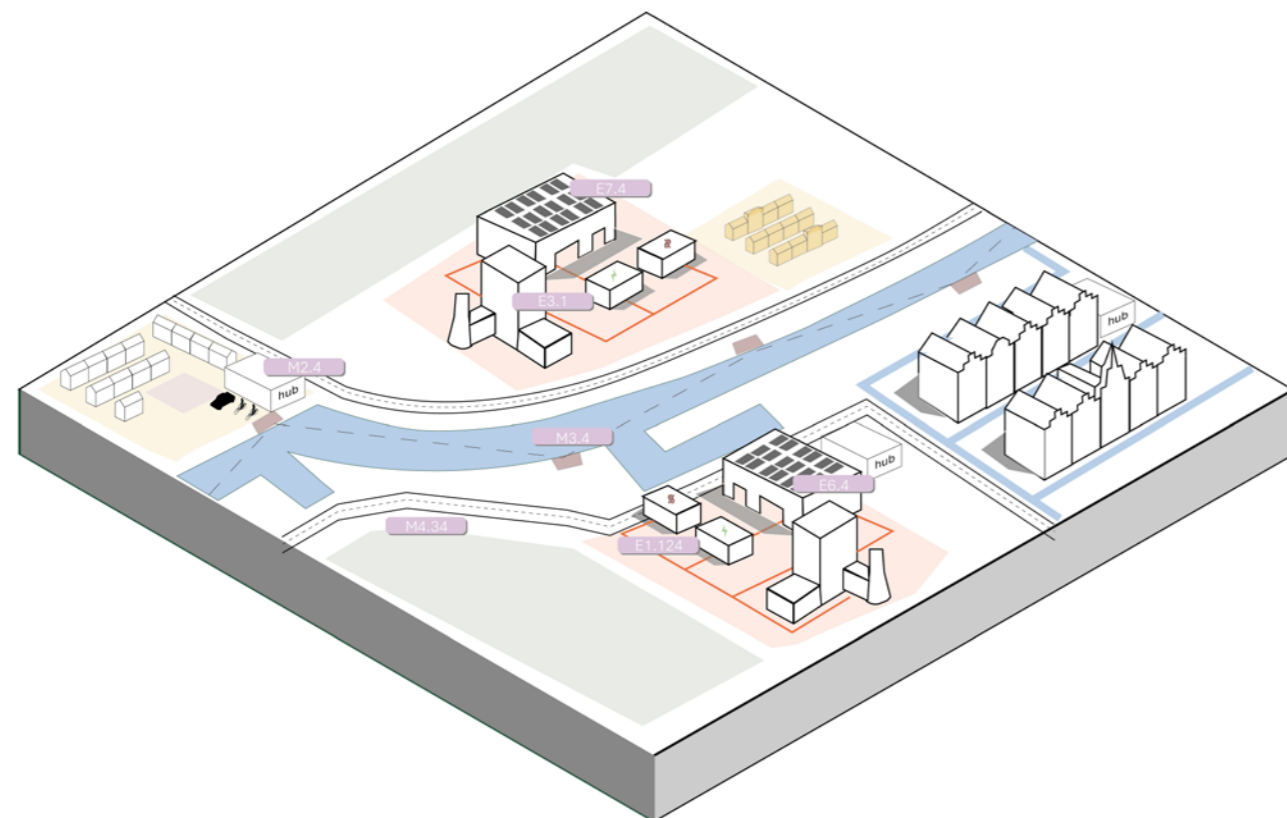


Figure 5.22: Axonometry connecting peri to urban

#### 5.5.2 Interventions

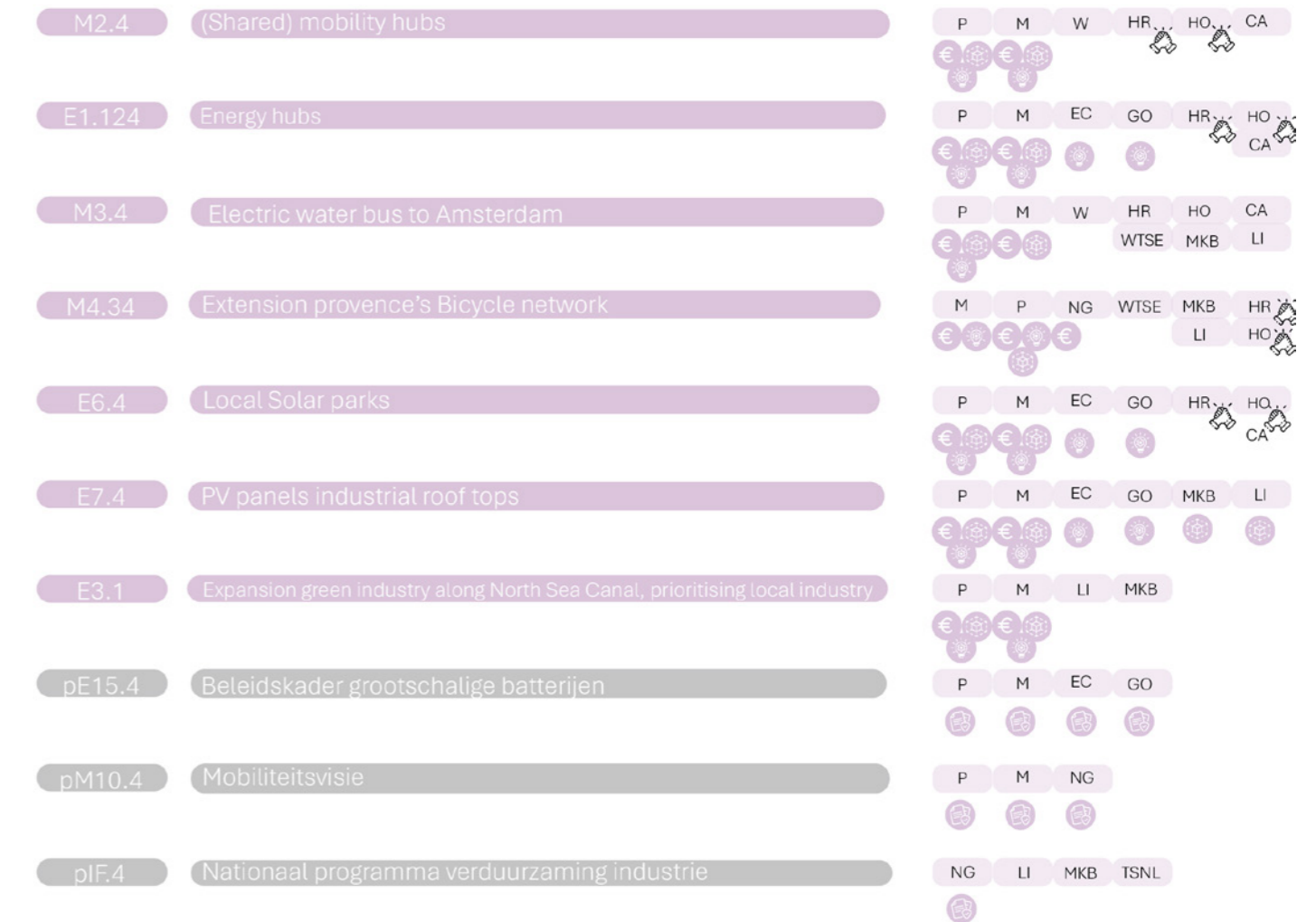
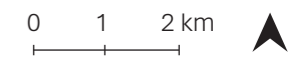
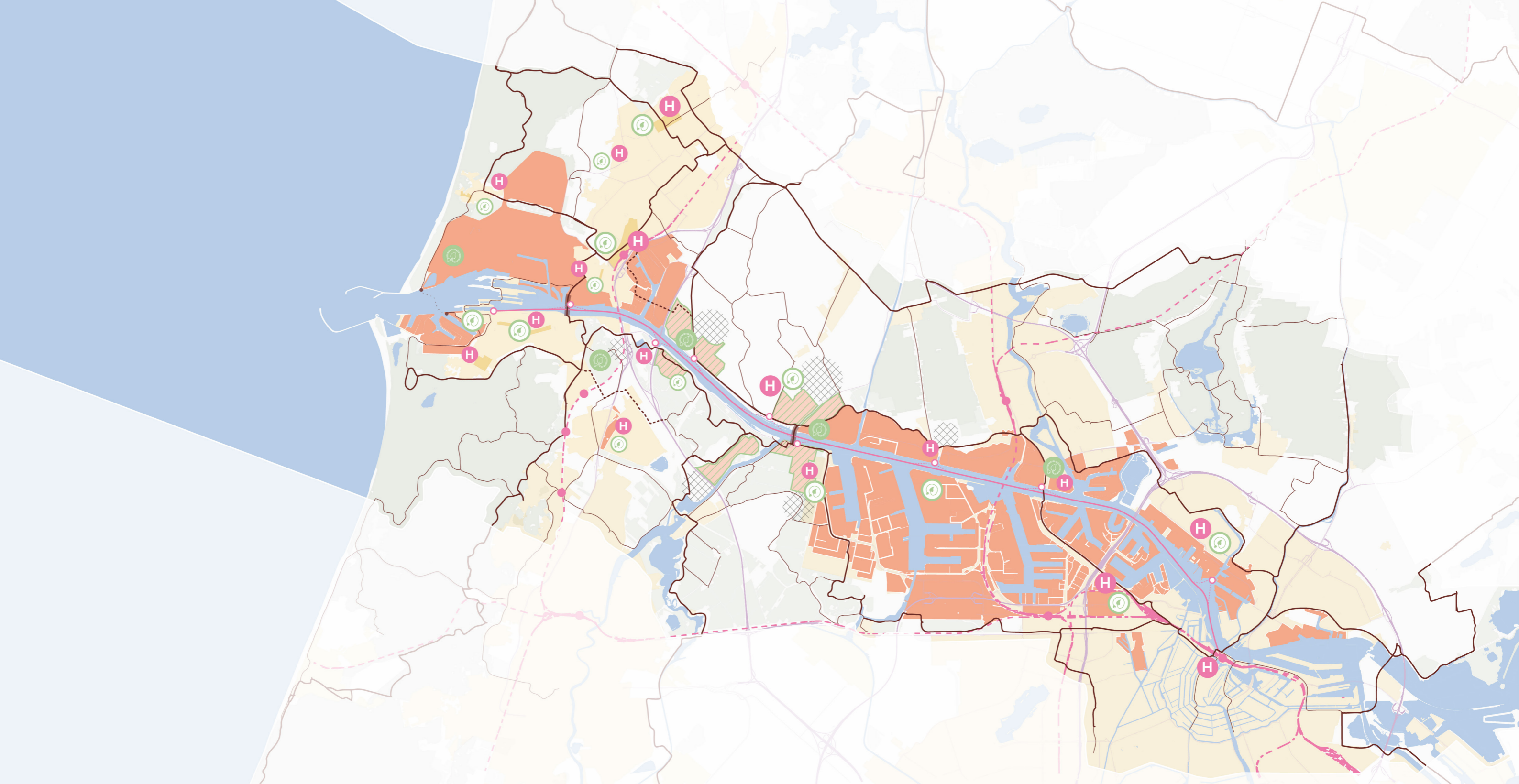


Figure 5.23: Interventions and stakeholders



**5.5.3 The spatial project**  
*Connecting peri with urban*

- Residential area
- Urban cores
- Industry
- New green industry & businesses
- Electrical water bus
- Stops water bus
- Train stations
- Train rails
- Main roads
- Local solar parks
- Province bicycle network
- Extended bicycle network
- Local bicycle network
- H Waste heat injection station
- ⊙ Grid energy hub
- ⊞ Energy hub microgrid  
'Grid connected mode'  
& 'local/island mode'

Figure 5.24: Strategy map project 4  
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## 5.5.4 Phasing

