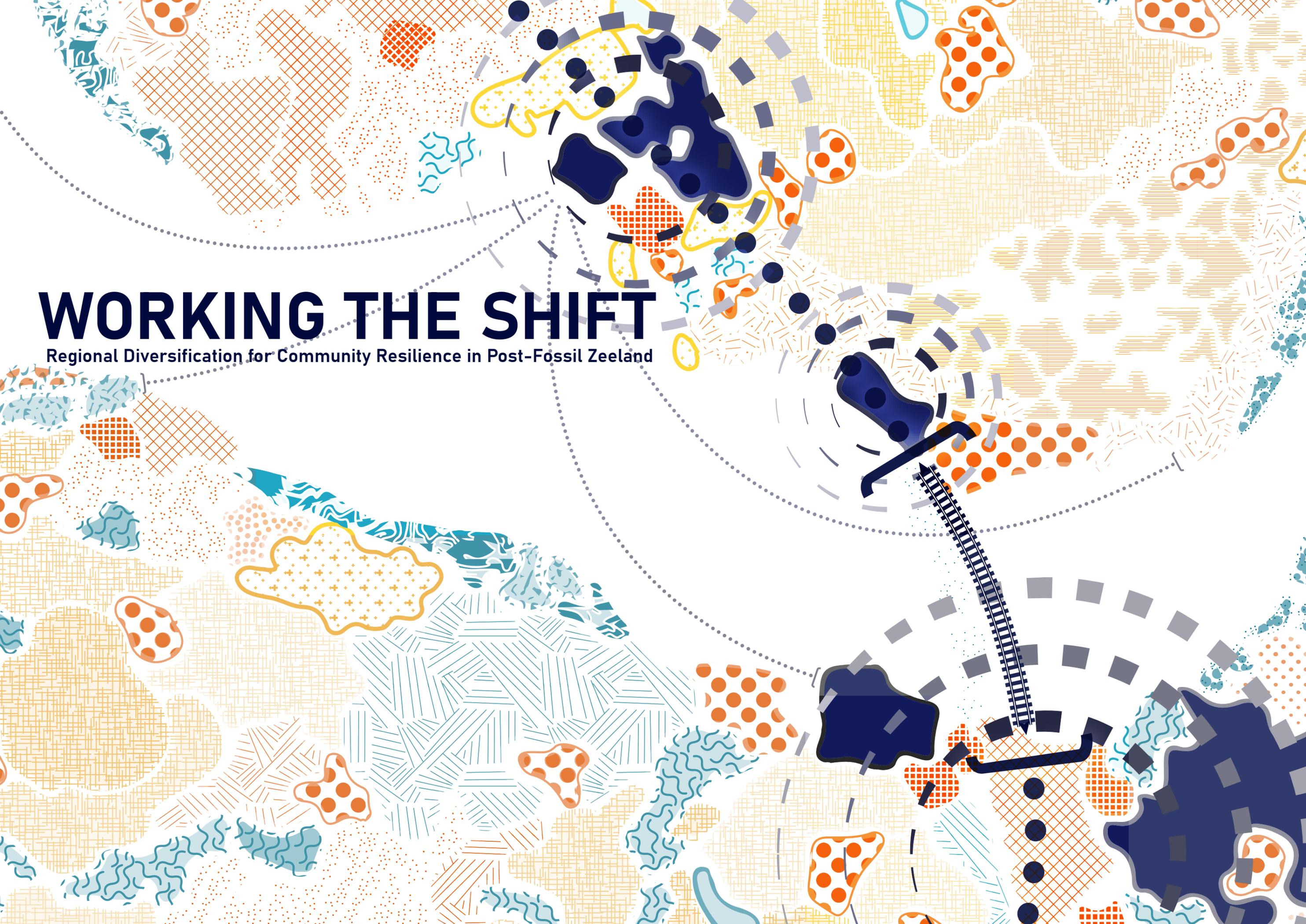


WORKING THE SHIFT

Regional Diversification for Community Resilience in Post-Fossil Zeeland



WORKING THE SHIFT

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Zeeland's landscape is currently dominated by fossil fuel-based industries. There are four big companies that emit huge amounts of greenhouse gasses. As the energy transition progresses and stricter limitations to these polluters are set, they will have to drastically change their processes or phase out. Though necessary, this threatens the livelihood of these practically educated employees. To come to solutions that fit within a just transition, this research explores how spatial transformations can empower these workers.

The study uses spatial analysis, policy and plan review and stakeholder research to come to a vision of diversification of the labor market spaces and voices. This vision is worked out according to three spatial design principles: smart land use, multifunctionality, and evolving place identity. Smart land use prioritizes the redevelopment of brownfields and salinized farmland over using more unused land to develop. Multifunctionality means the use of large open spaces for more than one type of industry. An evolving place identity means that the future is built upon a past that is seen as a vital stepping stone instead of something to be ashamed of.

The results include the conclusion that for a just transition to take place, there is a need for worker-centered policies, retraining initiatives, and spatial strategies that allow individuals to choose their own pathway through the energy transition. This report presents a multisectoral and integrated strategy, working out the sectors of tourism, food production, and clean and green energy production. An expanded mobility network ties these changes together, allowing for better accessibility within and into Zeeland.

By positioning workers at the core of the transition, Zeeland can serve as an example for industrial regions navigating similar structural changes. A more diverse future will make Zeeland more resilient to both the current energy transition as well as other uncertainty and change.

KEYWORDS: Energy transition, regional economy diversification, fossil fuel industry, multifunctionality, spatial adaptation, Zeeland

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I.

INTRODUCTION

ZEELAND SITUATED

Zeeland is located in the southwest of the Netherlands, and currently has a population of 393,048. This makes it the country's least populous province. It is composed of a set of islands and peninsulas and borders South Holland to the north, North Brabant to the east and three regions of Belgium to the south and west. Its population has seen moderate but continuous growth over the last 30 years, with a positive rate of 7.4% in the period between 1995 and 2025. Administratively, Zeeland is divided into 13 municipalities and its capital is Middelburg, with 50,167 inhabitants, although the most populous is Terneuzen, which currently has 55,663 inhabitants (Allecijfers.nl, n.d.).

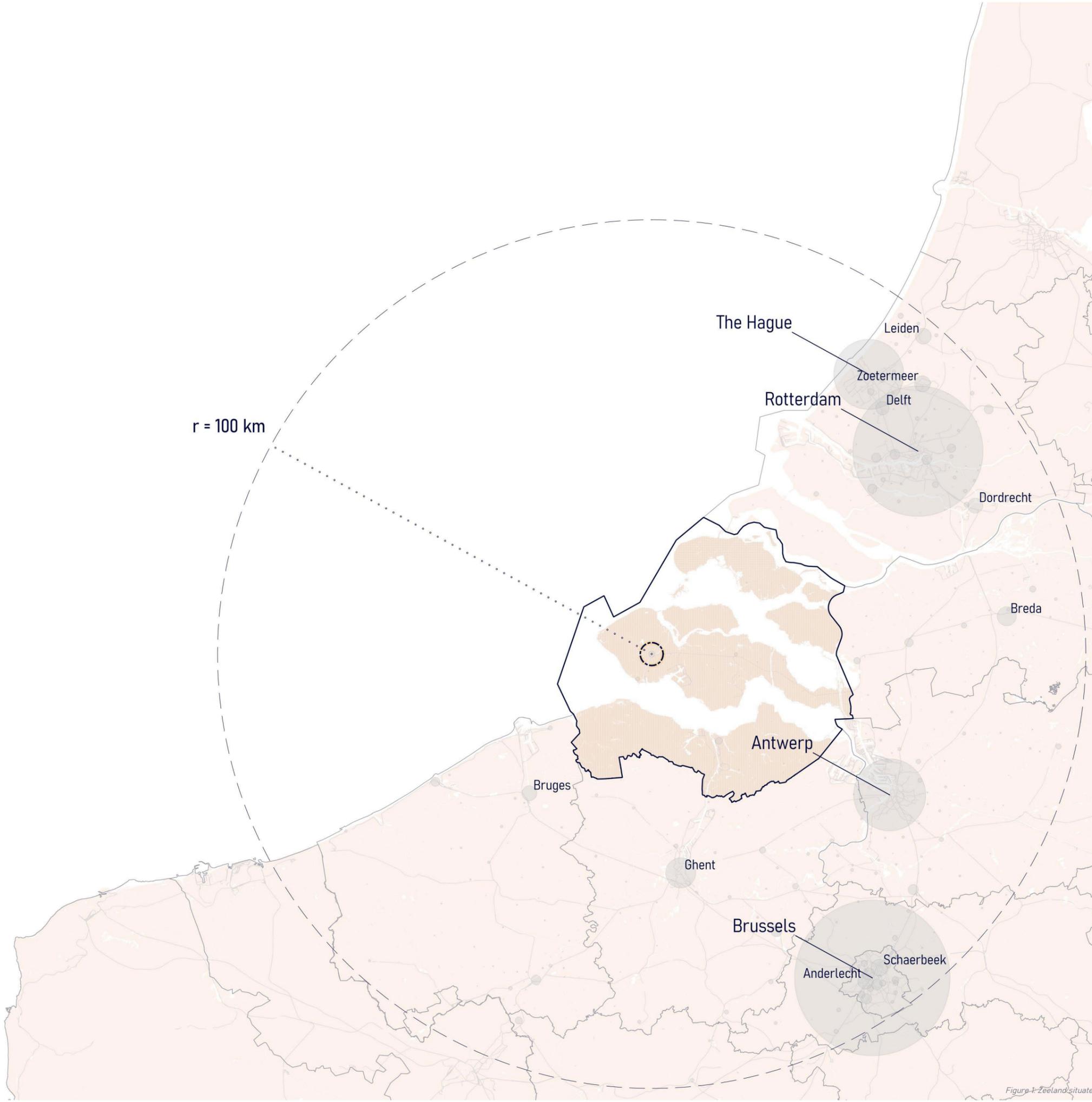


Figure 1: Zeeland situated

REGIONAL HISTORY & MILESTONES

The History of Zeeland: Mobility and Energy Production
 Zeeland has a rich history, especially when considering the profound changes in mobility. In addition, Zeeland plays an important role in the Netherlands' energy production. There are several major energy production sites in Zeeland that are crucial to the country. These factors have not only influenced Zeeland's economic situation, but also shaped Zeeland's society into what it is today.

INDUSTRY IN ZEELAND
 Three major industrial emitters in Zeeland - Yara Sluiskil, Dow Terneuzen and the Sloe power plant - have played an important role in the region's economic growth. The largest industrial clusters are located along the Westerschelde. These companies are not only important employers for the Zeelanders, but the size of the companies also ensures constant expansion of the transport and energy infrastructure.

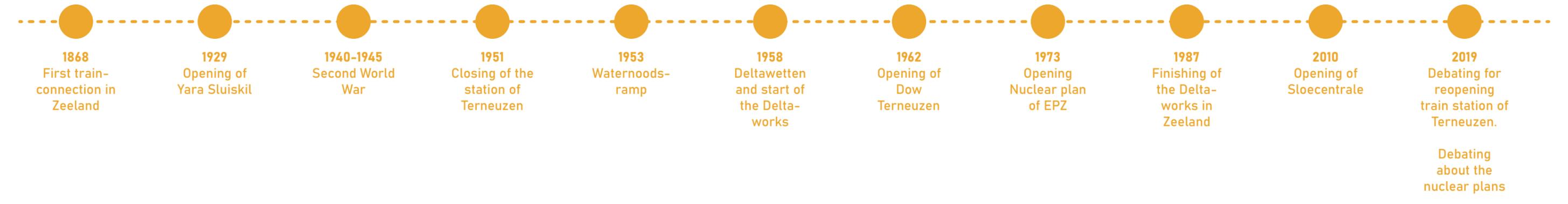
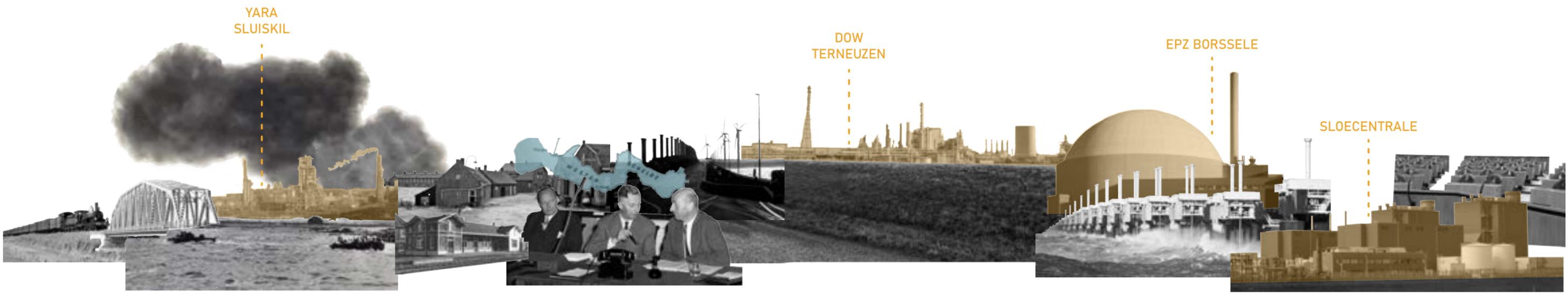
In 1973, EPZ's nuclear power plant was opened in Borssele. The original plan was to close this nuclear power plant in 2003, but it has been postponed several times, and the planned closure is now set for 2033. Given the current climate crisis, the debate on nuclear power is again of great importance in the Netherlands. Currently, there are plans to build two new nuclear power plants in Borssele, to be operational by 2036.

MOBILITY IN ZEELAND
 Mobility in Zeeland received a major impulse when the first rail connection was opened in 1868. The railway line between Bergen op Zoom and Goes connected Zeeland to the national railway network. This new form of mobility led to greater movement of both goods and people, giving a big economic impulse.

After World War II, in 1951, railway line 55 between Terneuzen and Ghent (Belgium) was closed to passenger traffic. In 1964, a side branch of this line was built to transport goods to Dow. Passenger transport was not resumed after 1951, but there are noises from both the Netherlands and Belgium to reopen this line.

The 1953 Waterloodsramp was one of the most profound disasters in Zeeland's history. There was a growing awareness that Zeeland, and the Netherlands in general, was vulnerable to floods. Delta Laws were introduced and the Delta Works began, one of the largest hydraulic engineering projects in the world, aiming to protect the region from floods.

The Delta Works were fundamental to Zeeland's future, as they not only provided protection but also increased mobility. The Delta Works, completed in 1997, significantly improved connections between the islands of Zeeland and with the surrounding provinces.



ZEELAND AT A GLANCE

Zeeland produces food for other provinces as well as export. Agricultural land takes up 45% of the land area (CBS, 2022).

Water has very clearly shaped this province, taking up 40% of the total space (CBS, 2022).

Urban areas span about 10% of the total area, housing nearly 400.000 inhabitants. The province may be the least populous, but it is denser than Friesland and Drenthe (CBS, 2022).

The activities of the port have given Zeeland a place in shipping routes that extend globally.

Forests and relatively natural open land takes up the remaining 5% of land, or nearly 150 km² (CBS, 2022).

Fossil fuel-based industry and their large industrial estates dominate this landscape. They occupy over 13% of the region's workforce (CBS, 2025).

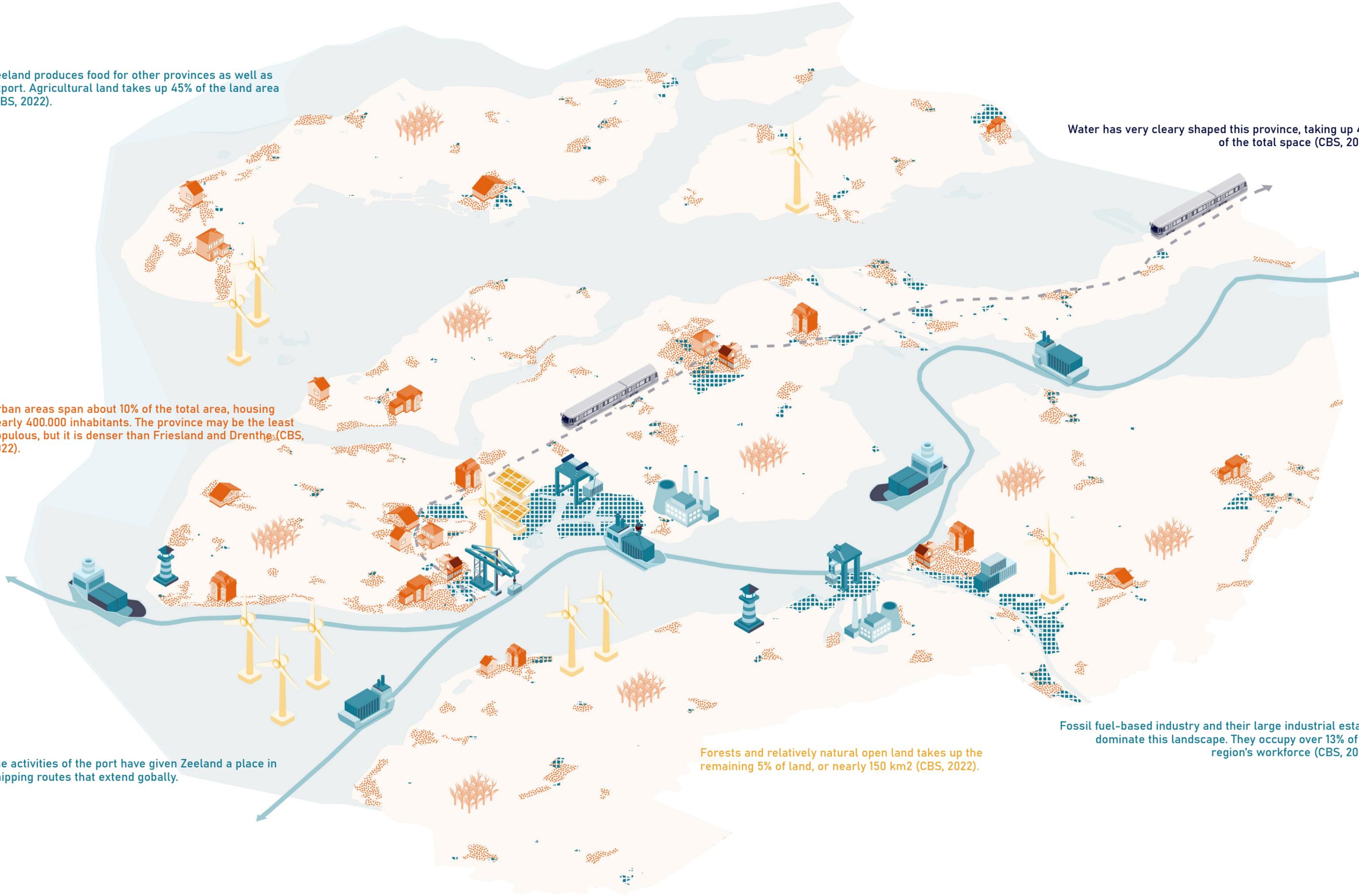


Figure 3: Zeeland at a glance

POLITICS IN ZEELAND

During major socially related transitions, such as the current energy transition, the political landscape is a critical indicator of possibility to enact meaningful change. The positioning of regional political parties, governments and communities towards national policies can significantly impact the outcome of the transition plans. Although guidelines will be drawn up at the national level, plans to implement these guidelines will have to be incorporated into concrete plans by regional bodies.

If the political segment in the region differs greatly from the national segment, this can cause friction between top-down policies and local support. Regional and local coalitions can play a proactive role to relieve this effect partially, for instance by giving their own input to the climate goals from the climate agreement.

Acceptance of the new narrative will strongly depend on trust in politics, opportunities for participation and how visible and affecting the new situation is for current communities.