The strategy towards 2050

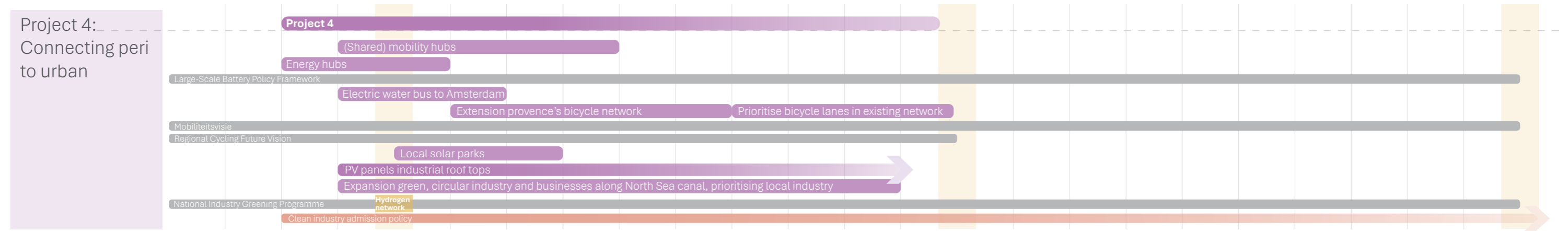
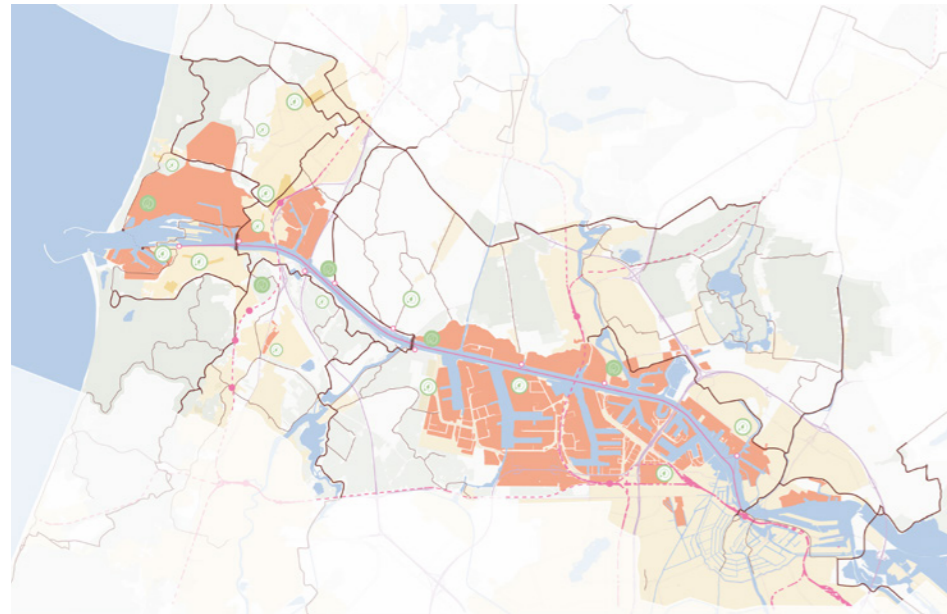
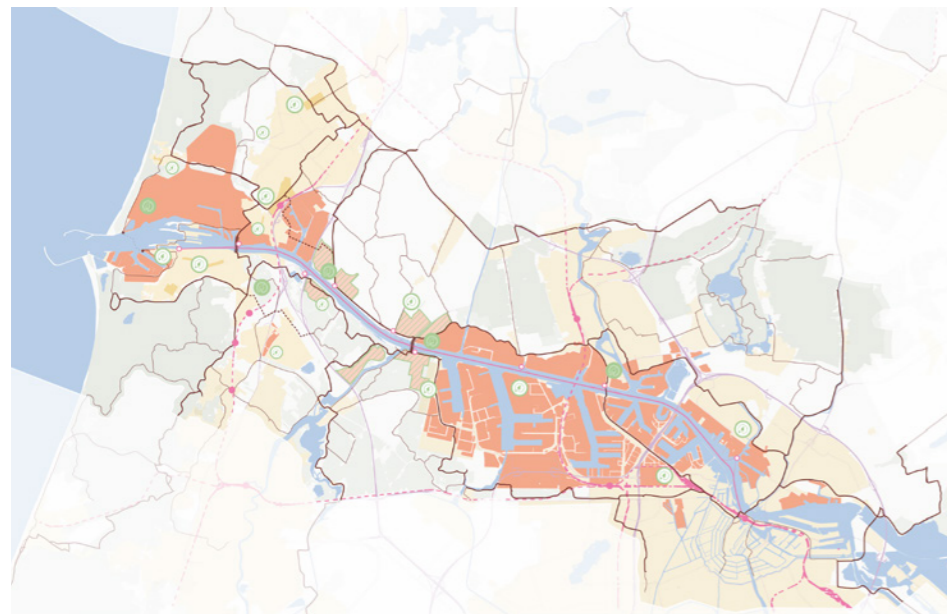