The current national political landscape is predominantly right-wing. The most recent composition of the cabinet

clearly shows that energy transition is by no means a priority in government policy. As much as EUR 1.2 billion is being cut from the climate fund. This development is in sharp contrast to the urgency of the climate crisis.

Zeeland traditionally votes slightly more conservatively than the national average, which was evident from the most recent elections as well.

For this reason alone, it is critical to actively attempt to increase community support for the energy transition. With national climate policy lacking ambition in many areas and large-scale policy plans failing to appear, the perceived responsibility is increasingly shifting towards the regions. It is up to provincial and local governments, civil society organisations and concerned citizens to create movement. The energy transition will only succeed if there is involvement and trust at the local level. This requires an approach aligned with Zeeland's identity.

ELECTION RESULT NATIONAL, 15 NOVEMBER 2023

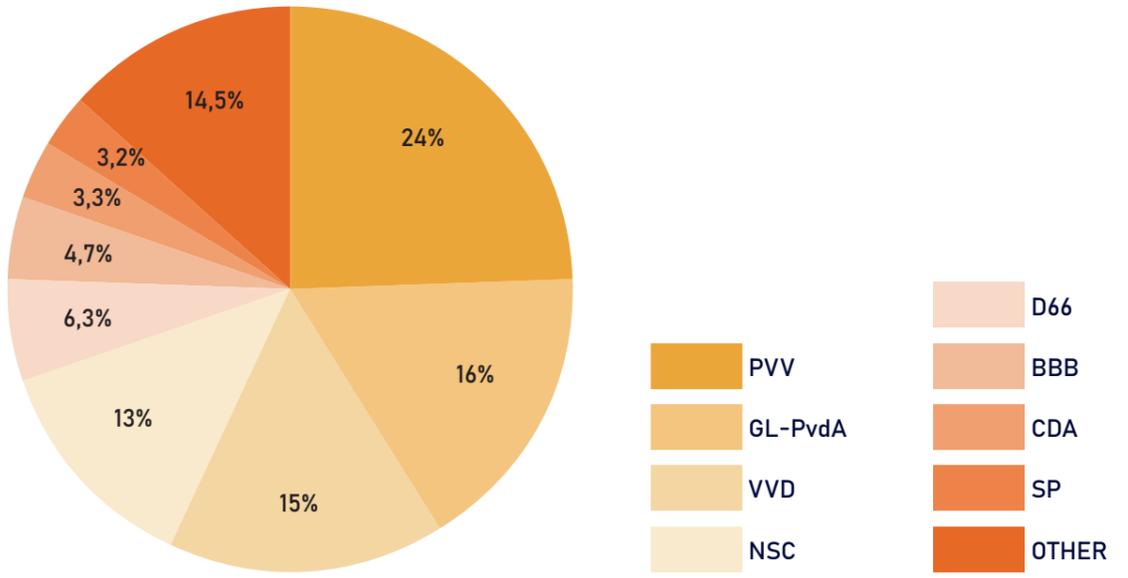


Figure 5: Election result National. Adapted from (Allecijfers.nl, n.d.).

ELECTION RESULT ZEELAND, 15 NOVEMBER 2023

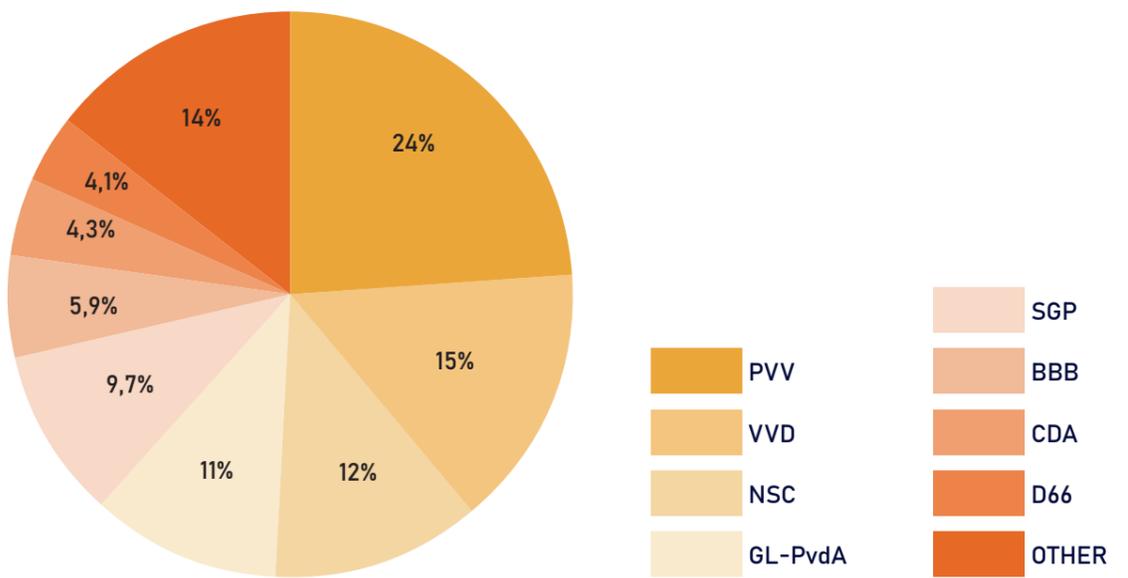


Figure 6: Election result Zeeland. Adapted from (Allecijfers.nl, n.d.).

NATIONAL ENERGY SYSTEM

The Dutch energy system serves as the cornerstone of the nation's economic strength and features numerous aspects of significant importance to both the European and global energy landscape. It is distinguished by its 'open' nature, with a complex energy balance, as illustrated in Figure 8, characterized by the vast daily flow of energy. The global map displays the 32 largest energy flows imported annually in the form of fossil fuels. Among these, the USA, Belgium, and Norway hold the top three positions as exporters. The Netherlands imports more than 1,344,000 TJ of natural gas (18%) and over 5,880,000 TJ of oil and petroleum products (78.5%) annually, with the USA alone contributing 19.3% (Eurostat, 2023). In terms of domestic production, energy is primarily generated from fossil sources, yet renewable and clean energy sources are at the heart of the political agenda. The country is steadily developing a robust system of mixed renewables, both onshore and offshore. The total energy imported and extracted, labeled as "transformation input" in Figure 8, is then processed for two main purposes: to produce refined oils and petroleum and to generate electricity.

Concerning the first category, the Netherlands ranks third in Europe and is home to the two largest refineries, both located in the Europort of Rotterdam (International Energy Agency [IEA], n.d.). With respect to electricity production, the primary source is gas-fired power plants, complemented by renewable sources, with offshore wind farms playing a prominent role. These farms are expected to experience major developments, making them a key component to ensure the long-term sustainability of the national energy system. Once processed, the great majority of energy is exported predominantly in the form of refined oils and petroleum, but also increasingly as electricity, with a growth trend of +525% over the period between 2000 and 2023. On the consumption side, the industrial sector accounts for the largest share, with 25.3% of total energy use, primarily driven by the chemical and petrochemical industries (IEA, n.d.). The following subchapter shows how Zeeland reflects these national patterns, as it stands out as one of the key hotspots for import, offshore landing, export, and consumption.



Figure 7: Yearly imports fossil-fuel energy sources

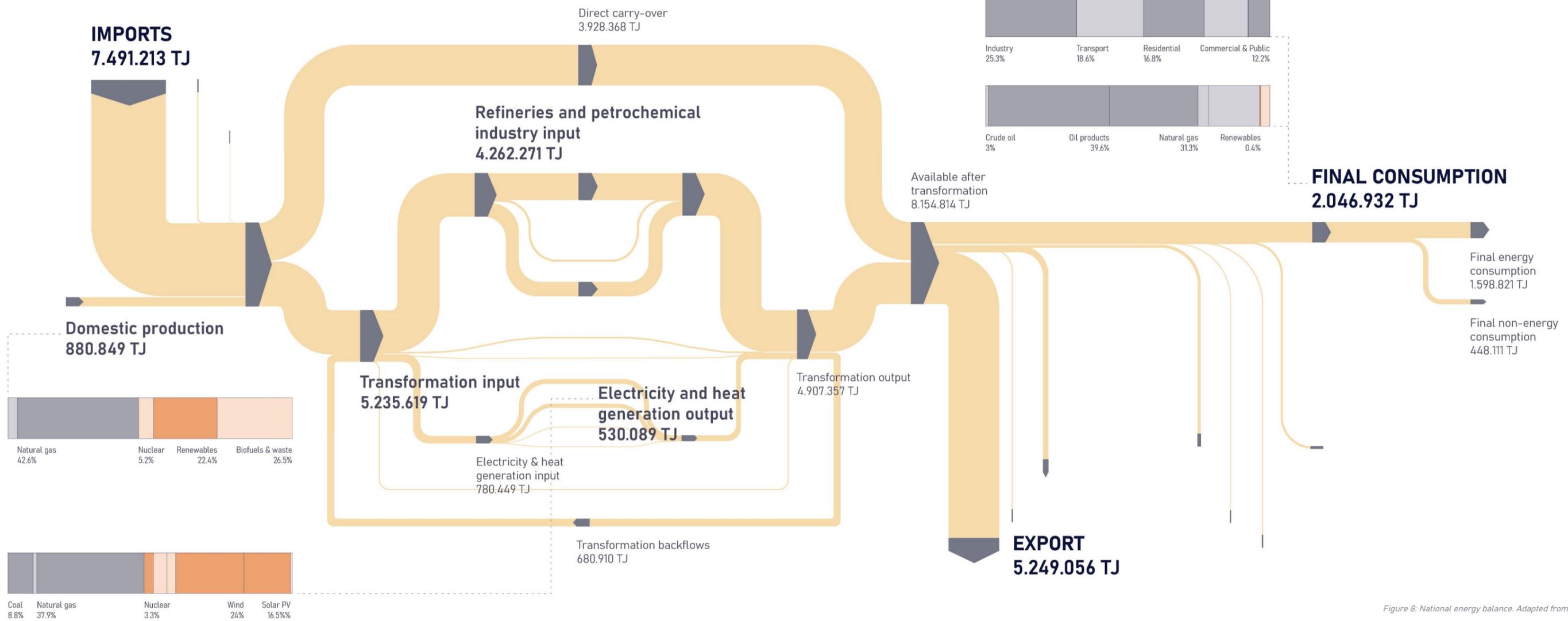


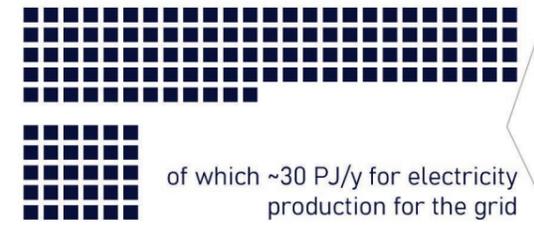
Figure 8: National energy balance. Adapted from (Eurostat, 2023).

REGIONAL ENERGY SYSTEM

Legend:

- Administrative boundaries
 - Power plants and generators
 - ✕ Wind turbines
 - Solar parks
 - Ocean energy projects
 - Nuclear Plants
 - Dutch power cables North sea
- Electricity infrastructure network
- 20 / 33 / 50 kv
 - 150 kv
 - 380 kv
 - Pipe strips

Current demand of Methane ~142 PJ/y



Offshore windfarms Borssele 1502,5 MW
Electricity production ~24,3 PJ/y

Installed wind energy capacity ~600 MW
Electricity production ~ 6,7 PJ/y

Installed solar energy capacity ~690 MW
445 MW on land
245 MW on roofs
Electricity production ~ 2,7 PJ/y

SLOE Centrale 870 MW
Electricity production ~8,15 PJ/y
through natural gas

Zeeland Refinery
Grey hydrogen production ~4 PJ/y
through SMR

EPZ Centrale (485 MW)
Electricity production ~4,6 PJ/y
through uranium

DOW - ELSTA Centrale (460 MW)
Electricity production ~4,85 PJ/y
through natural gas

YARA
Grey hydrogen production ~34 PJ/y
through-SMR

Figure 9: Regional energy system. Using data from CE Delft and SDR.

FOUR MOST POLLUTING COMPANIES

Industry is the most prevalent sector in Zeeland, employing about 25 000 people. In their labor market report of 2021, UWV recognizes the industrial sector in Zeeland as overrepresented compared to a national standard. The wide open spaces and port accessibility make the province suitable for large scale production, which is primarily focussed towards export (DG Regio, n.d.).

198 900 people are employed in Zeeland, **13,1%** or **26 055** of those are in industry (CBS, 2025).

The (petro)chemical subsector in this area is one of the largest of northwest Europe (Meiresonne, n.d.). The processes of these industries emit pollutants. The European Trading System or ETS regulates greenhouse gasses of major polluting companies in CO2 equivalent. In Zeeland, there are 4 major polluters that stand out among the rest.

THE SLOE CENTRALE is a gas-fired power plant with an output of 870 MW which is about 2 million households worth of power (EP NL, 2025).

THE ZEELAND REFINERY makes fuels from crude oil, half of which is exported to Belgium. The rest stays in the Netherlands or goes to Germany. They employ over 400 people and are also active in education (Zeeland Refinery, 2022).

DOW makes plastics and raw materials in their 16 factories, which occupy 440 hectares total. They employ around 3600 people here, which is 10% of the regional workforce (*Dow in De Benelux*, n.d.).

YARA works with CO2 to make different types of products (e.g. mineral fertilizers and dry ice) catering to horticulture and drink production companies. They loaded 5 million tonnes of product in 2022. They have 700 employees (Yara Sluiskil, 2018).

Because these big polluters will have to change their processes drastically or even close, these companies and their workers have a stake in the transition.

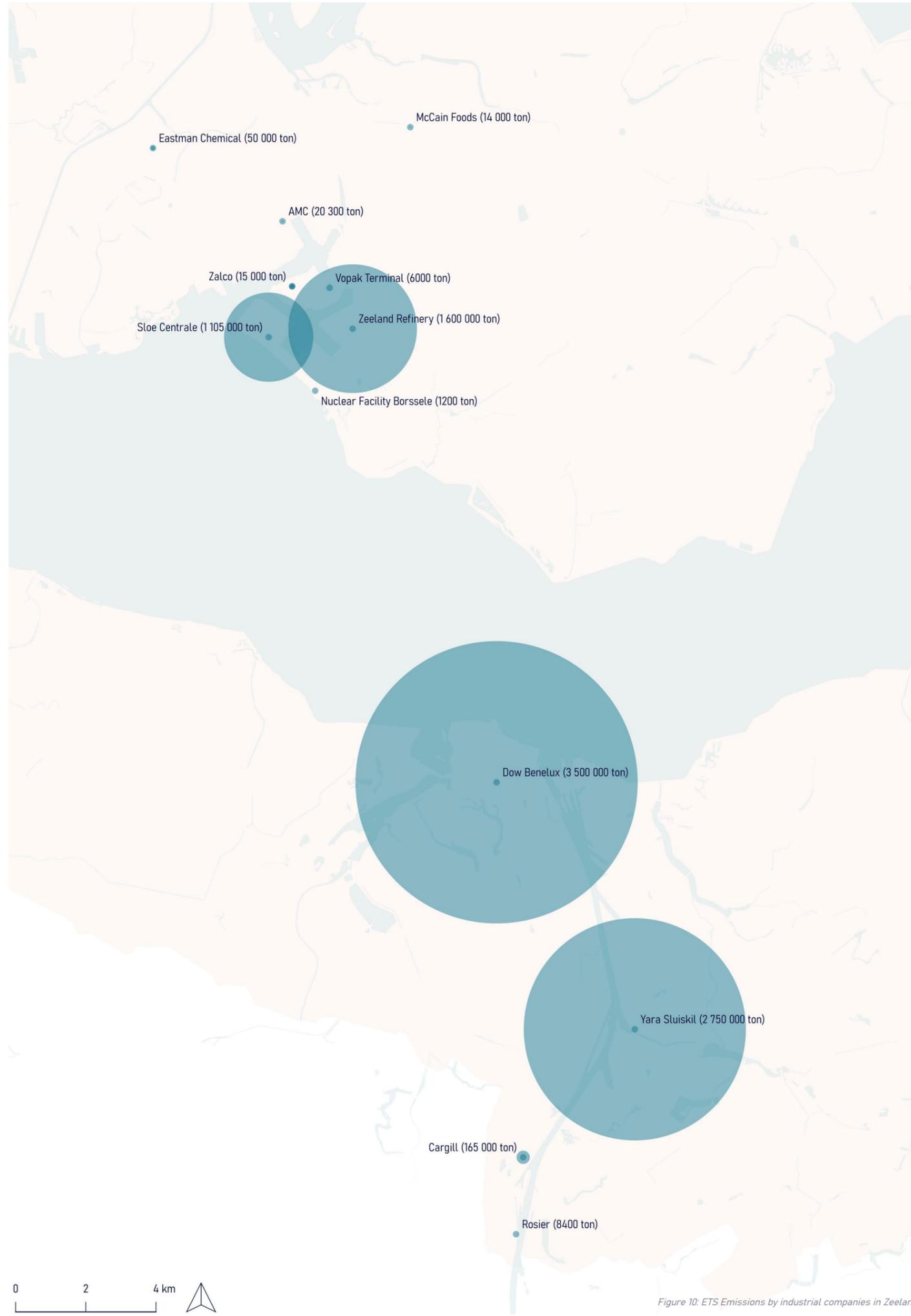


Figure 10: ETS Emissions by industrial companies in Zeeland

COMMUNITY OF 5.000 INDUSTRY WORKERS

The changes happening in the industry are not limited to the shifting of companies and their activities, but also the impact this has on their employees. Practically trained workers will **feel these changes the most**, due to their specialized training. They hold the **highest risk of jobloss** due **drastical changes**. These employees are **unable to influence** decision making processes, even though these decisions will shape **their future** the most.

Figure 11 shows the distribution of this community in terms of employers, worktypes, and age brackets. The biggest employers for our region are DOW, Yara, Zeeland Refinery, and EPZ. DOW is by far the largest, with 3,550 workers. Yara holds second place with 740 employees, Zeeland Refinery has 400, and EPZ has 391. This demonstrates how a large percentage of jobs are dependent on a small number of businesses. Thousands of individuals will be directly impacted if these companies alter the way they conduct business.

The second chart focuses on job types, splitting the workforce into physical laborers and office workers. The physical workers are the ones most at risk because they are practically educated, making it harder for them to choose different career paths. Office workers often have more flexibility since their skills can transfer more easily to new roles. If there is a lack in training programs or alternative jobs, they could struggle to find work in the future.

The third chart shows 39% of the workforce being 50 years or older. They will go through the transition, but in further chapter they will enter retirement. The younger workers, making up 22% of the community, are the ones who will be hit the hardest because this transition will define their entire working future. The 30-50 age group is also a major factor since they are right in the middle of this shift and will have to adjust while still being fully active in the workforce.

This shift does not cover technology and the transformation of industries exclusively. Real **people** are being **subjected to** a complex set of **changes** over which they have extremely **limited agency or control**. Without timely intervention and the provision of viable solutions, a significant portion of the **workforce** risks being **left behind**.

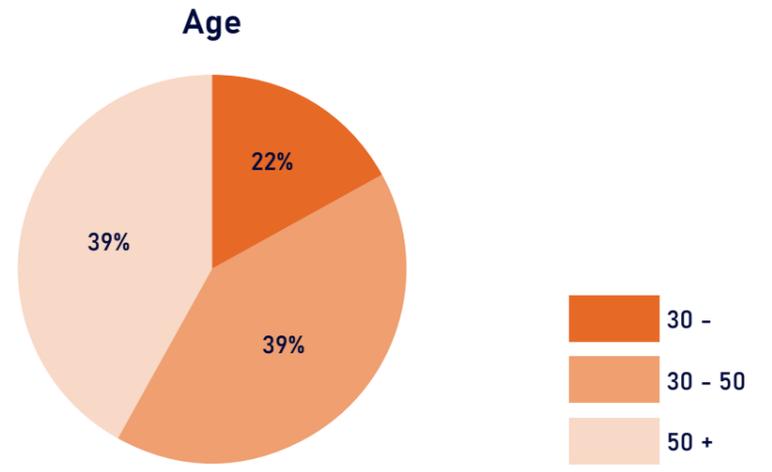
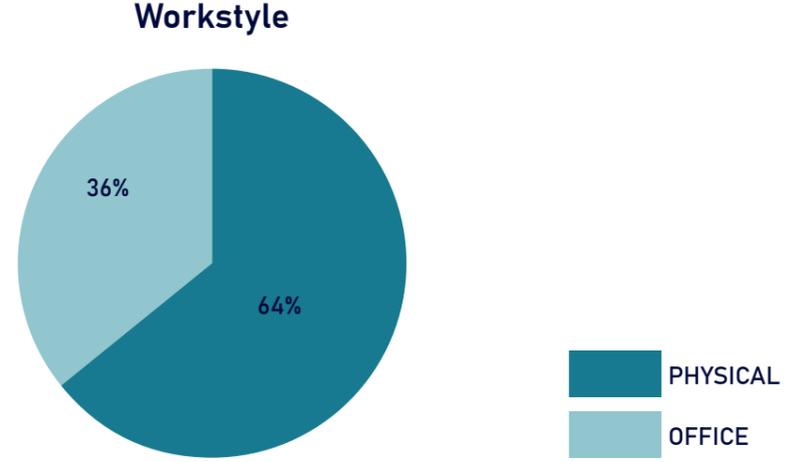
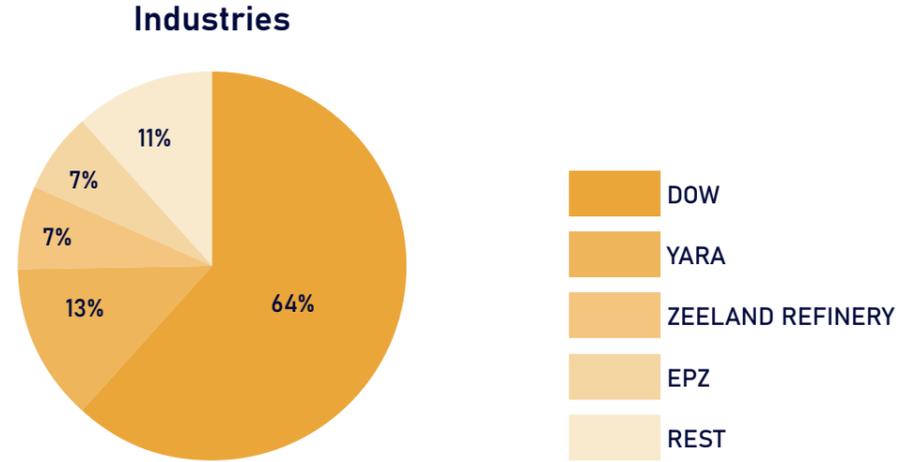


Figure 10: Introduction community. Made using seperated AI generated elements.

Figure 11: Statistics fossil-fuel workers in Zeeland.

INTERVIEWS

The following interviews are meant to convey some of the sentiment of employees at the four most polluting companies that were mentioned before. They were asked about their thoughts toward the energy transition and how it relates to their work. These are interpretations taken from the full interviews, the literal answers can be found in Appendix 1.



Carlo (23, DOW)

With the loss of jobs that this energy transition brings, my biggest worry is that there might not be **enough work in other sectors**. The decarbonisation of industry will happen, and with this, hydrogen is likely to increase as a renewable energy carrier.



Matthew (25, Zeeland Refinery)

With the energy transition, there is a good chance the refinery would have to close. I am not sure I will still have a job after the changes. Some type of **retraining** might be necessary, especially when moving to a different sector. I am also worried about prices for fuel that will increase. To make this transition successful, we need clear communication and subsidies.



Mitchell (25, DOW)

These industries are responsible for a lot of emissions, but you cannot deny their economic value. They should not disappear without replacement. I fear that there is not enough support from the government to change into different jobs if that becomes necessary. This job does not have a lot of sentimental value for me, and I do see **the energy transition as an opportunity** to possibly get into a new job. I definitely see a future in clean energy, but it will take a lot of time!



Daniel (28, Yara)

We don't talk a lot about the energy transition, because we work for the food industry which will stay an important sector. There will definitely be drastic changes in the processes. I would not mind to get into a **different type of work**, as long as I am not inside too much.

PROBLEM STATEMENT



Figure 13: Elevation collage transitioning landscape



Figure 14: Elevation collage 2 transitioning landscape

As part of the energy transition, fossil fuel-based companies that dominate the homogenous (industrial) landscape of Zeeland will have to drastically change their process or go out of business. About 5.000 jobs will change or be lost at the four biggest users and producers of fossil fuels: DOW, Yara, the Zeeland Refinery and the Sloe Centrale. With limited opportunities outside the industrial sector, the community of workers face significant challenges in finding alternative job opportunities, highlighting the necessity of economic diversification and retraining.



II.

METHODOLOGY

RESEARCH QUESTION & THEORETICAL FRAMEWORK

The main research question is answered by means of combination of the three subresearch questions. These sub research questions do not follow eachother chronologically, but instead take place simultaneously and impact one another continuously.

In order to answer these research questions, the following methods of research will be used:

- Spatial analysis through QGIS
- Literature review
- Exploration of stakeholder interests
- Review of existing regional and national plans

Empowering industry workers shifting from fossil fuels is essential to the main research question. What does this mean?

- Providing different types of employment options near places of residence.
- Increasing the availability of housing options.
- Providing easy mobility options between places of residence and places of employment.
- Cultivating accessible public recreational areas.
- Recognizing the fossil-fuel-based industrial past as a vital stepping stone, not a source of shame.

Because this project spans a long timespan, reaching well towards 2100, two different types of analysis have been distinguished. First, explorative research is done to find possible answers to the research questions based on existing situations. Secondly, forecasting analysis is done to make evidence-based predictions of what the future might look like.

THEORETICAL FRAMEWORK

Polycentricity

Although the meaning and implementations of polycentricity vary, partially based on the scale it is applied to, its main goal is to balance economic growth with cohesion. It is as much about the spatial effect of nodes with a certain amount of distance between them as it is about the flows between those centres (Meijers, 2008).

Community resilience

Many pieces of literature look at community resilience in regard to disasters and other extreme events. Conceptually, it applies to drastic changes such as the energy transition as well. Resilience in this case would refer to a community's ability to be flexible and adapt to changes (Berkes & Ross, 2012)

Related Variety

Related variety speaks to the theory that a region may benefit from cultivating a variety of sectors in order to learn from knowledge spill-overs. However, these learning opportunities occur mostly between sectors that share a knowledge base, unlike in un-related variety. (Content & Frenken, 2016).

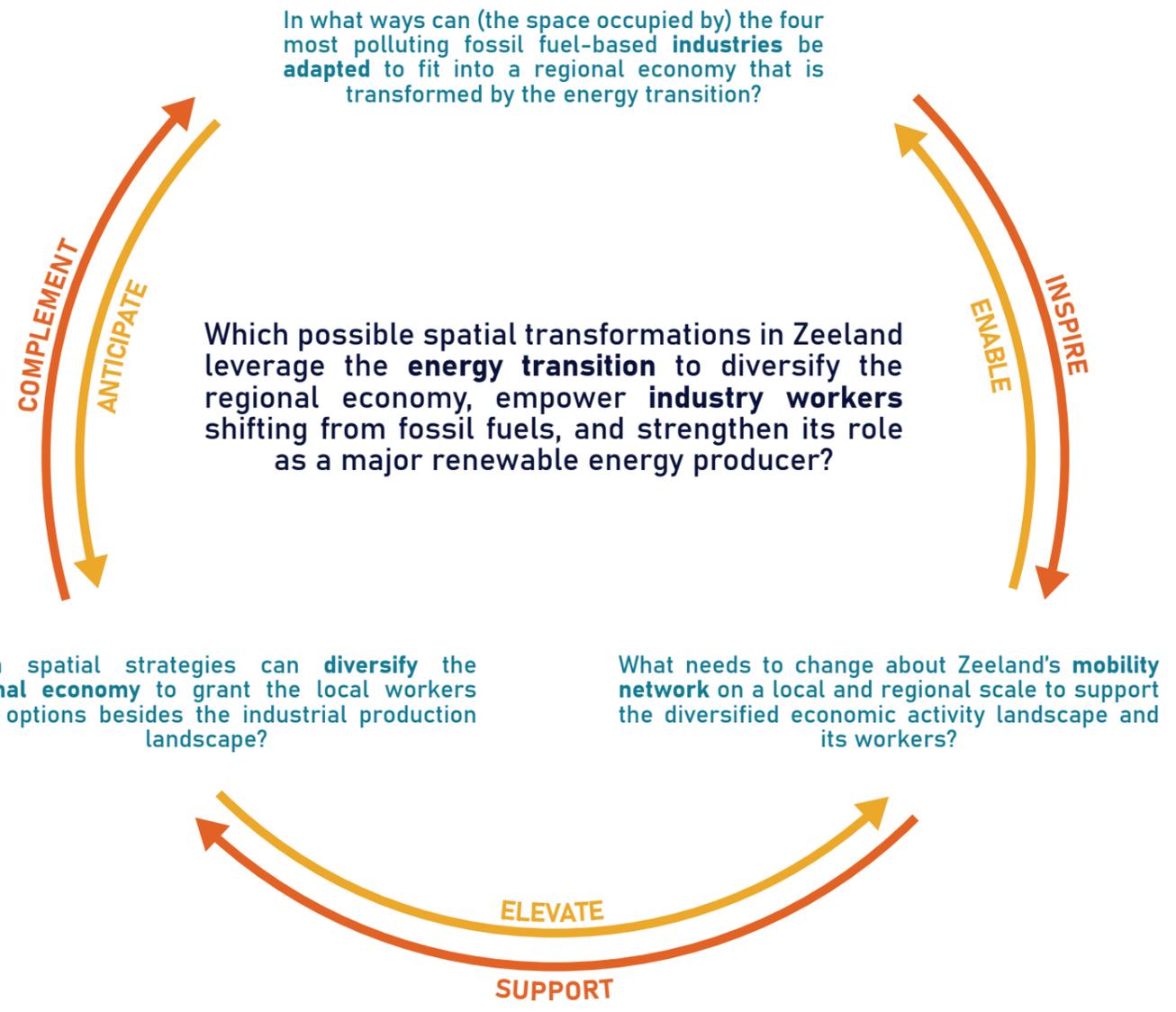


Figure 15: Research question diagram

CONCEPTUAL FRAMEWORK

In order to achieve a resilient community, an integrated approach is needed in which spatial, economic and social aspects come together. The conceptual framework is designed around the three guiding themes: Clean/Green Energy, Heritage & Landscape and Connectivity. The overall goal is for Zeeland to diversify. This is why diversification is shown as an overarching dimension to the framework.

Clean/Green Energy and Heritage & Landscape are both strongly embedded in Zeeland's spatial environment and are therefore inextricably intertwined, also relating to the region's identity. Their spatial origins mean that together they set the foundation for future developments in the region. The third theme, Connectivity, surpasses this spatial dimension. It covers not only physical mobility, but also the exchange of knowledge and co-operation. Connectivity should form a catalyst towards integral and inclusive transition for the community.

The connection between the guiding themes is represented by an arrow, which shows the movement of the community through the themes within a more diverse Zeeland. This arrow manoeuvres through different dimensions and symbolizes the development from the community towards a more resilient future.

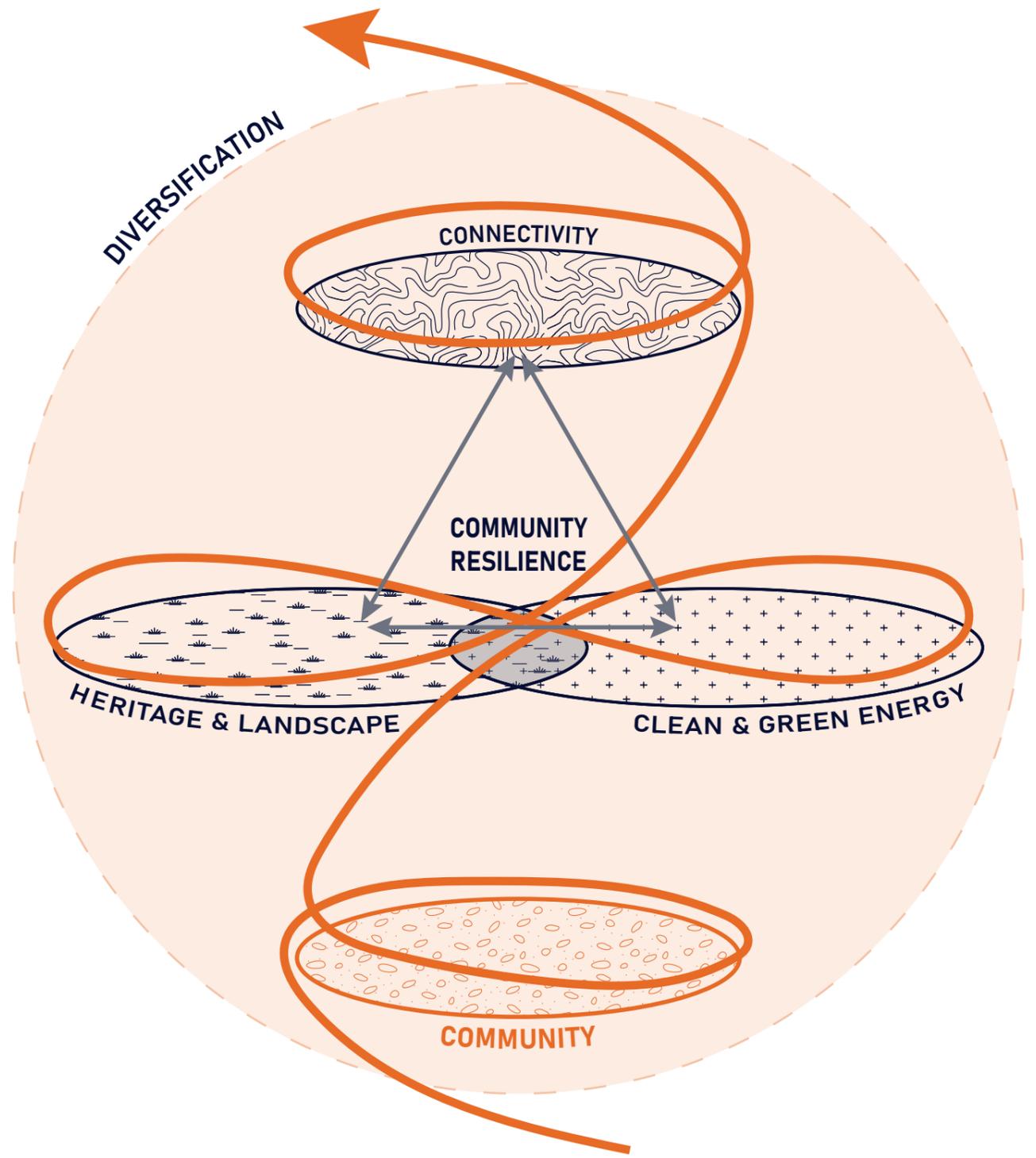


Figure 16: Guiding themes, Working the Shift

Figure 17: Conceptual framework, Working the Shift

EXPLORATIVE MATRIX

The guiding themes in this matrix were derived from the conceptual framework: clean and green energy, heritage and landscape, and connectivity. These themes are rooted in the socio-spatial conditions observed during site analysis: regional dependency on fossil fuel industries, the vulnerability of mono-economies, but also the need to acknowledge that which has existed here for a long time.

A set of overarching design principles are formulated that lead the investigation and will shape the future interventions. These design principles are based on the shared values of urbanism, accumulated through critical discussions, regarding the qualities that should be maintained throughout the vision and strategy. These principles drive the central ambition of the project.

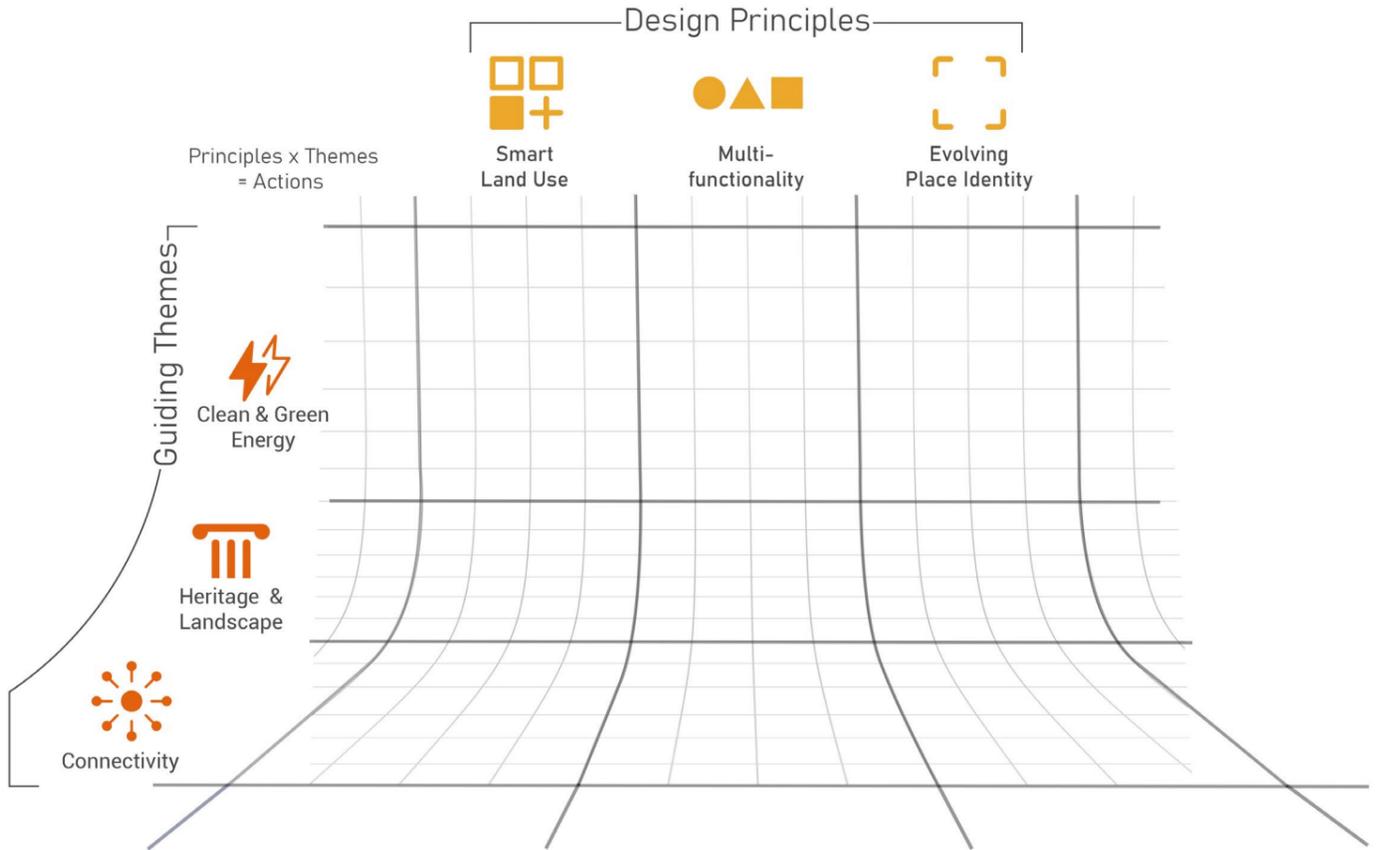
The Matrix was conceptualised as cross-referencing framework between the guiding themes and the design principles for any future spatial ideas. The matrix is an explorative method for the construction of the vision for Zeeland.