Figure 5.25: Timeline project 4

### Phase 1



### Phase 2



### Phase 3

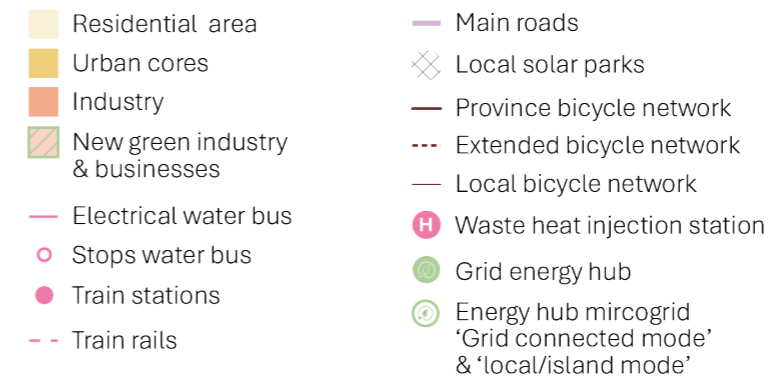
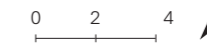
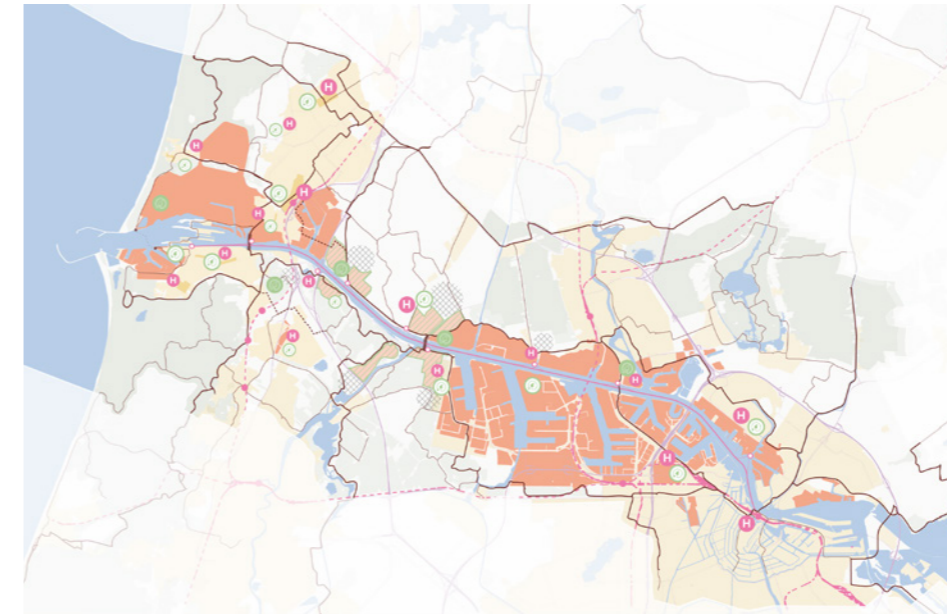


Figure 5.26: Phases of the strategy project 4

## 5.6 Timeline

Strategy towards 2050



Figure 5.27: Timeline combining the projects

## 5.7 Zoom-in

A strategic knot

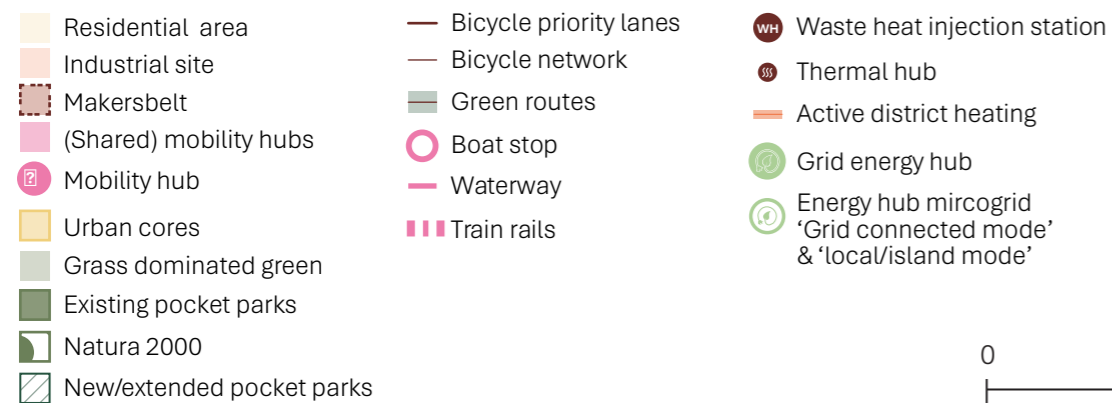
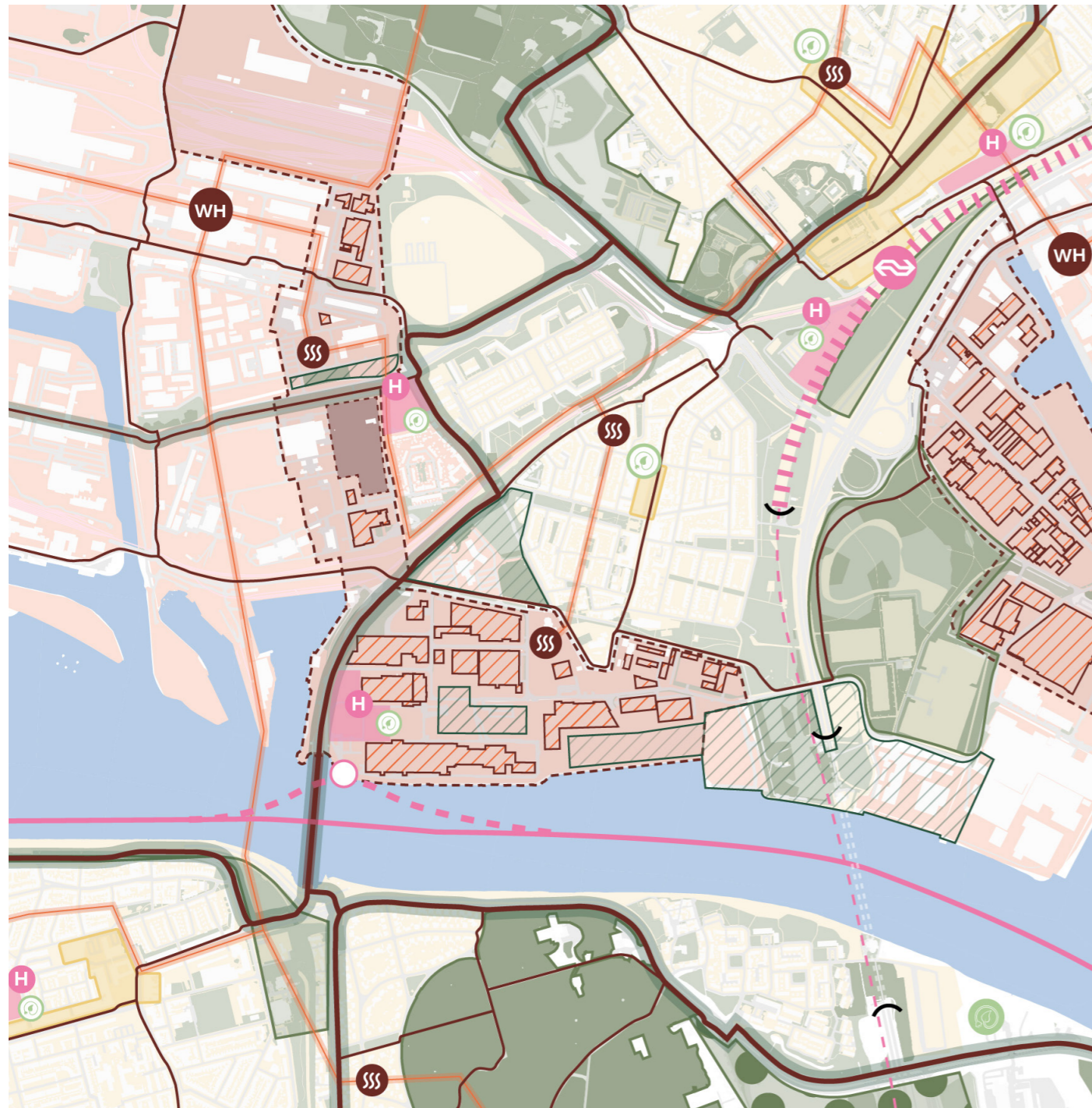


Figure 5.28: Zoom-in project Velsen-Noord

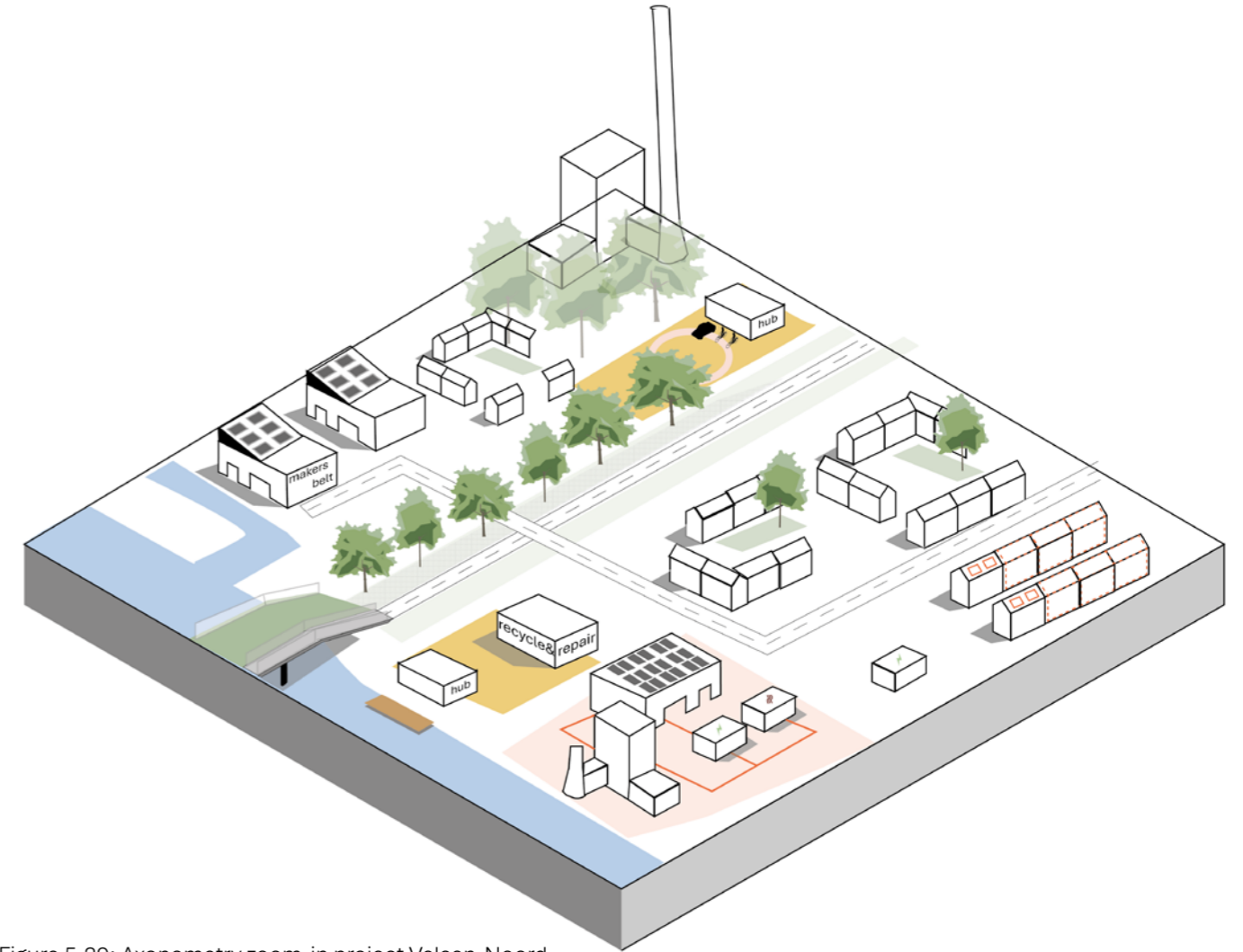
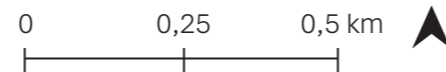


Figure 5.29: Axonometry zoom-in project Velsen-Noord

The zoom-in illustrates how the interventions and the accompanying policies are integrated into the spatial environment. Velsen-Noord has been highlighted, because it is the point where all four projects converge and physically intersect.

A defining feature of the zoom-in is the transformation of the current hard border between the neighborhood and the industry. This is replaced by a soft border consisting of the Makers belt and a supportive green structure.

Strategically integrated into this border are two mobility hubs. One is situated near the new water bus connection, connecting the residents of Velsen-Noord with for instance the urban area of Amsterdam or their work in the harbor of Westport.

Furthermore the Beverwijk station will take a more prominent role in the regional accessibility and is also reinforced with a mobility hub.

The urban core of Velsen-Noord is developed and plays an important role in facilitating the local energy hub. The energy grid in the neighborhood is self-sustaining, and the hub is actively managed through participatory projects. Connections between the various urban cores are also strengthened via an enhanced bicycle network and the overarching green structure.

A network of industrial waste heat creates a functional link between the industry and the neighbourhoods.