WORKING THE MATRIX

Each cell within the matrix represents a potential intersection where a guiding theme can be operationalized through a specific design principle. This results in a space to imagine for possible actions and their outcomes, as well as associated synergies, conflicts, and syntheses.

Its purpose was keeping the design process critical and continuously aligned with the core vision and navigate complexity. It fostered conversation, creativity, and cohesion for the project team, but as a step ahead it can also be used in envisioned future engagements with communities, stakeholders, and planners. It is not meant to be read as a fixed or prescriptive table, but rather as an open-ended and adaptable device, to help designers ask the right questions at each intersection of theme and principle. It functions as a generative tool to support decision-making processes and encourage interdisciplinary thinking. The tool tries to invite designers and stakeholders to trace relevant connections, identify synergies, and foreground the plurality. It cultivates alignment between long-term regional ambitions and everyday spatial realities by ensuring that the principles guiding action are grounded in the themes that reflect the region's social, ecological, and economic priorities.

As such, the matrix is positioned not only as a reflective framework but also as a foundation for continuity throughout the design process. It is used to structure future design strategies, enabling the translation of abstract values into spatial narratives and interventions that are responsive to the needs, capacities, and resilience the community.



Design Principles

Smart Land Use



Prioritising brownfields and urban areas for development before taking up more space

Multi-functionality



Designing spaces that serve multiple purposes to blend energy production, manufacturing, education, and more

Evolving Place Identity



Appreciating Zeeland's past, allowing places to adapt while maintaining and building upon their essence

Figure 18: Design principles, Working the Shift

Figure 19: Design matrix, Working the Shift



III.

EXPLORATIVE ANALYSES

MOBILITY & CONNECTIONS

Zeeland's transportation system is characterized by low accessibility and long travel times from other parts of the Netherlands, for example, taking around 2 hours by train from Rotterdam to Middelburg. The region is served by only one highway, and the railway connection enters solely from the main mainland, limiting overall connectivity. Although bus and ferry services are available, they do not cover the territory extensively. In contrast, Zeeland excels in soft mobility: its extensive network of cycle paths and well-maintained pedestrian infrastructure makes cycling and walking very pleasant. Additionally, the area is connected by bus to Ghent in Belgium, and there are several disused railway segments that could be reopened to improve connectivity.

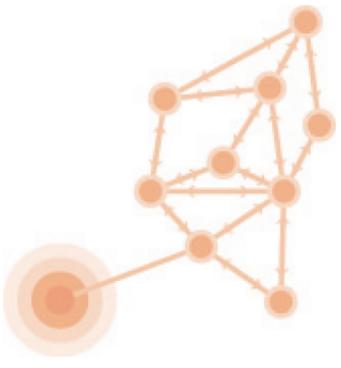


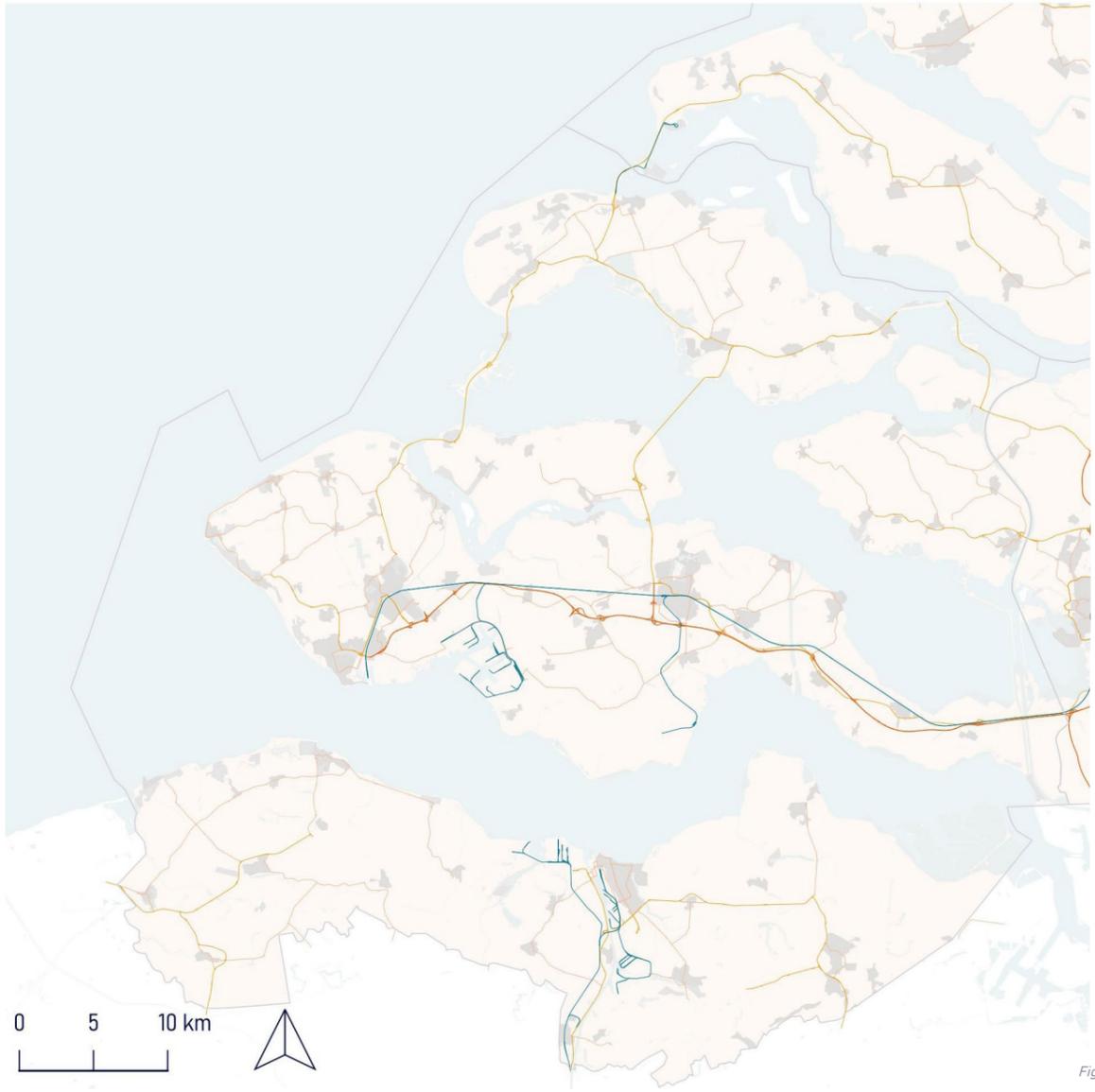
Figure 20: Disconnection of Zeeland diagram

Legend:

-  Administrative boundaries
-  Residential areas
-  Railways
-  Highways



Figure 22: National mobility infrastructure



Legend:

-  Administrative boundaries
-  Residential areas
-  Railways
-  Highways
-  Primary roads
-  Secondary roads

Figure 21: Regional mobility infrastructure

NATURE & PROTECTED ENVIRONMENTS

This map presents important environmental layers. The first layer shows the Natura 2000 sites. In Zeeland, there are 16 designated Natura 2000 sites, many of which are predominantly aquatic environments. These sites shape a network aimed at protecting biodiversity and ensuring the long-term survival of different species under the framework of European environmental directives (Zeeland.nl, n.d.).

Complementing the Natura 2000 are compensation projects. These projects are part of the "Nature Package Westerschelde", with the goals of ecological restoration and habitat enhancements. The interventions under this package involve strategic actions such as the restoration of estuarine wetlands, which not only improve water quality and nature-based flood protection, but also create recreational and educational opportunities for local communities and tourists (Zeeland.nl, n.d.).

The National Park Ooster Scheldt represents a key conservation area where efforts to protect both terrestrial and aquatic ecosystems are consolidated under a unique management plan. This approach talks about efforts to integrate local conservation practices with broad regional planning initiatives, highlighting high awareness of the Zeeland Province and other authorities about the importance of regional environment and ecosystems (NP-Oosterschelde.nl, n.d.).

The Nature Management Plan 2025 is rooted in national legislation. This plan outlines a strategic framework for environmental governance, ensuring that regional actions are in compliance with national standards and objectives (Zeeland.nl, n.d.; Zeeland Dataportaal, n.d.).

Lastly, even if not represented as a map layer, the UNESCO Geopark Schelde Delta initiative deserves attention. Recognized for the unique attributes of its geological and cultural landscape, the Geopark promotes a better understanding of the region's natural processes and heritage. The mission here is to link scientific knowledge, education, and sustainable tourism with spatial development goals (Zeeland.nl, n.d.).

This analysis highlights individual conservation initiatives and how efforts on multiple scales are linked to safeguard Zeeland's rich natural heritage.

- Legend:**
-  Administrative boundaries
 -  Natura2000 Sites
 -  Oosterschelde National Park
 -  Nature Conservation Act
 -  Nature Management Plan 2025
 -  Other natural / semi-natural areas
 -  Compensation nature projects
 -  Vulnerable nature
 -  Meadow birds
 -  Wet ecological connections
 -  Watercourses

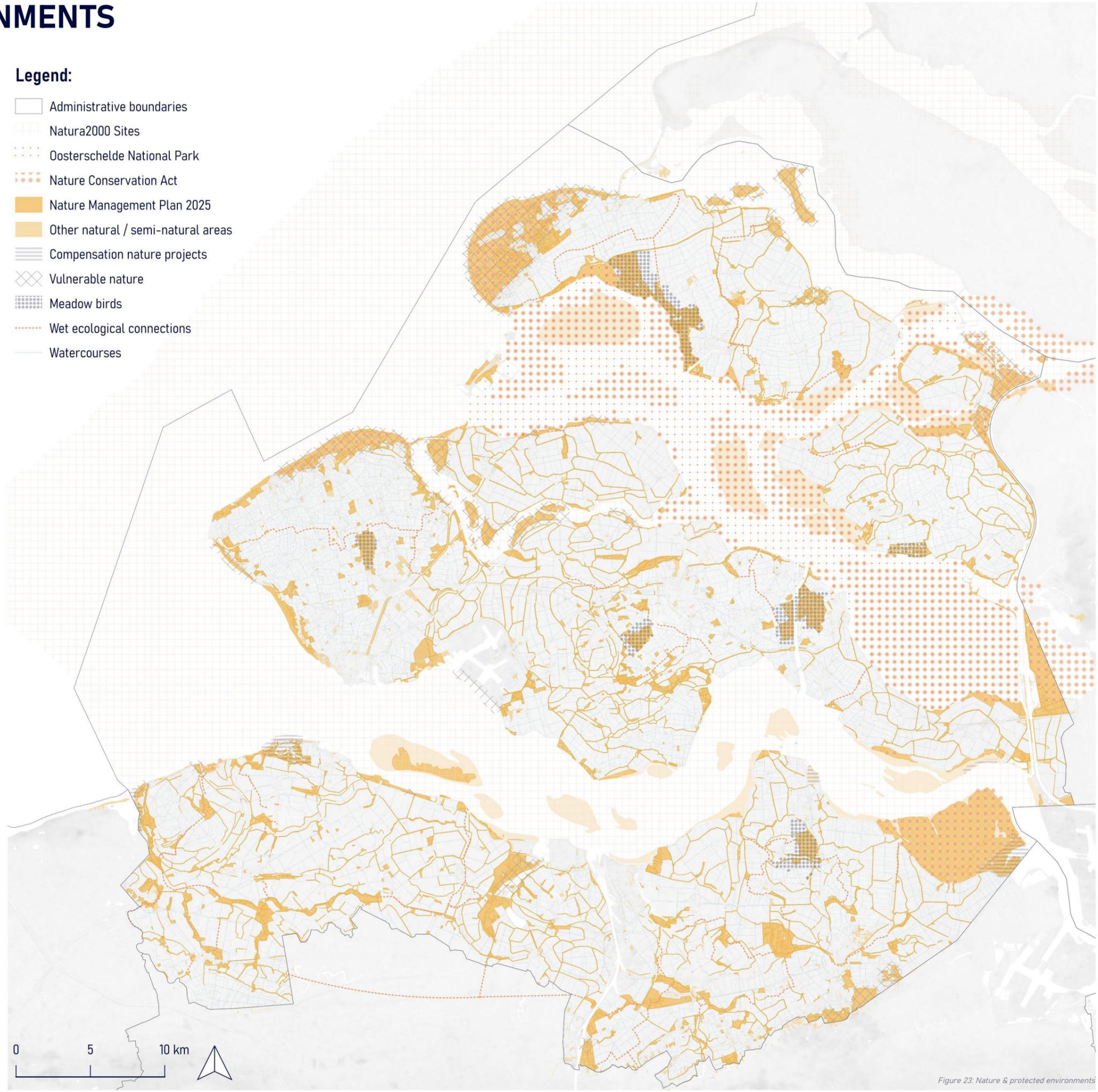


Figure 23: Nature & protected environments

HERITAGE & LANDSCAPES VALUES

This map represents the set of elements belonging to both the natural and built environment that constitute the identity or cultural values of the region. Natural areas are once again highlighted, this time with greater emphasis on recreational nature, namely areas that have attractive potential and are already used for leisure and outdoor activities. It is evident that this category of natural areas is predominantly found along the regional coasts, which are favored destinations for both tourists and local residents.

A particularly important layer in this case is the one representing linear elements of landscape and historical-cultural significance. This unique dataset, developed by the Province of Zeeland, includes all the "lines" visible in the landscape that form an integral part of the aesthetic and identity values of the region. Examples of these "lines" include major civil engineering works, such as the Delta Works and the Zeeland Bridge, the ancient walls of settlements, the contour lines of dune landscapes, and other significant natural and semi-natural formations (Province of Zeeland, 2023).

In addition, the map features a series of valuable elements of the built environment, such as historic and aesthetically significant farms, castles and fortresses, windmills, and other heritage structures.

The Province of Zeeland considers cultural heritage to be a living part of the region's identity. Through various programs and initiatives, it aims to preserve and strengthen both tangible and intangible heritage, linking past and present to shape a shared future (Zeeland.nl, n.d.).

- Legend:**
-  Administrative boundaries
 -  Nature Management Plan 2025
 -  Recreational nature
 - Valuable elements of the built environment**
 -  Landscape and cultural linear elements
 -  Castles - forts - ruins
 -  National monuments
 -  Attractions
 -  Lighthouses
 -  viewpoints
 -  windmills
 -  Valuable farms

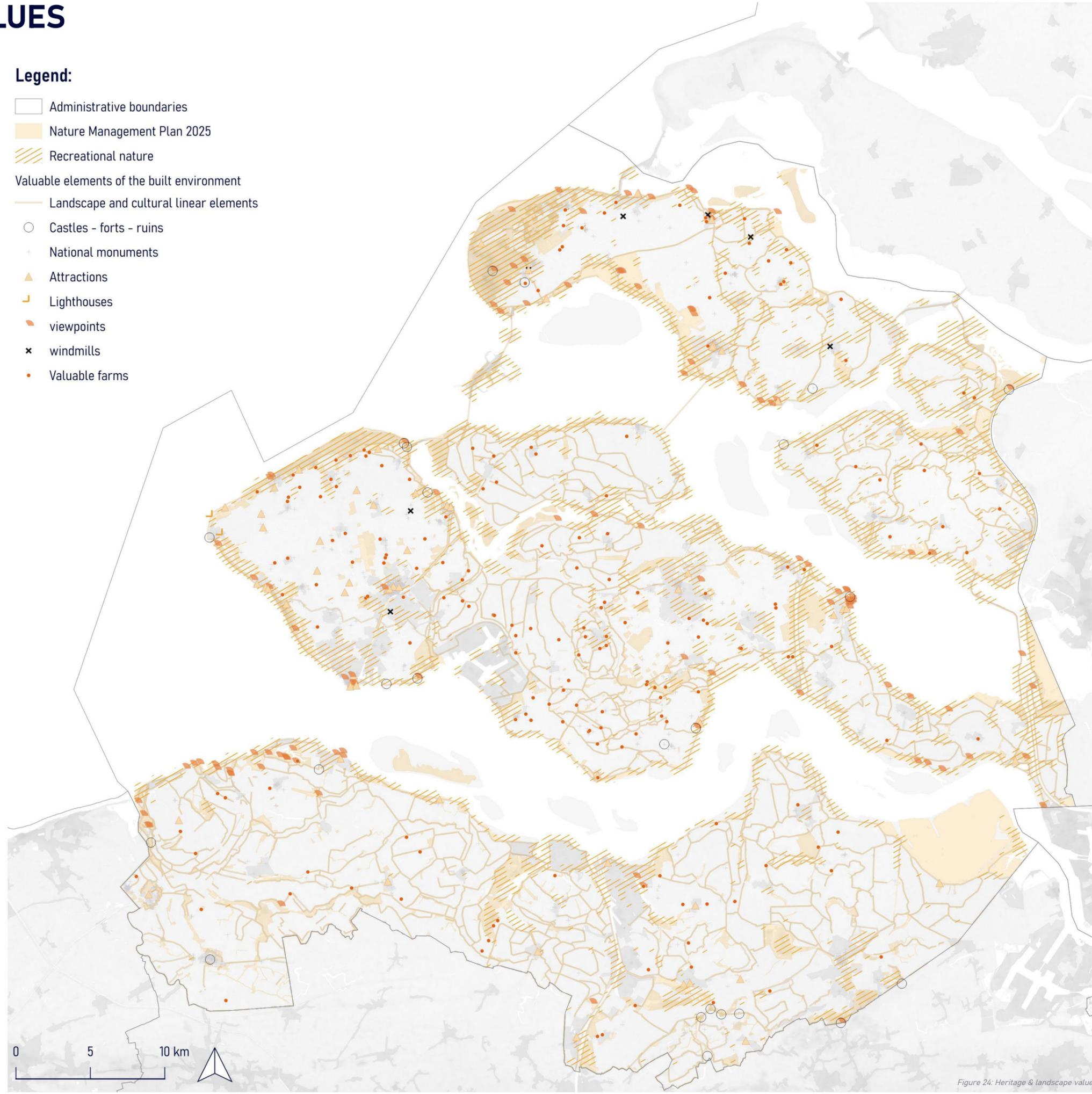


Figure 24: Heritage & landscape values

LABOUR LANDSCAPE

This map illustrates the distribution of workplaces in Zeeland. The largest amount of landspace belong to the agricultural sector, spread throughout the region, from the coasts to the inland areas. Even though the representation operates at a regional scale, concentrations of greenhouses clearly emerge as a distinctive element of both the regional and Dutch economies.

In addition, within the Eastern Scheldt basin, there is a notable presence of aquatic farming activities, including algae, oyster, and shellfish cultivation, which represent a fundamental component of the regional economy and local identity.

Looking at other sectors, industry stands out due to its enormous presence across the territory, organized in large-scale clusters, such as Borssele and the industrial corridor connecting Terneuzen with Ghent in Belgium. The industrial estates have often even outgrown urban areas. It is worth noting how industrial sites are often located in close proximity to urbanized areas. This spatial relationship is repeated at different scales throughout the landscape, from the larger conglomeration linking the industrial area of Borssele with Middelburg and Vlissingen, to smaller clusters dispersed across the countryside.

The map also includes commercial facilities, mainly located within urban centers and along coastal tourist zones, as well as areas characterized by a high density of hospitality structures, which will be examined in further detail later on.