## 5.9 Stakeholders

### The shift

The community will gain greater knowledge and awareness of regional challenges, enabling a stronger voice and more meaningful participation through co-production, thereby cultivating empowerment.

Improved collaboration among stakeholders, particularly those with access to financial resources, expertise, space, and regulatory influence, will contribute to a more supportive environment.

Overall, these interventions are expected to enhance awareness, improve environmental conditions, and strengthen relationships between the community and industry

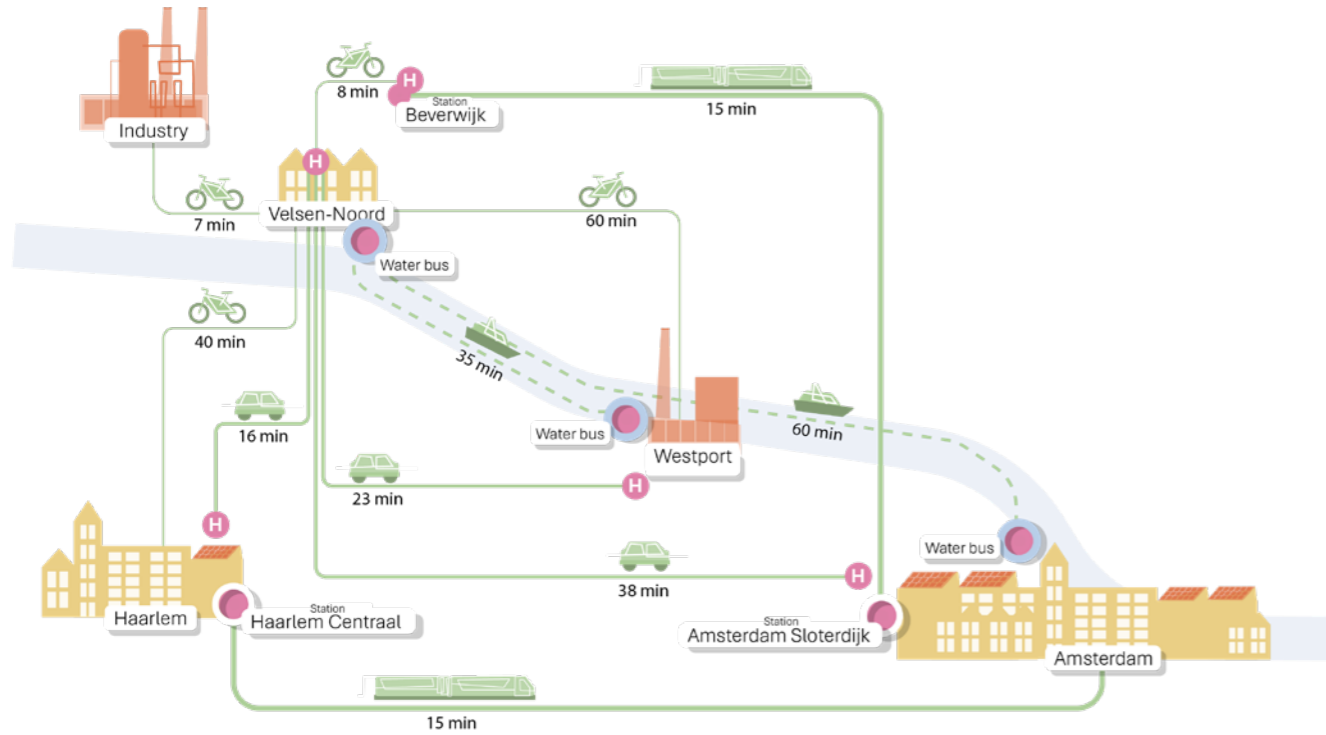


Figure 5.30: Future accessibility

The strategy interventions regarding mobility transform Velsen-Noord from a car-oriented environment into an area that provides access to affordable and sustainable transport.

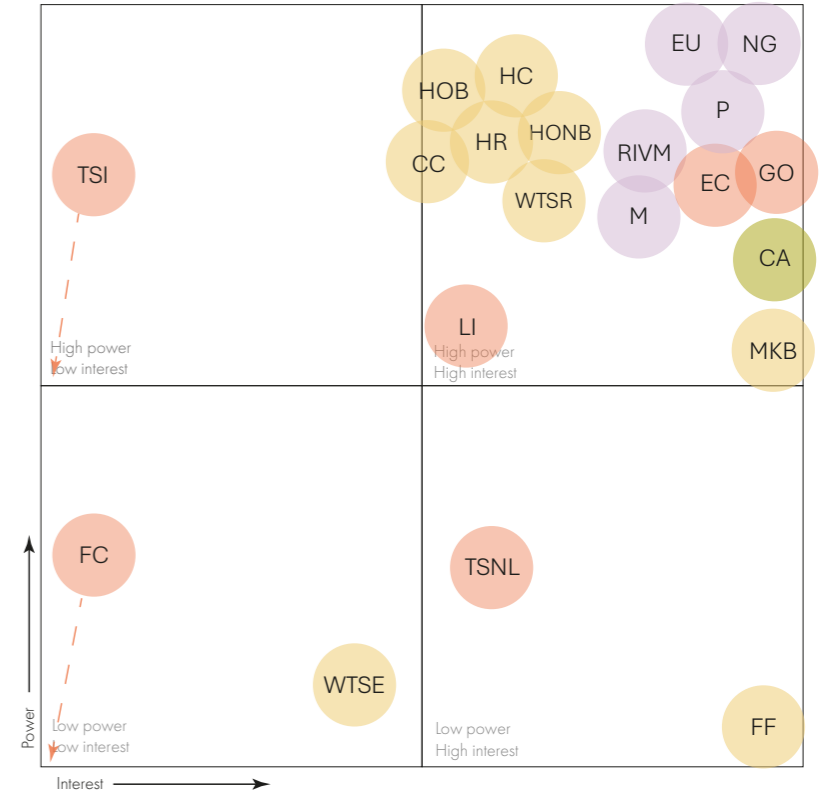


Figure 5.31: Power vs Interest matrix shift

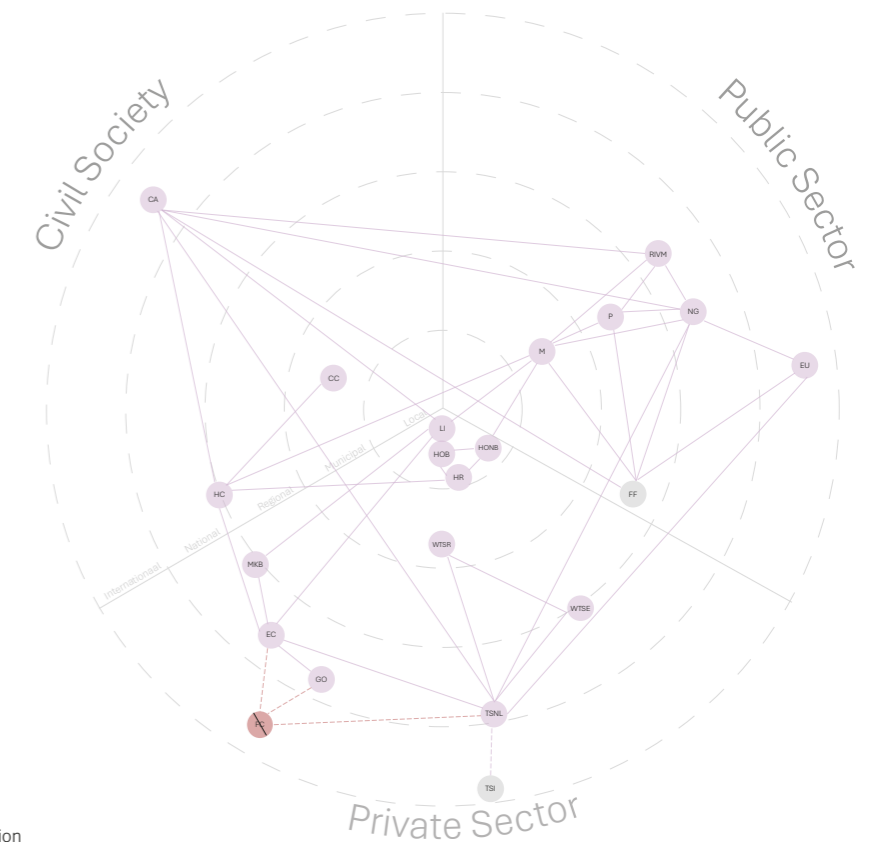


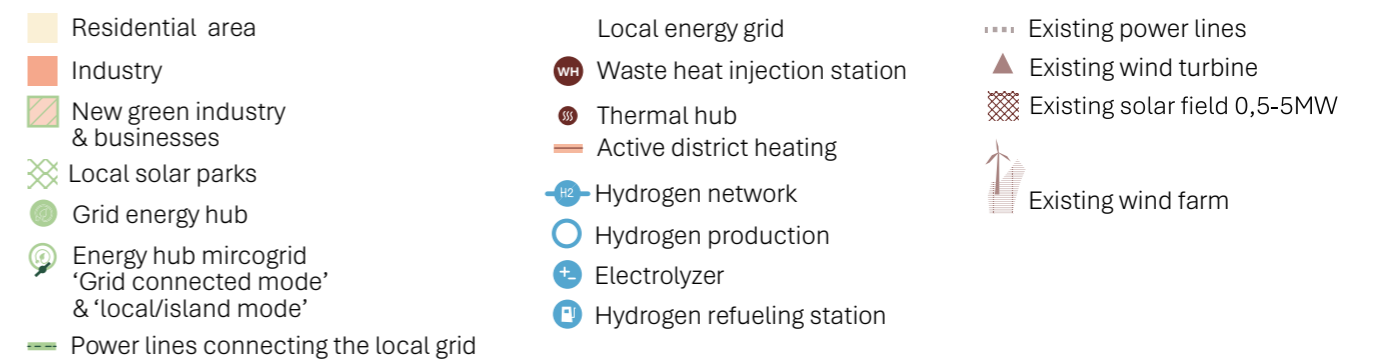
Figure 5.32: Union diagram shift

## 5.8 A strategic energy system

The importance of the North Sea Canal



Figure 5.33: Strategy energy map





6.1 Evaluation  
6.2 Conclusion

## Evaluation & Conclusion

### 6.1 Evaluation

In this evaluation the research and outcomes are reviewed with the theoretical framework.

#### SPATIAL JUSTICE

We used the spatial justice benchmarking tool to evaluate on the distributive, procedural and recognition justice.

##### Distributive justice

The interventions like pocket parks are shared fairly across the neighbourhoods. The implementation of new bicycle routes does make the public transport better accessible, but does not include options for residents who are unable to use a bicycle. The pedestrian focus is the most equal way of transport. The interventions are distributed equitably, focussing on improving the most vulnerable neighbourhoods first. For example people who do not have the (financial) resources to transform their houses, will receive extra financial support according to the policies.

##### Recognition justice

By recognising the different sub communities within our community and their struggles. The research recognises the vulnerabilities, identities and trajectories by noticing this community stands for a huge transformation. The uncertainty of the industry makes the residents vulnerable and fearing of losing their identities.

##### Procedural justice

Those most vulnerable to the uncertainty surrounding the industry, and most dependent on the transition, will be supported in developing a future that is less reliant on it. Ensuring active participation in decision-making processes allows the community to play a meaningful and equitable role in shaping the energy transition.

#### COMMUNITY GOALS

Our conceptual framework shows how the just energy transition is the driver of change towards a just future for the community. During the transition, the community is influenced by spatial interventions and uncertain aspects. The interventions of our strategy arose from principles that were based on social, environmental and economical aspects.

For instance, from the relational ontology perspective there is a dependent relation between the peri-urban community and the industry. The community does not exist without the context of the industry. This dependent toxic relationship between the industry and the neighbours causes injustice. So, justice is also a relational concept. From the realist ontology perspective, the community is an entity on its own. It does function without the context of the industry. This conceptual framework is integrated relational and realist ontology, by putting the relational concepts in the centre.