Legend:

- Administrative boundaries
- Agriculture and farming**
- Agricultural fields
- Greenhouse concentrations
- Shellfish plots
- Mussels farms
- ▲ Algae producing industries
- Oyster pits
- Others**
- Industries
- Residential areas
- Retail locations
- + Hospitality structures
- EU DEM**
- 65,77 m
- -9,51 m

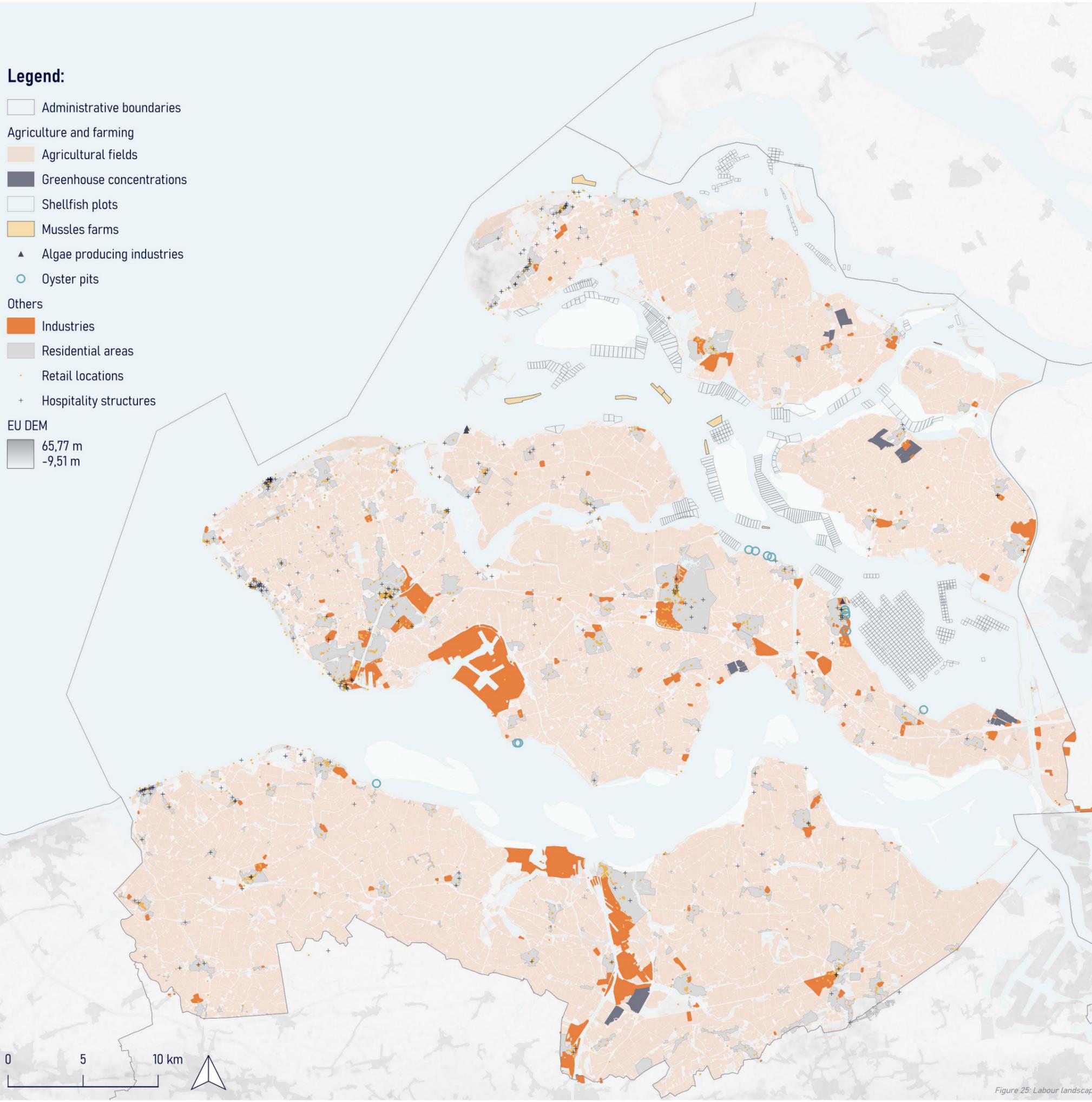


Figure 25: Labour landscape

TOURISM INFRASTRUCTURES

This map aims to illustrate the spatial dimensions of the tourism sector. The focus is not on tourist destinations per se, but on the infrastructures that support the sector, both physical and organizational systems.

The Province of Zeeland has developed the official platform Zeeland.com to promote and inform visitors, which functions as a central hub for tourism-related information. This portal advertises attractions and events and also guides users through accommodations, nature areas and cultural opportunities.

The majority of visitors are attracted by the coastal environment, spending time on the region's vast beaches. According to the Province of Zeeland, the region is home to some of the cleanest and safest beaches in the Netherlands, with high-quality facilities and excellent swimming conditions across several designated zones (Zeeland.nl, n.d.).

With rich natural landscapes like wetlands and salt marshes, extensive water systems, and protected ecosystems, Zeeland has a high potential for ecotourism as well.

Accommodations such as hotels, camping areas, and holiday villages are concentrated in a few coastal hubs. In terms of mobility infrastructure, Zeeland benefits from an extensive cycling network, covering nearly the entire territory. This network is well-structured and ready to support potential upscales in tourism flows, particularly from an eco-mobility perspective. A key component of this system is the Zeeuws Toekomstbeeld Fiets (ZTF), a strategic cycling vision developed as a co-production by the Province of Zeeland, municipalities, and local partners. The ZTF focuses on making cycling a convenient and accessible mode of transport by improving infrastructure and integration with both tourism and everyday mobility (Zeeland.nl, n.d.).

However, public transportation infrastructure is currently limited in comparison. The railway network reaches only major urban centers, and while there are ferry and bus lines available, these are not spread in coverage.

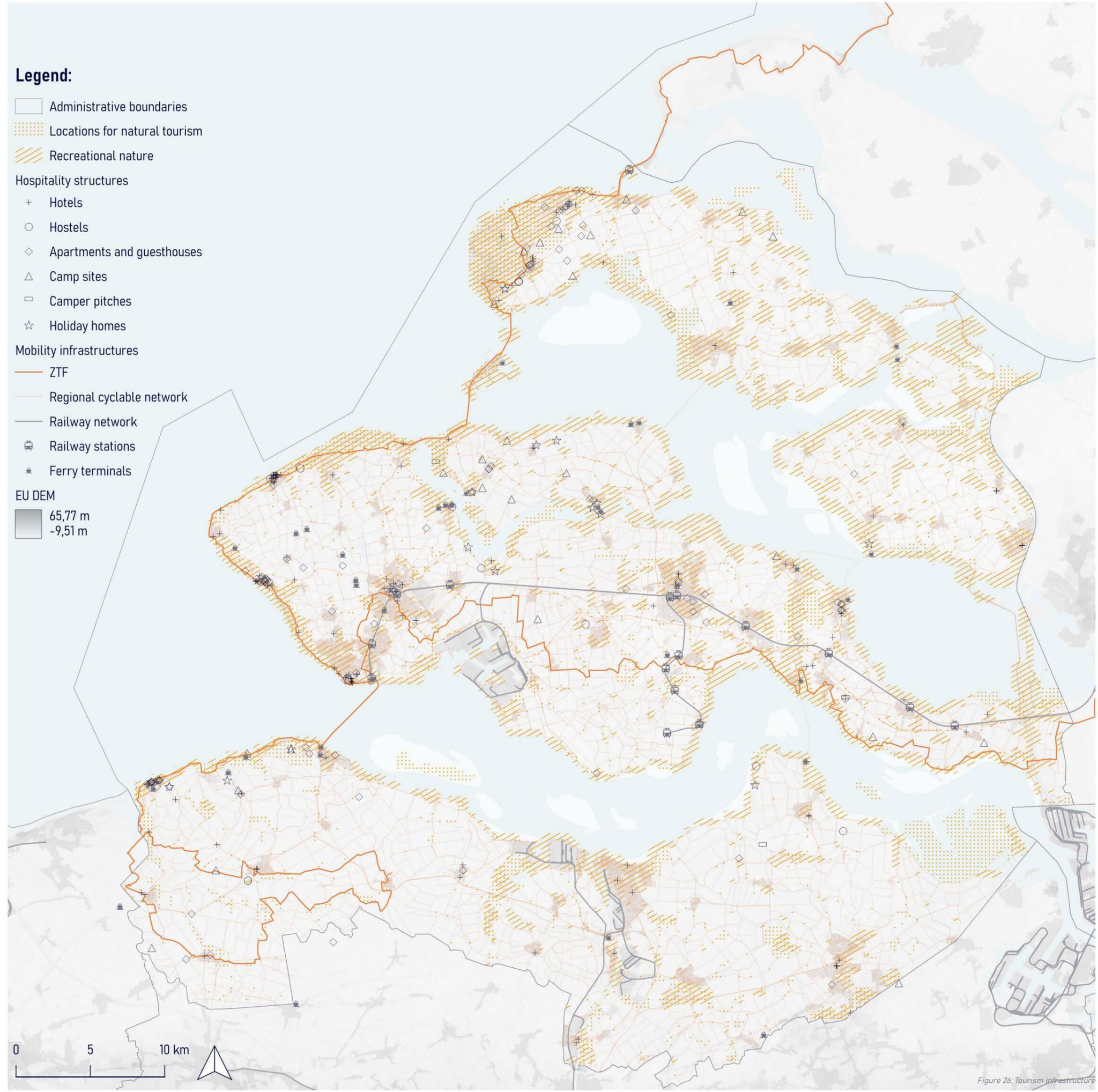


Figure 26: Tourism infrastructure

MAIN PROGRAMMES & CO-OPERATIONS



The Nationaal Plan Verduurzaming Industrie (NPVI) plays an essential coordinating role on a national level. Its mission is providing opportunities to make industry more sustainable, fostering collaborations between businesses, governments, and knowledge institutions. With this approach the NPVI aims to stimulate a broader systemic change towards a circular and climate-neutral economy (NPVI, 2024).

The goal is adoption and promotion of cooperation chains, encouraging sectors such as construction, food and chemicals to innovate together and align with national climate and circularity goals. The NPVI also aims to strengthen connections between public policy and industrial innovation. Which means that they are involved in national agendas like the Climate Agreement, the Circular Economy strategy, and the Mission-Driven Innovation Policy (NPVI, 2024; NPVI, n.d.).

The NPVI tries to maintain connections with national ministries (including Economic Affairs and Climate, and Infrastructure and Water Management), regional authorities, and various industry coalitions. Also collaborating with innovation platforms and programs, ensuring alignment with national ambitions, but also broader European goals such as those outlined in the EU Green Deal (NPVI, 2024).

(CES) 3.0

Cluster Energie Strategie (CES) Zeeland 3.0 is a regional plan in Zeeland which focuses on making the economy more sustainable by working together on innovation and circular solutions. It connects to national strategies like the NPVI, just like the NPVI, CES Zeeland 3.0 encourages cooperation between sectors so that new ideas could lead to a more climate friendly and circular future. It also values the link between scales of policy makers, connecting with companies, coalitions, ministries and European plans (SDR, 2024; NPVI, 2024).



Smart Delta Resources (SDR) is a regional collaboration in the Schelde Delta region, connecting industries from Zeeland, West Brabant, and West Vlaanderen. Their goal is to create a competitive, climate-neutral, and circular industry by 2050 (Smart Delta Resources, 2020).

SDR focuses on innovation and circular solutions, encouraging cooperation across sectors to develop new ideas. Key programs include Hydrogen Delta, Carbon Connect Delta, and Heat Delta, covering various aspects of the energy transition. Smart Delta Resources collaborates with national and European policies, aligning their regional initiatives with broader strategies like the NPVI. This approach focuses on connections between companies, coalitions, ministries, and European plans, fostering a comprehensive and unified effort towards sustainability (Smart Delta Resources, n.d.).

PROGRAMMA NOVEX

NOVEX (Nationale OmgevingsVisie EXecutiekraacht) is a national strategy in the Netherlands focussed on guiding spatial planning and longterm land use across the country. It helps organize how space is used in terms of major transitions, like the energy, housing, nature, and climate adaptation, the goal is to do this by coordinating efforts between national, regional, and local governments (NOVEX, 2022).

The goal is to ensure that these large transitions are not handled separately, but merged into a single vision. This means combining concepts such as building new houses, protecting nature, and strengthening infrastructure.

At the national level, NOVEX supports collaborations between Ministries. It also works on regional scales, aiming for collaborations with provinces, municipalities, and water boards. By doing this, NOVEX connects policy with planning, and local implementation to help shape the future of the Dutch landscape (NOVEX, 2022).

Ruimtelijk Voorstel Zeeland

Verkenning in het kader van programma NOVEX

The RVZ is an exploration based on the program of NOVEX on the national scale, it focusses on shaping the spatial future of Zeeland. It tries to balance the major changes from the transitions with local identity. In this vision, Zeeland shows how the province wants to contribute to national goals like climate adaptation, housing, nature restoration, and sustainable mobility, while also protecting the unique identity and qualities of Zeeland (Provincie Zeeland, 2023).

The RVZ approach builds on ongoing regional strategies and aims to combine the energy transition with climate change adaptation and economic renewal. Zeeland's role as a coastal and industrial region makes this integration complex but crucial for the future of the proud community of Zeeland. The program promotes smart spatial planning, like combining housing with natural landscapes or integrating energy infrastructure into industrial zones.

Key stakeholders in this program include the Province of Zeeland, municipalities that lie within them, the water board, ministries, and local organizations. They work closely together to ensure Zeeland's input is connected to national ambitions, while still fitting the region's identity and vision (Provincie Zeeland, 2023).



The Climate Agreement (Klimaatakkoord) is a national plan focusing on reducing greenhouse gas emissions. The goal is to shrink emissions by 49% in 2030 compared to 1990 levels. It supports the transition towards a cleaner and more climate-friendly country. The agreement was made with all types of actors working on climate solutions (Rijksoverheid, 2019).

The Climate Agreement strategy is based on five sectors: electricity, industry, mobility, agriculture & land use and the built environment. The goal is to foster cooperations between these sectors, so that they can work on solutions together and support the energy transition in the end. The Climate Agreement is also linked to other national plans like the Circular Economy strategy, and to international goals like the Paris Agreement and the EU Green Deal (Klimaatakkoord, n.d.; Rijksoverheid, 2019).

The Climate Agreement attempts to uphold strong connections with national ministries, regional governments, and private organisations. It is also coordinated with regional programs like the Regional Energy Strategies (RES) (Rijksoverheid, 2019).

RES 2.0 Zeeland

The Regional Energy Strategy (RES) Zeeland 2.0 holds approaches towards a more sustainable energy system. RES Zeeland aims to contribute to national climate targets by focusing on three main goals: sustainable energy production, a shift towards sustainable heat sources and integration of energy infrastructure. These ambitions are aligned with the Climate Agreement and are meant to contribute to the national goal of a 55% Carbondioxide reduction by 2030.

RES 2.0 states realistic goals based on current developments and technological advancements. For example, Zeeland intends to continue expanding solar energy on large rooftops and in open areas and wind energy is expected to grow even more. In terms of heat, RES Zeeland is exploring alternatives to natural gas for the heating of buildings, for example aquathermy and residual heat. Grid congestion remains a major challenge, and the strategy includes the optimization of spatial planning and energy use to lower the pressure on the electricity network in Zeeland (RES 2.0 Zeeland, 2022).

Key stakeholders in the RES Zeeland process include municipalities, the province of Zeeland, the water board, network operators (such as Stedin and TenneT), energy cooperatives, and more. The aim is for them to collaborate, using the RES 2.0 guidelines to ensure that the energy transition is not only technically feasible but also socially balanced. Public participation and support are seen as crucial within this vision, with residents being engaged through local meetings and consultations. Together, these actors strive to ensure that Zeeland can evolve itself in terms of the energy transition, respecting the character and ambitions of Zeeland (RES 2.0 Zeeland, 2022).

Programma Energiehoofdstructuur

PEH is a national strategy that helps make space for the energy system of the future by planning ahead for important infrastructure like high-voltage grids, pipelines, batteries, and hydrogen facilities. It connects to national visions like the NOVI and supports the goal of having a climate-neutral energy system by 2050. Just like the NPVI, the PEH encourages working together across scales, connecting local to transnational, so that stakeholders can be better prepared for the future of sustainable energy. It also supports reuse of existing energy locations, for example by using old fossil energy sites for new sustainable purposes. The program is not a fixed idea, but a flexible plan that is updated every four years, based on new insights, innovation and feedback from society (Ministerie van EZK, 2024; Programma Energiehoofdstructuur, 2024).

Zeeuwse Omgevingsvisie

The Zeeuwse Omgevingsvisie is the long-term spatial plan for the province of Zeeland with a horizon towards 2050. The vision consists of 4 ambitions: living well in Zeeland, balancing water and rural areas, building a sustainable economy, and creating a climate-proof and carbondioxide-neutral region (Provincie Zeeland, 2023).

The implementation strategy includes 27 main themes. Examples are: housing, health, water safety, mobility, circular economy, and cultural development. It promotes co-operations between governments, businesses, and local communities to address challenges related to climate change and is coordinated with national policies like the National Environmental Vision (NOVI) and the Sustainable Development Goals made by the United Nations (UN).

The province works closely together with the municipalities, the water boards and also with residents, to shape the vision using local qualities (Provincie Zeeland, 2023).

STAKEHOLDERS NETWORK

The energy transition involves lots of different stakeholders, from big international organizations to local communities. While governments and large companies make key decisions about energy policies and infrastructure, local communities often have the most at stake but the least influence. The power-interest matrix shows this imbalance.

On the international scale there is one important stakeholder. This is the European Commission. The European Green Deal is a key example policy that is guiding the EU towards becoming climate-neutral by 2050 (European Commission, n.d.). Big international companies like Yara and Dow also have a huge influence, because of their economic power, they can influence some of the energy policies (Yara International, n.d.; Dow, n.d.).

In the Netherlands, multiple ministries are responsible for the energy transition. The Ministry of Climate and Economics and the Ministry of Climate Policy and Green Growth focus on national strategies for sustainability (Government of the Netherlands, n.d.). The Ministry of Infrastructure and Water Management arranges that these energy policies fit into infrastructure plans (Government of the Netherlands, n.d.), while the Ministry of Economic Affairs and Climate Policy supports companies in transitioning to using cleaner energy (Government of the Netherlands, n.d.). TenneT, the national distribution system company, keeps the electricity grid running smoothly (TenneT, n.d.). EPZ, which runs the Borssele nuclear power plant, is also an important stakeholder in the Dutch energy sector, supplying stable, low-carbon electricity (EPZ, n.d.).

On a regional level, province Zeeland tries to arrange the national energy goals into action (Provincie Zeeland, n.d.). The North Sea Port is a major industrial hub where companies use energy policies to guide their investments in their transition away from fossil fuels (North Sea Port, n.d.). Smart Delta Resources, a cooperation of big companies in Zeeland, works together to improve their energy efficiency and lower emissions (Smart Delta Resources, n.d.). Locally, companies like ICL Group, Arkema, Heros, OVET, Covra, and Sloe Centrale all play a role in the regional energy system. They depend on stable energy supplies while also dealing with policy changes (ICL Group, n.d.; Arkema, n.d.). Municipalities are also key players in the energy transition, acting as a link between national and local scale. Since industries operate within municipalities, local governmental bodies also play a key role in the energy transition (Provincie Zeeland, n.d.).

THE NEGLECTED STAKEHOLDER: THE AFFECTED COMMUNITIES

Despite being the ones most impacted by energy policies, working-class communities often have little influence in the decision-making process. Rising energy costs, changes in job markets, and shifts in industry bring uncertainty. These communities have limited influence over how the transition happens but this could change. A more balanced approach is needed to make sure that the energy transition benefits everyone, not just those with power and money.

The power-interest matrix shows that while governments and corporations drive the energy transition, local communities face the biggest changes with the least control. Finding a balance between environmental goals and fairness is key to making sure that the transition works for both the economy and society.



Figure 27: Sketches interviewees

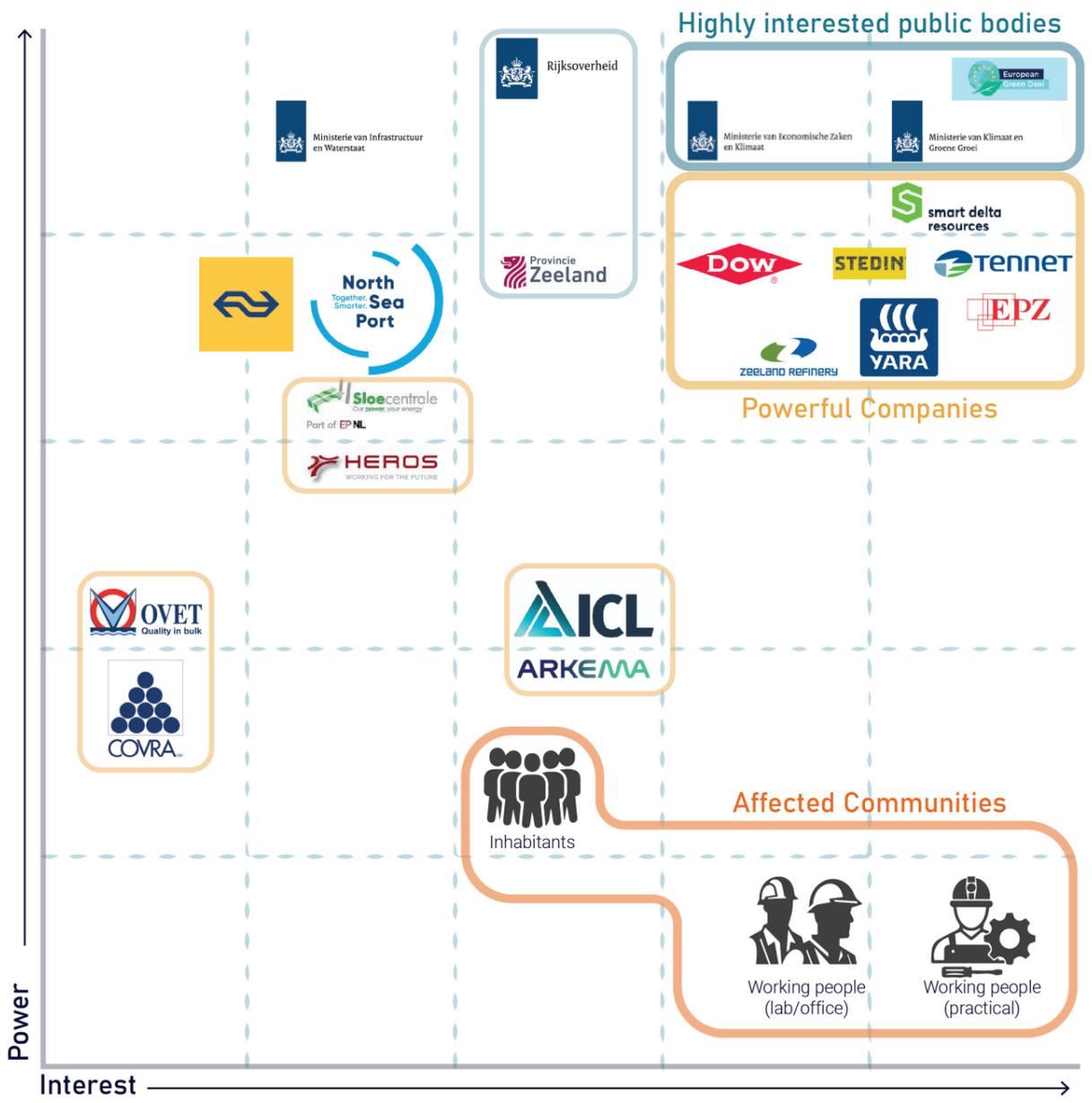


Figure 28: Power / interest stakeholder diagram

STAKEHOLDERS NETWORK

The energy transition requires strong collaboration between various stakeholders, as visualized in the power diagram. As shown in figure 29, many of these stakeholders are already interconnected, meaning that changes in one sector affect a large part of the system.

Some key players in this transition are the cooperatives. By joining forces, companies within cooperatives gain more influence, allowing them to act as a unified stakeholder with stronger connections across industries and governances. This enables them to more easily access funding, policy support, and technical expertises. The diagram clearly highlights how cooperatives like Smart Delta Resources link businesses with government bodies and research institutions, which fosters innovation in the energy market and empowers them in their role in the energy transition (Smart Delta Resources, n.d., North Sea port, n.d.).

The role of the affected communities, such as fossil fuel industry workers is maybe even more important. The transition must not forget about them, instead, these workers can be empowered through collective action, causing a more just energy transition. This applies to other impacted groups as well. For example farmers, local businesses, and citizens must also have a voice in shaping policies that directly affect their daily life. Empowering these community networks can make the transition smoother and more inclusive.

To drive real change, the right connections must be established. The power diagram that was previously discussed showcases how different stakeholders are positioned within the energy transition, revealing opportunities for strategic collaboration. Policies therefore should facilitate these collaborations by implementing incentives linked to challenges within the energy transition.

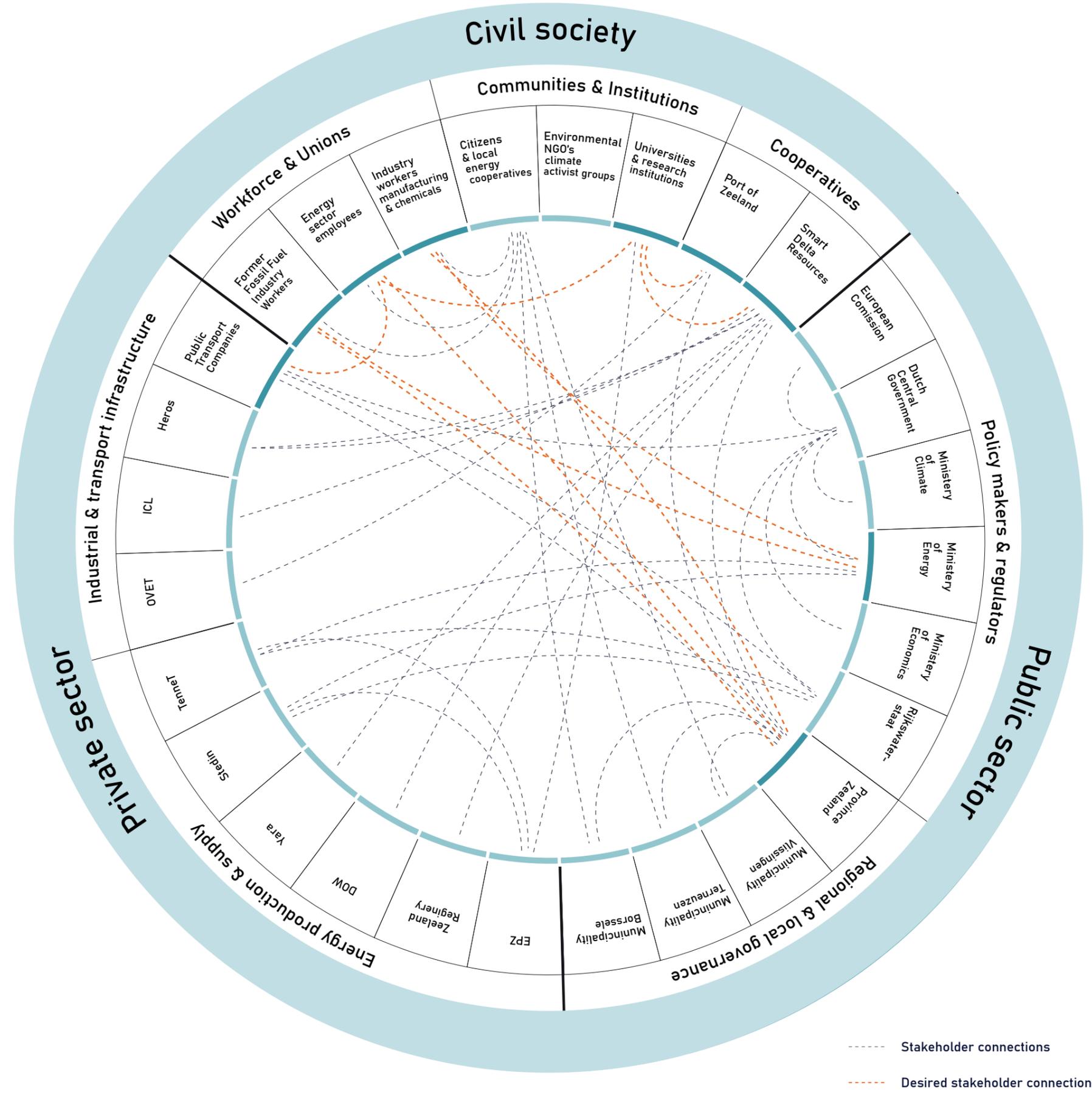


Figure 29: Connections stakeholders

ENERGY TRANSITION IN THE NETHERLANDS

The Netherlands is already seeing some changes due to the energy transition or other climate change related agendas. Some of the already placed developments as well as some perspective projects have been shown in figure 30. Gas and coal fired power plants are still active, but many will be closed in the near future. Renewable energy production will replace those, like wind turbines, of which clusters have been shown as well (Van Os & Nieuwenhuizen, 2023). Currently there is one nuclear facility in Borssele, but there are plans for it to be replaced by two new ones in the same area.

The NOVEX areas are set areas to be developed according to certain themes, of which the industrial ones are shown in figure 30. The North Sea Port District is the one in Zeeland, which includes plans for housing, accessibility, water, and transitioning towards more sustainable industry (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2025).

ENERGY PROJECTS IN ZEELAND ACCORDING TO DUTCH MINISTRY OF CLIMATE AND GREEN GROWTH (2024):

- Strengthening electricity network Schelde-Delta region
The existing infrastructure will be extended past the border to support the industrial electricity needs throughout the energy transition, and new capacity will be installed to match the increased need.

- High voltage station Sloe area
Tennet (a network operator active in Zeeland) is planning a new high voltage station in the area of the Sloehaven, with infrastructure to match. This would support the added clean and/or green energy that will be produced when more polluting alternatives close.

- Network on sea: IJmuiden Far Alpha and Nederwiek 1
Tennet and the ministry are working together to realise 3 high voltage networks to be able to handle more transport of electricity that is produced by wind turbines at sea. These two connect to the Sloehaven.

- Hydrogen network southwest Netherlands
Pipes will span from Belgium, up through Zeeland as part of the Dutch Hydrogen Network.

- Carbon Connect Delta
Carbon will be collected from large polluting industries and transported by ship to Rotterdam, to be stored underground.

- Multiutility crossing point Zeeland
The pipes will be crossing the Westerschelde, in the area of the existing tunnel in order to support industries transitioning to more circular processes.

- Delta Schelde CO₂nnection (DSC)
This will be a carbon transport pipe shared by the industries of Zeeland, Rotterdam, and Antwerp.

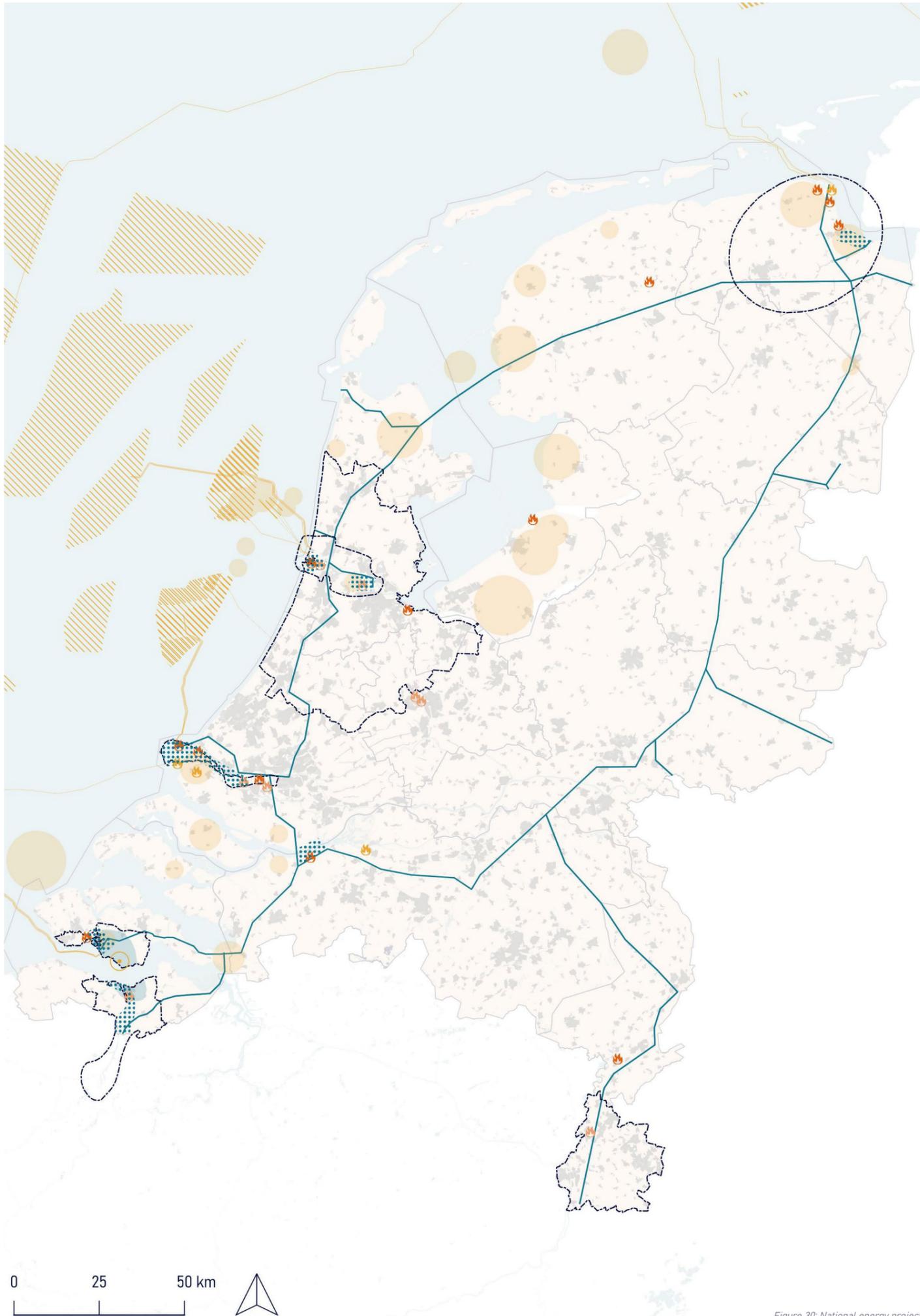


Figure 30: National energy projects

HYDROGEN FUTURE

Hydrogen is important for the future of Zeeland. It's a new way of using clean and green energy, and it plays a big role in the transition away from fossil fuels. More and more, hydrogen is being seen as a serious alternative, especially green hydrogen, which is produced using renewable energy. This makes it not only cleaner but also more sustainable in the long run. It's not just a local idea either. Large cooperations and companies across Europe are talking about it. There is a future where green hydrogen will take over the use of fossil fuels like methane and others.

This is also in line with the vision of Daan Schalck, CEO of North Sea Port. He talks about the new attraction of innovative industry, which will not only bring more employment to the port area but also reduce the environmental impact that the port currently has. Green hydrogen is part of this bigger movement where industry and sustainability go together. It shows that Zeeland is not just following the trend but can actually lead it by connecting economic growth to a cleaner future.

Zeeland has the potential to innovate itself into a green hydrogen hub. The region already has strong facilities that make this possible: a nuclear central, a big landing point for offshore wind farms, a 380kV high-voltage grid and station, and well-developed port infrastructure. These high-level connections form a strong base for green energy development. If these elements are brought together in the right way, Zeeland can position itself as a key player in the hydrogen economy, creating jobs, attracting innovation, and becoming a model for clean industry in the Netherlands and beyond.

“THE AVAILABILITY OF SUSTAINABLE HYDROGEN AND THE RELATED INFRASTRUCTURE WILL ATTRACT NEW, INNOVATIVE INDUSTRY. THIS WILL SERVE TO FURTHER EMBED ECONOMIC ADDED VALUE AND EMPLOYMENT IN THE PORT AREA WHILE REDUCING THE NEGATIVE IMPACT ON THE ENVIRONMENT EVER FURTHER.” – DAAN SCHALCK, CEO OF NORTH SEA PORT

(North Sea Port, n.d.)

GREY HYDROGEN

Grey hydrogen is currently the most common way hydrogen is made, but it is far away from being sustainable. The hydrogen, is made using steam methane reforming. Natural gas reacts with steam to create hydrogen and carbon dioxide, emitting the carbon dioxide into the air. This is bad for the climate because it adds to the greenhouse effect directly causing global warming.

The formula for producing grey hydrogen is:

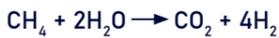


The big downside of grey hydrogen is that the carbon dioxide is not captured. It just gets released, which adds to global emissions. That's why this method is seen as harmful to the environment and not suitable for the future.

BLUE HYDROGEN

Blue hydrogen is made in almost the same way as grey hydrogen, but with one big difference: the carbon dioxide that gets released during the process is captured and stored. Which helps to lower the impact this process has on the environment. This blue hydrogen is made through a process called steam methane reforming, where natural gas (methane) reacts with water (steam) to produce hydrogen and carbon dioxide.

The formula for producing blue hydrogen is:



In the case of blue hydrogen, the carbon dioxide from this reaction is not released into the air but collected and stored underground, unlike grey hydrogen. This makes it a cleaner option. However, this process still depends on natural gas, and therefore is not green or renewable.

GREEN HYDROGEN

Green hydrogen is a new and sustainable way to produce energy, it can play a major role in making the future more sustainable. The green hydrogen is formed through a process called electrolysis, in which water is split into hydrogen and oxygen using electricity. This electricity usually comes from renewable sources like solar-, wind-, or tidal energy and that is why it is called green hydrogen.

The formula for producing green hydrogen is:



This process produces clean hydrogen while also releasing oxygen. Because it does not involve any fossil fuels and uses green electricity, it is seen as a much better option for the environment. Green hydrogen helps reduce carbon emissions and supports a more sustainable energy system.