#### SUSTAINABILITY TRIANGLE AND INTRA- AND INTERGENERATIONAL JUSTICE

The project uses the definition of sustainable development from the Brundtland report – our common future: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Sustainability is multidimensional and a sustainable environment is impossible without a harmony between the three pillars, social, economic and environmental. To ensure long-term sustainability our strategy creates a balance between the social, economic and environmental aspects through spatial interventions based on these three dimensions.

As reflected in our conceptual framework we focus on the community during the transition. This means in our strategy that we look beyond the present. To take the needs of the future community into account we tackle the impact of uncertain future, such as the developments of Tata steel, to shift the relation from a toxic dependence relation towards empowerment and autonomy. Spatial interventions that support this autonomy include local self-sustaining energy grids and a wider range of affordable, accessible transport options that allow for independent choices.

Additionally, the interventions can be used flexibly. The local neighbourhood’s electricity grids can operate independently or reconnect to the national network when needed. Instead of

focusing on rigid spatial boundaries between the industry and residential areas, projects like the makers belt and the green buffers can grow and adapt alongside the changing industry.

Together the strategy ensures an intra- and intergenerationally just strategy for the community.

### **TRANSTHEORETICAL MODEL**

Over time the toxic relationship with the industry has created certain behaviour of the community. To repair the toxic relationship, the strategy introduces spatial interventions that change the physical environment, impacting the behaviour of the community. However, physical changes alone are insufficient. To restore the toxic relation, the behaviour of the community must shift from dependency toward autonomy. While the spatial interventions provide an environment that enables better behaviour, behavioural change can be difficult. Therefore, the strategy, together with certain spatial interventions, has policies that support the community at every stage of behavioural change:

1. **Precontemplation:** The support focuses on awareness. The community is informed about current behaviours, and the potential benefits of behaviour change through initiatives like information sessions.
2. **Contemplation:** In this stage, the community acknowledges the need for change but may be hesitant. The support focuses on encouraging the community.
3. **Preparation:** The mindset shifts from being problem-oriented to solution-oriented. The community becomes curious and wants to experiment. The strategy introduces and encourages ownership. For example, the community begins exploring and testing the management of their own local energy hubs.
4. **Action:** Behavioural change is occurring, but the risk of relapse remains high. It is crucial that the national and municipal governments ensure that all spatial interventions considering the behaviour change are fully working and emphasize the positive benefits of the new behaviour.

5. **Maintenance:** The new behaviour of the community is established. The government must continue to provide attention and support to ensure these changes are fully integrated into daily life and sustained long-term.

Despite the structural approach of the phases, a challenge remains. The strategy has not implemented the actual time that is required for each phase. The duration of the stages for the community are unpredictable and this lack of temporal certainty makes it difficult to align it with the implementation of the spatial interventions.

### **SDGS**

Ten of the seventeen Sustainable Development Goals (SDGs) align with our vision for the community. Specifically, our objectives correspond with SDGs 1, 3, 7, 8, 9, 10, 11, 12, 16 and 17. Each SDG consist of specific action targets to reach these goals.

In this project, the energy transition serves as the drier of change, placing extra emphasis on SDGs 7, 11 and 12. The strategy contributes to the targets of SDG 7 by facilitating renewable energy for housing, utilizing industrial waste heat for residential heating, and renovating homes to reduce overall energy consumption. Furthermore, the implementation of independent energy grids at the neighbourhood level ensures universal access to affordable and reliable energy, avoiding the negative impacts of national grid congestion. The policy Neighbourhood energy & renovation campaign and the policy Affordable retrofit access policy via community centres work together with these spatial interventions to provide further guidance for achieving the targets.

The strategy supports SDGs 11 and 12 through the introduction of the Circular construction and material use policy. The establishment of Recycle & Repair Points further encourages the recycling and reuse of materials. Across all policies, we aim to create awareness of sustainable development and lifestyles. Additionally, the

Clean Industry Admission Policy encourages companies to adopt sustainable practices and reduce their environmental footprint.

To ensure the strategy facilitates a just transition, SDGs 10, 16, and 17 have been integrated. Contributed to equal opportunities there is an environment created where the community has access to the same chances and choices, for example by the development of local mobility hubs.

Prioritising the health and well-being, SDG 3, of the community, both now and in the future, is central to our vision. Recognising that heavy industry currently impacts local well-being, existing policies and the new policy Clean Industry Admission are putting pressure to accelerate the transition toward cleaner industries. To meet the targets of SDG 3, smaller-scale interventions, such as creating green barriers to reduce air pollution, are being implemented.

The creation of the Makers Belt contributes to the targets of SDG 8. This interventions creates an environment, in which creativity, innovation and the growth of small local businesses are encouraged.

## 6.2 Conclusion

**How can peri-urban communities in the IJmond region participate in a just and inclusive energy transition considering their wellbeing, identity, chances and choices influenced by the heavy industry?**

By turning their toxic relationship with heavy industry into one of mutual benefit, autonomy and empowerment.

First, the industry needs to transition towards fossil-free and non-pollution production, which not only improves the wellbeing of the community, but also encourages them to participate in this energy transition. The transition also brings opportunities for the new industry. Creating local hubs and a grid system, could help reduce reliance on national grid expansion and create the possibility to exchange energy with the neighbours of the industry.

Since the community around industry often lack the power or resources to transition, they need help with knowledge, subsidies, resources and aid from housing corporations, creating the chance to go through the energy transition.

Insulating homes and facilitating renewable energy is not enough. A full transition requires the community to make different choices. Like improving non-car mobility networks, such as public transport and the active mobility network. With the addition of greenery, the community will be encouraged to use active mobility as mode of transport. The added greenery is inviting, but also directly improves the mental health of the community, one of the aspects of wellbeing.

The industry identity needs to be freshened up, by creating softer borders, with greenery and a gradual transition from residential to industry with an active border where industry and amenities meet. The identity of the community is not only about industry. Strengthening the existing ties with the dunes, the beach and other nature can ease the transition.

### *Contextual adaptation*

As a case study, some conclusions need contextual adaptation. While the community in IJmond has strong ties with dune and beach, other peri-urban areas would strengthen different natural features or identity elements.

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