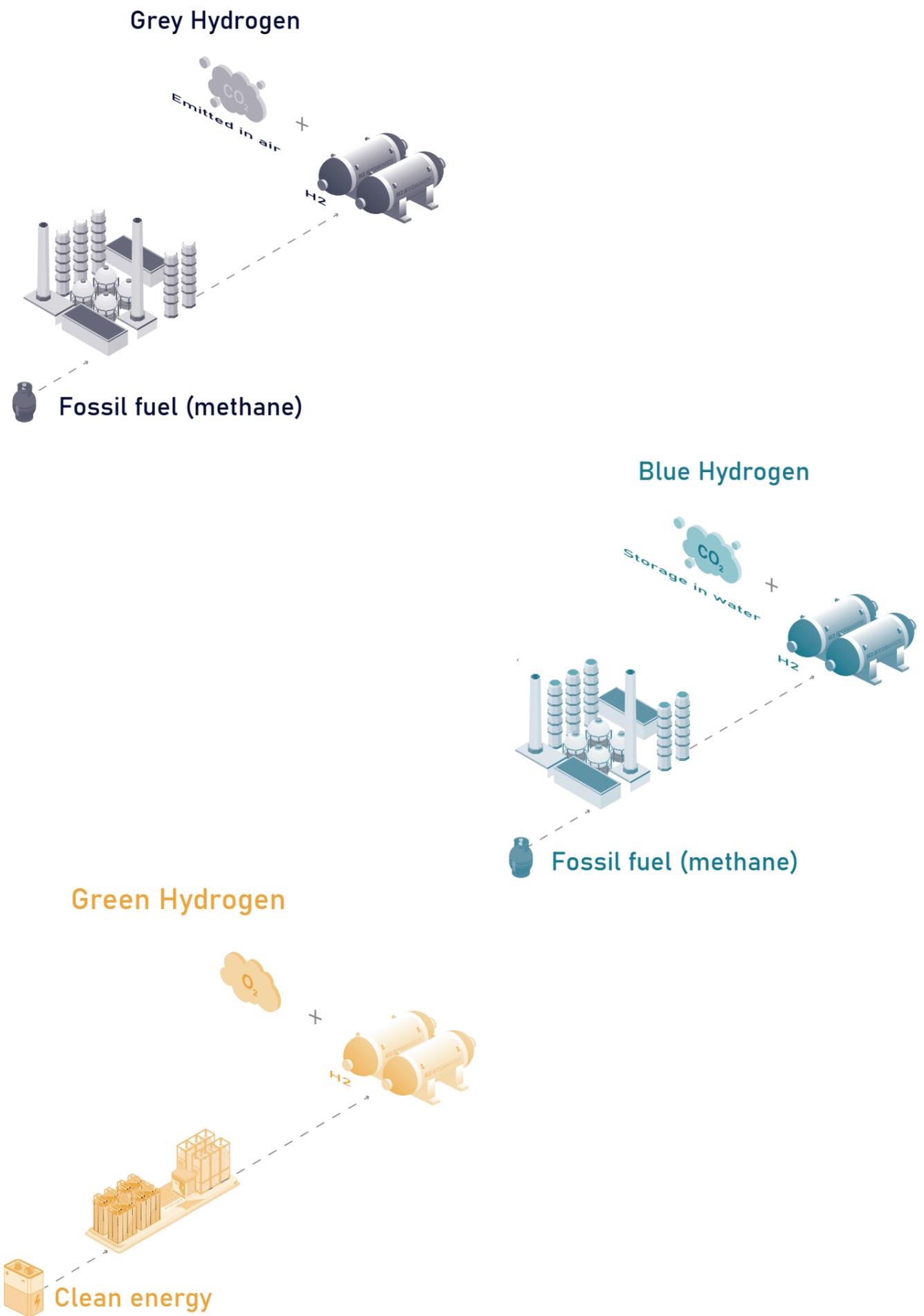


Figure 31: Hydrogen processes

SOLAR ENERGY POTENTIAL

Zeeland is already leading the way in solar adoption: as of early 2024, approximately one in three homes in the region was equipped with solar panels (Omroep Zeeland, 2024). However, the potential remains still high. The region benefits from the highest annual solar irradiance in the Netherlands, offering ideal conditions for the continued expansion of solar energy production, particularly on rooftops.

This map visualizes the spatial potential for rooftop solar energy in Zeeland. It combines several data layers to identify where solar energy deployment on roofs could be most effective. A solar irradiance raster serves as the base layer, indicating the average intensity of solar radiation. Over this, a filtered layer of building footprints larger than 250 square meters has been overlapped, focusing on structures with substantial rooftop surface suitable for photovoltaic installations.

To visualize the hotspot for these developments at a regional scale, a hexagonal grid of 1 km² cells was applied. The thickness of each hexagon's outline corresponds to the total rooftop area within the cell, providing a clear representation of building surface density across the landscape. This visualization reveals both zones with high rooftop area and irradiance, ideal for concentrated solar deployment, and areas with fewer buildings but very high solar potential, which might be suitable for new development strategies or innovative installations.

According to Zeeland's Regional Energy Strategy (RES 2.0), the joint target is to generate 1,000 MW of solar power by 2030, primarily from rooftops. The focus is on leveraging existing built environments rather than open land. Most rooftop development is driven bottom-up by residents and businesses, with the national government playing mostly regulatory role, for instance, by setting standards through the Buildings Living Environment Decree. Importantly, there are no fixed assignments per municipality, but each is expected to contribute to the shared target of 1,000 MW (0.8 TWh) based on local potential and capacity (RES Zeeland, n.d.).

The spatial insight provided by this map can support a place-specific approach, helping policymakers and stakeholders identify priority zones for solar energy development and guide future strategies.

- Legend:**
-  Administrative boundaries
 -  Density of available roofs
 -  Buildings with area > 250 sqm
- Solar potential
-  3,112 pt
 -  2,896 pt
- EU DEM
-  65,77 m
 -  -9,51 m

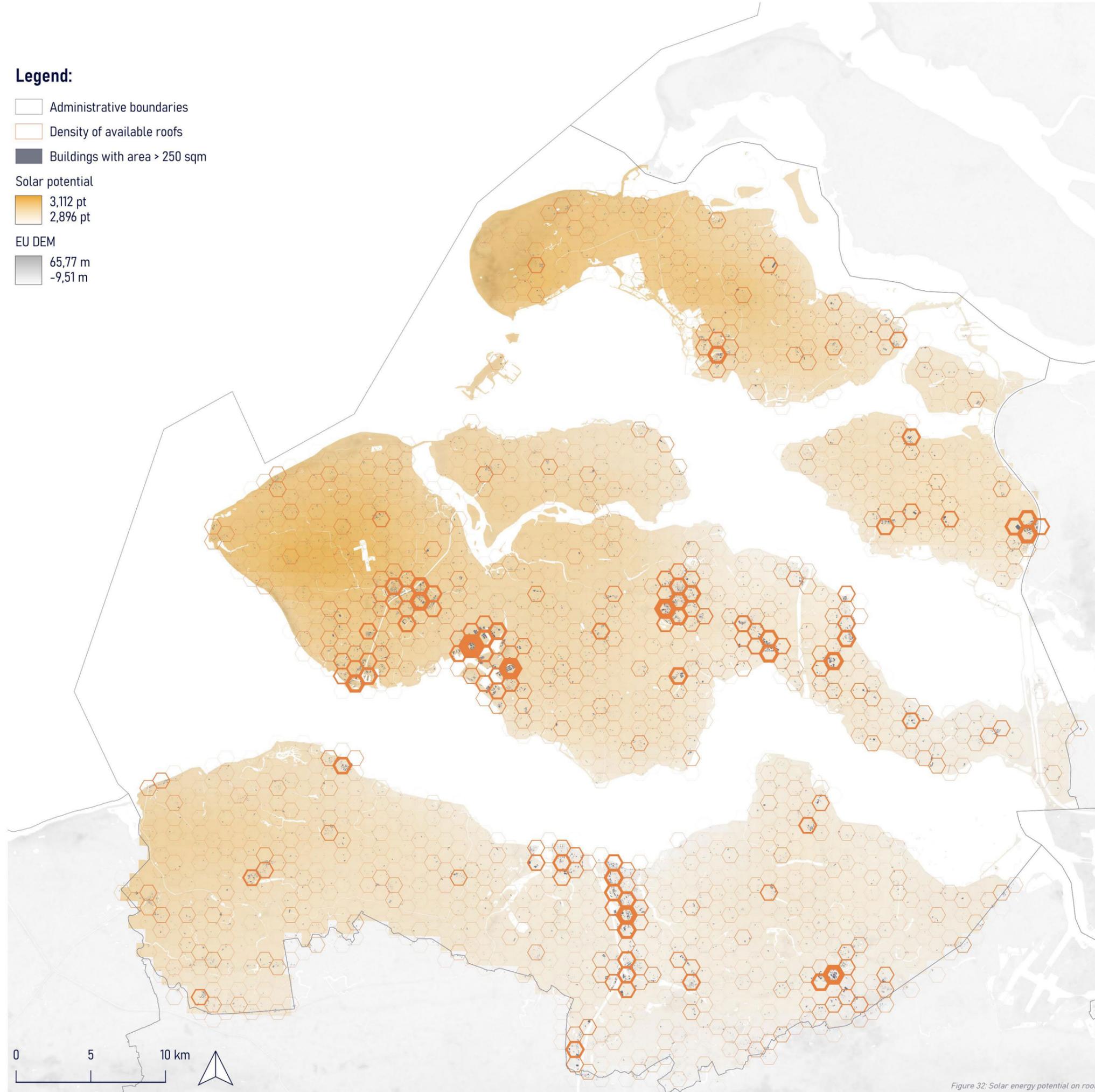


Figure 32: Solar energy potential on roofs

SOLAR ENERGY POTENTIAL

This second map provides a spatial analysis of the land surface conditions that could support new solar energy infrastructures, ranging from traditional solar parks to innovative experimental techniques.

As with the rooftop map, the base layer is a solar irradiance raster, highlighting areas of high exposure. However, here the focus shifts to land use characteristics, particularly agricultural zones that may either be challenged by environmental changes or well-suited for developments in this direction.

One key dimension of this analysis is the identification of agricultural land at risk of salinization, a process increasingly affecting coastal and low-lying areas of Zeeland. These lands may, in the future, become less viable for traditional cultivation and could be repurposed for solar energy production, contributing to the province's target of generating 3.0 TWh of electricity, as outlined in the RES 2.0 (RES Zeeland 2.0, n.d.).

The core of the map's analysis is the exploration of the agrivoltaic potential of Zeeland's farmland. Agrivoltaics refers to the co-location of solar energy systems with agricultural activities, enabling land to be used for both food and energy production simultaneously. This dual-use concept can limit land-use conflicts and support rural economies, especially when deployed on crops that tolerate partial shading (U.S. Department of Energy, n.d.).

The map highlights several types of farmland with potential suitability for this approach. Particularly favorable are fields dedicated to beans, tree-related agriculture, and red fruits, all of which can perform well under discontinuous shading. Moderately suitable areas include lands used for green manure, herbs, and cabbage-like crops, which may also adapt to agrivoltaic systems if designed properly.

Given the main concentrations, the map identifies potential agrivoltaic clusters that could be developed by adapting selected fields, especially those with both high irradiance and crop compatibility, to form cohesive, productive and sustainable landscapes.

- Legend:**
-  Administrative boundaries
 -  Farmland under risk of salinization
 -  Other suitable areas
 - Suitability for agrivoltaic (crops)
 -  High
 -  Medium
 - Solar potential
 -  3,112 pt
 -  2,896 pt
 - EU DEM
 -  65,77 m
 -  -9,51 m

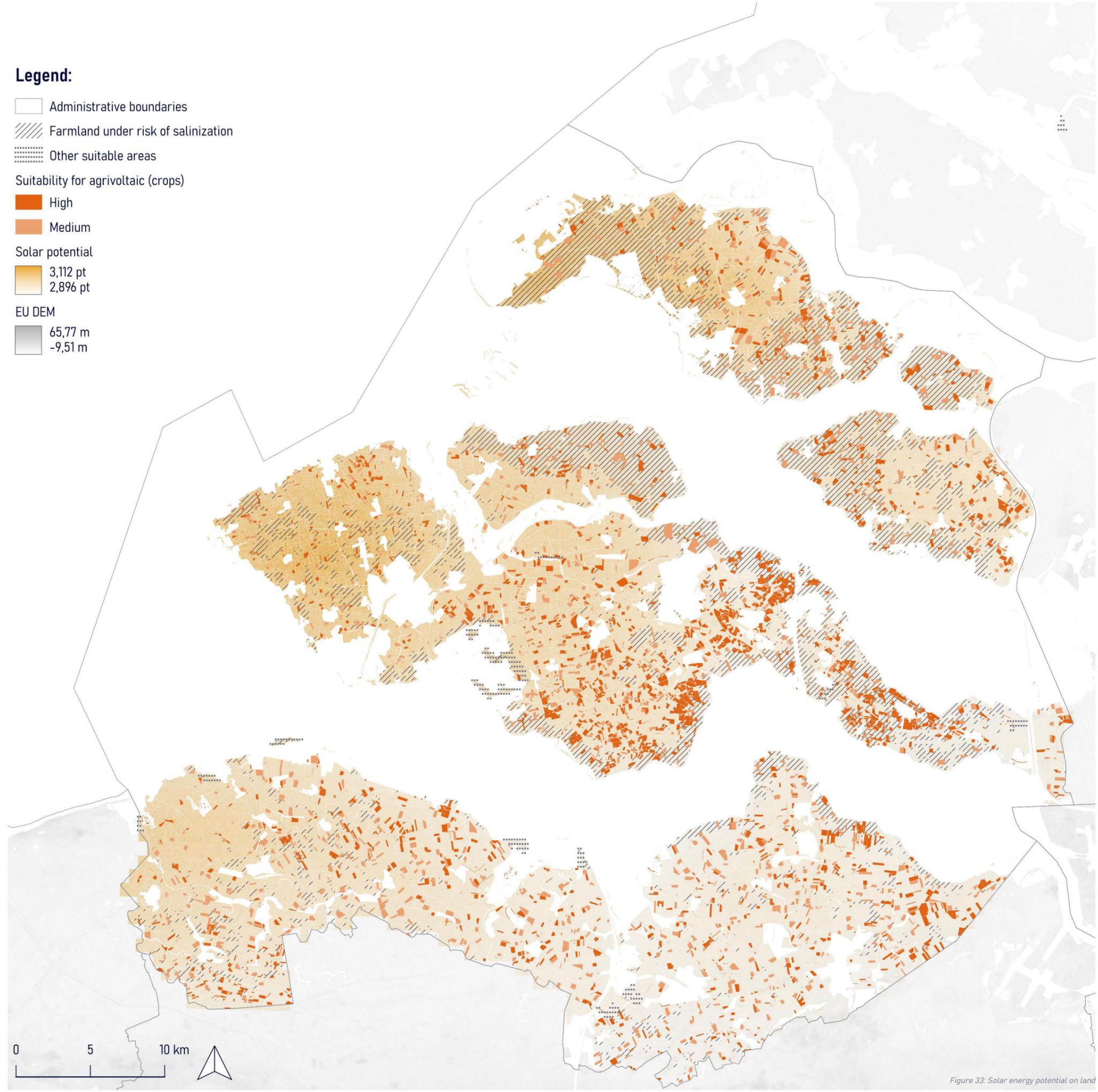


Figure 33: Solar energy potential on land

WIND ENERGY POTENTIAL

According to the RES 2.0 Zeeland, the regional objective for wind energy is to reach 700 MW (2.10 TWh) by 2030, of which 601 MW (1.85 TWh) had already been achieved by the end of 2023. This indicates that Zeeland is well on track to meet its wind energy targets, thanks to a combination of existing wind parks and ongoing project preparations. The regional focus is beginning to shift towards maintaining and repowering the existing capacity beyond 2030. Additionally, the "Omgevingsplan Zeeland 2018" already identified extra space for wind energy expansion, assessing the potential for additional locations if necessary to surpass the 2030 targets (RES Zeeland, n.d.).

This map visualizes the spatial conditions for further onshore wind energy development in Zeeland. The base layer consists of a raster showing wind speed at 100 meters NAP, offering a detailed view of the best-performing areas in terms of wind intensity. Over this, all the restricted zones were overlaid, areas where the installation of wind turbines is not permitted or is highly constrained, such as urban zones, forests, and nature reserves. A 500-meter buffer around urban centers has also been applied to reflect aesthetic considerations and preserve the integrity of the local landscape. These exclusions allow to identify the remaining high-potential areas that are technically viable and spatially adequate. The resulting map supports further strategic discussions on the expansion of onshore wind.

As Zeeland continues to work on its role in the renewable energy transition, it is likely that, in addition to the saturation of existing concentration locations, new zones, on both land and water, will be designated for future development.

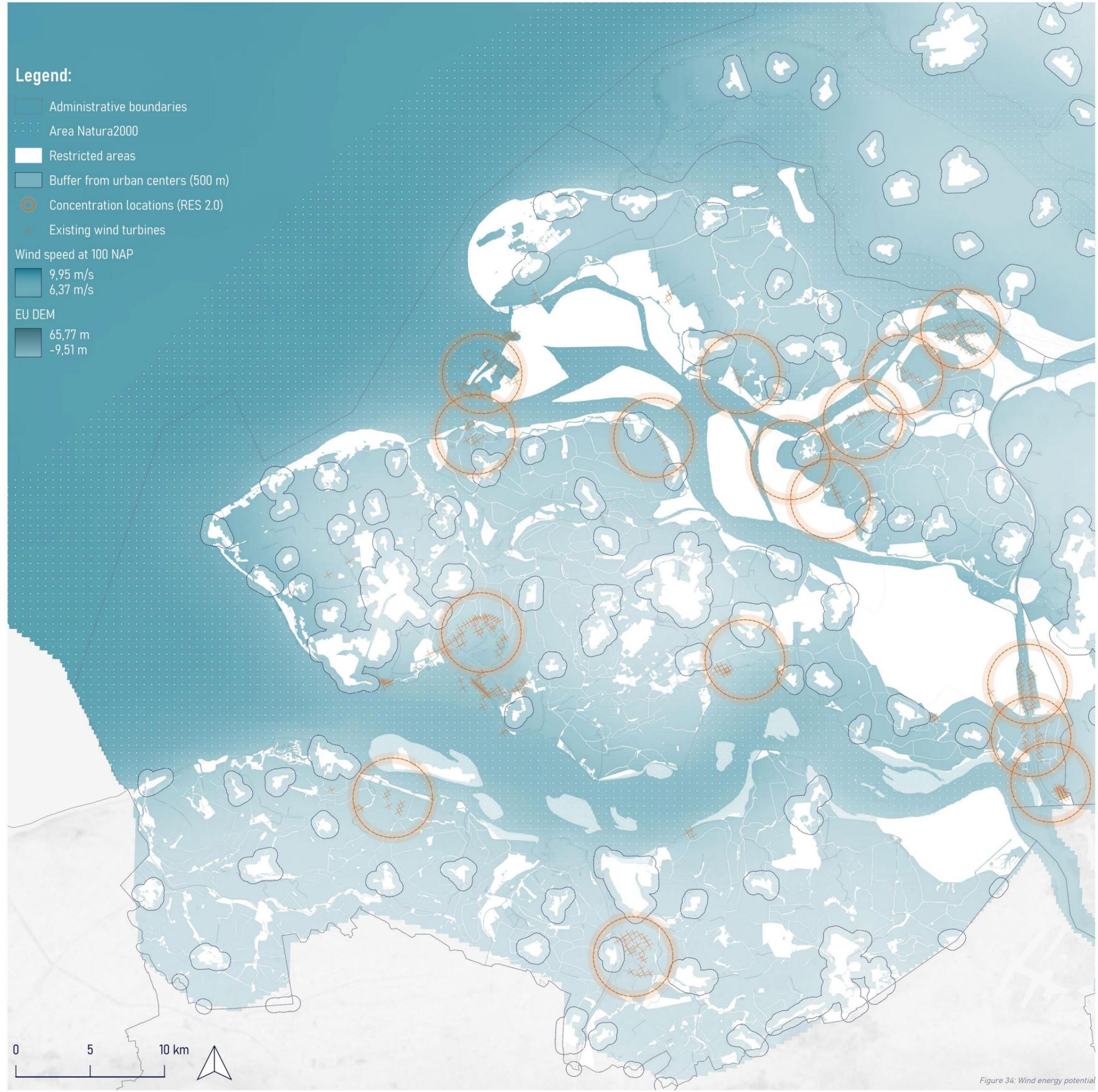


Figure 34: Wind energy potential



IV.

FORECASTING ANALYSES

SEA LEVEL RISE & SALINIZATION

Freshwater availability from both surface and groundwater sources is important for agriculture, industry, drinking water, and ecosystems in Zeeland. However, climate change and rising sea levels are significantly increasing the risk of salinization. This spatial analysis shows three integrated map layers to provide key insights into the environmental risks this brings and supports strategic planning.

The first layer reveals areas which are vulnerable to water erosion, especially where sloped soils lack permanent vegetation. In such areas, which is commonly in agricultural and natural landscapes, surface runoff can remove the valuable top layer of the soil, reducing land productivity. Vegetation plays an important role in protecting the landscape, and its absence during fallow periods or post-harvest seasons increases exposure to erosion (Klimaat-effectatlas, n.d.).

The second layer addresses groundwater salinization, which occurs when the freshwater-saltwater interface lies within 0 to 10 meters of the surface. This narrow buffer makes the ground water highly susceptible to saltwater intrusion, especially in coastal zones like Zeeland. Things like tidal forces and sinking land make this weakness even worse. The Atlas Natuurlijk Kapitaal maps visualize and identify these sensitive zones (Atlas Natuurlijk Kapitaal, n.d.).

The third layer visualizes the impact of future sea level rise, showing projected salt load increases under a 1-meter rise scenario. The results (from 500 to over 250,000 kg/ha/year of sodium chloride) shows a scale of local conditions including soil composition and land use. These projections are based on the IPCC RCP 4.5 scenario, which estimates sea level rise between 50 and 94 cm by 2100. Figure 35 displays the adapted IPCC table, while Figure 36 visualizes the expected changes in salinity patterns (Klimaat-effectatlas, n.d.).

Conclusion: The integration of these three layers leads to a clear spatial prediction: Zeeland faces increasing risk from both erosion and salinization, particularly in coastal and low-lying areas. These vulnerable areas will experience reduced freshwater availability, soil degradation, and agricultural challenges in the coming decades.

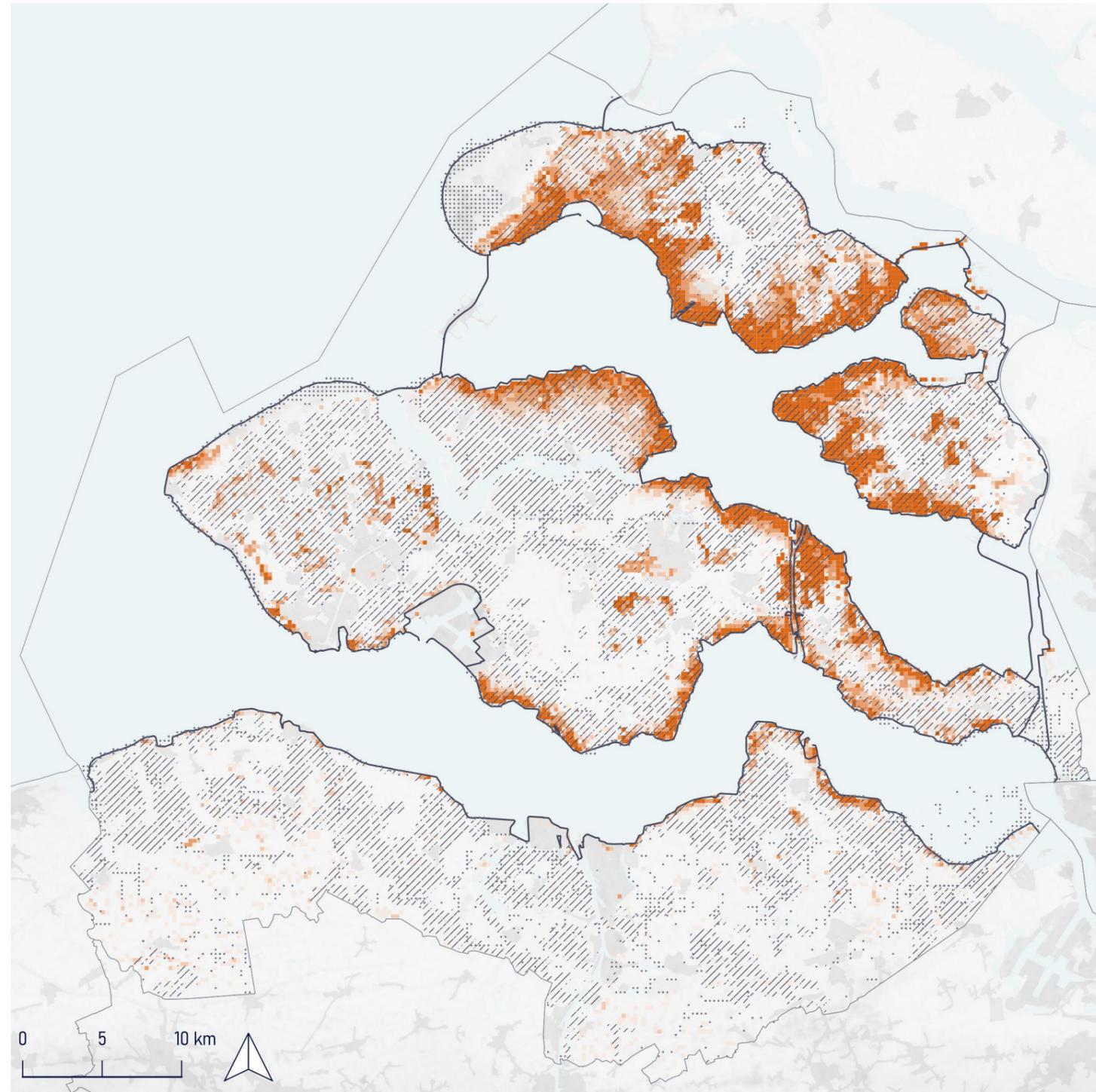


Figure 36: Salinization in Zeeland

Year	2050	2050	2050	2100	2100	2100
Emission-scenario	SSP1-2.6	SSP2-4.5	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP5-8.5
Sea level rise in CM	14-38 CM	15-41 CM	16-47 CM	50-81 CM	39-94 CM	54-121 CM
Rising speed in MM/jaar	2.8-8.7 MM/year	5.2-10.6 MM/year	5.9-12.1 MM/year	2.9-9.1 MM/year	4.4-10.5 MM/year	7.2-16.9 MM/year

Figure 35: Sea level rise scenerios. Adapted from (KNMI, 2021, p.17).

Legend:

- Administrative boundaries
- Water erosion
- High risk of groundwater salinization
- Salt Load Difference with SLR 1 m
 - 500 - 2.500 kg / ha / y
 - 2.500 - 5.000 kg / ha / y
 - 5.000 - 10.000 kg / ha / y
 - > 10.000 kg / ha / y
- Primary flood defences

DEMOGRAPHIC GROWTH

Based on a study conducted by Provincie Zeeland (2024), the graph has been adapted and extrapolated to illustrate projected population growth through to the year 2050. This visual representation incorporates various demographic scenarios for Zeeland's future, ranging from moderate shrinkage to substantial growth. These projections are grounded in national and regional research, including data from the Centraal Bureau voor de Statistiek (CBS) and models such as PEARL and Primos, providing insight into the potential development of the province. (CBS, 2023)(ABF research, 2023)

The general forecast, as outlined by Provincie Zeeland (2024), indicates significant population growth, driven by a combination of economic development, national population trends, and the increasing attractiveness of Zeeland as a place to live and work. Among the scenarios, the "high scenario" anticipates an increase of approximately 80,000 people, bringing the population total to around 472,500 by 2050.

This high-growth scenario may be the most plausible outcome. Our prediction is based on Zeeland's evolving role within the Netherlands, including its strengthening regional economy, its position as a leader in green hydrogen import, production, and export, and its growing appeal through job diversification and multifunctional spatial development. These factors combined suggest a future in which Zeeland becomes not only more populous but also more dynamic and economically resilient.

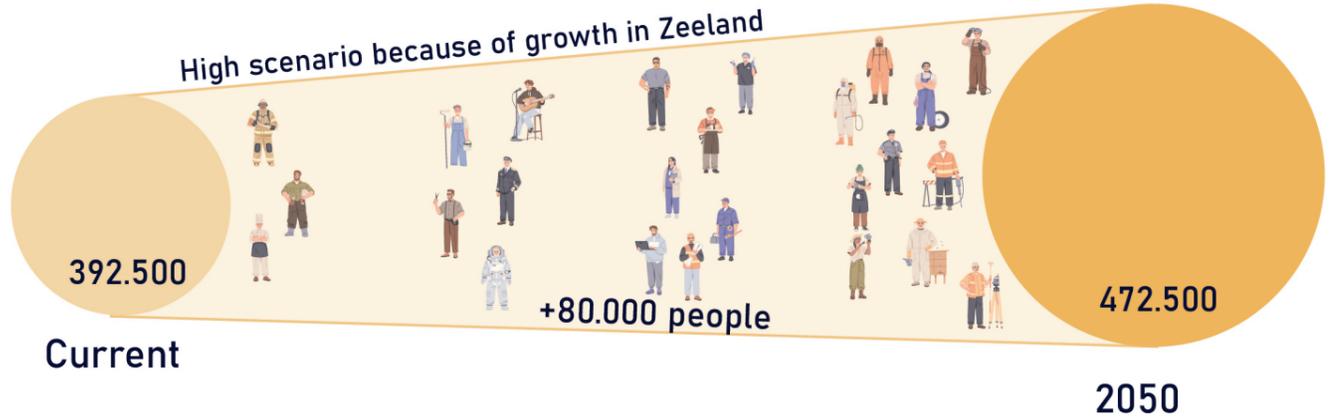


Figure 37: Population growth

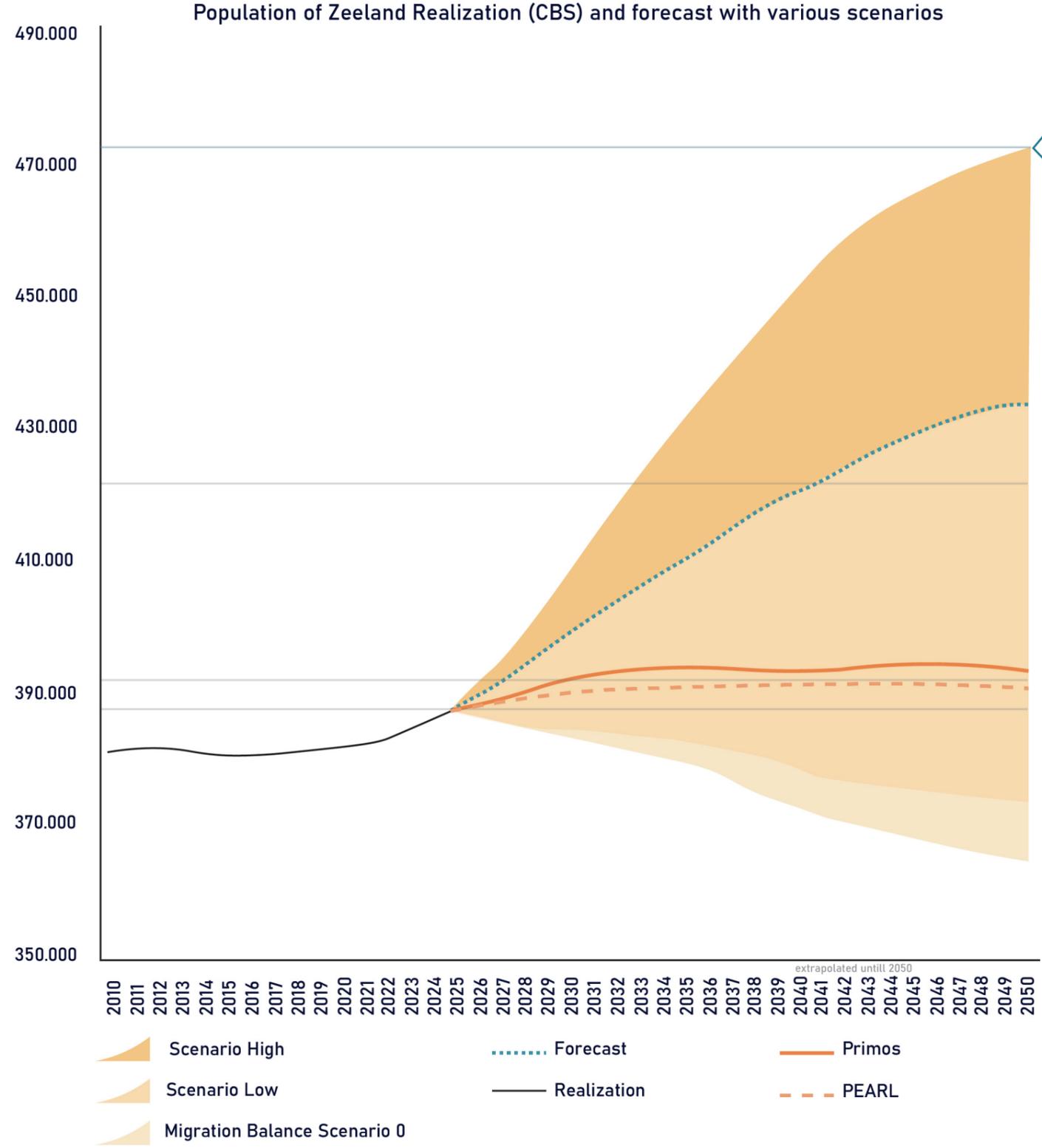


Figure 38: Scenarios population growth Zeeland. Adapted from (Provincie Zeeland, 2025).

REGIONAL ENERGY DEMAND BY SECTOR

Based on several sources, a forecasting analysis of future energy use across various branches in Zeeland was conducted. This was primarily informed by insights from the *Systeemstudie energie-infrastructuur Zeeland* (CE Delft, 2020). In this document, the composition of the energy system is presented per branche for the year 2020, which is used as a current baseline.

From this baseline, four main branches of energy consumption are identified:

1. Industry – the highest consumer,
2. Built environment,
3. Mobility,
4. Agriculture.

The energy use is measured in PetaJoules (PJ), a unit of energy where 1 PJ equals 10^{15} joules.

Looking ahead to 2050, and translating scenario-based insights from the *Systeemstudie energie-infrastructuur Zeeland*, it is estimated that total energy demand will drop by approximately 50 PJ, bringing the future total to around 84 PJ. This projection is rooted in expected shifts due to the ongoing energy transition.

According to the system study, one possible future includes large industrial players such as DOW, YARA, and Zeeland Refinery electrifying their operations, which would significantly increase energy demand in the industrial branche. However, the analysis assumes an alternative trajectory: these companies will shut down due to their unsustainable business models. For example The document shows a potential increase of 55 PJ of electricity demand if DOW would electrify the chemical cracking processes.

The development of new, more sustainable industries in the region is probable. To account for this, an estimated 10 PJ of demand is added, also keeping in mind the closing of DOW, YARA and Zeeland refinery. The industrial branch will probably evolve through the integration of green hydrogen production and renewable energy systems. Taking all of this into account, the industry branch their energy demand in 2050 will be approximately 64 PJ.

In the built environment branch, following the system study scenario of the regional scale, a decrease in energy demand is probable. This demand caused by developments in renewable energy production, improvement of buildings insulation and overall more integration of sustainability innovations within the built environment. This results in a scenario where the built environment will demand around 11 PJ of energy in 2050.

In the mobility branch, based on the system study scenario at the regional scale, a significant decrease in energy demand is anticipated. This reduction is driven by the shift toward renewable energy sources, increased efficiency of vehicles, and the broader adoption of sustainable mobility innovations.

As a result, the energy demand in the mobility branche is expected to decline from 8 PJ to approximately 4 PJ by 2050. For the agriculture branche, projections at the regional level indicate a modest decline in energy demand, decreasing from 6 PJ to 5 PJ by 2050. This trend is expected despite growth in agricultural activity, as advancements in technology and more efficient practices play a key role. The integration of renewable energy generation within agricultural operations, along with innovations in sustainable farming techniques, contributes to this overall reduction in energy use.

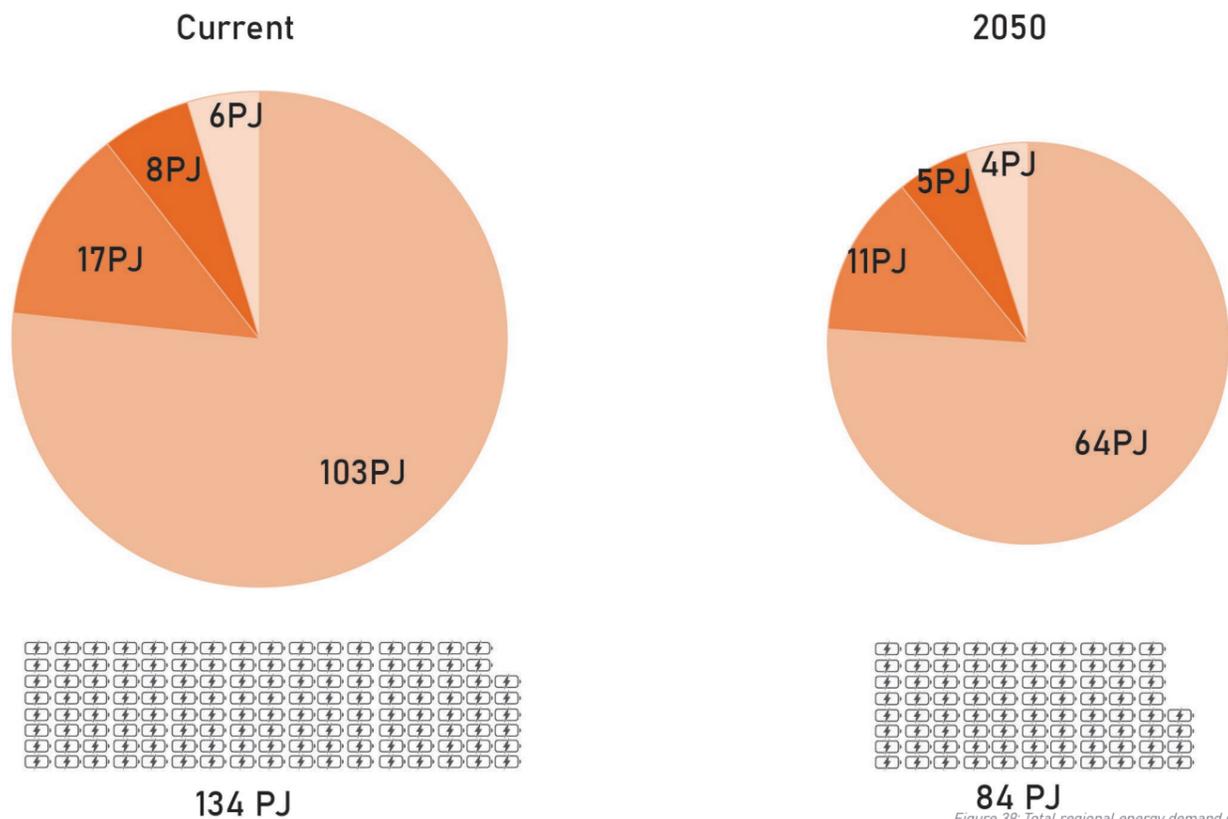
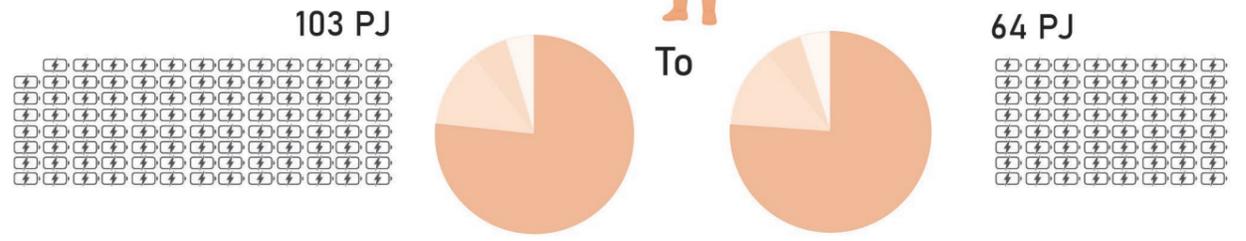
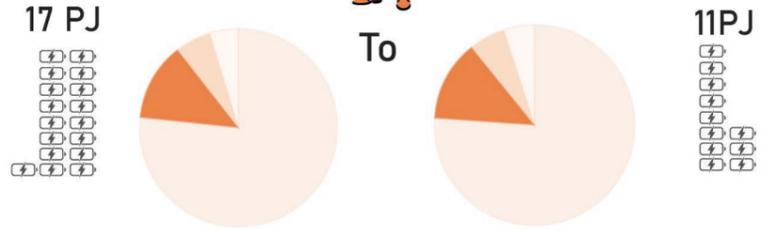


Figure 39: Total regional energy demand sectors. Based on (CE

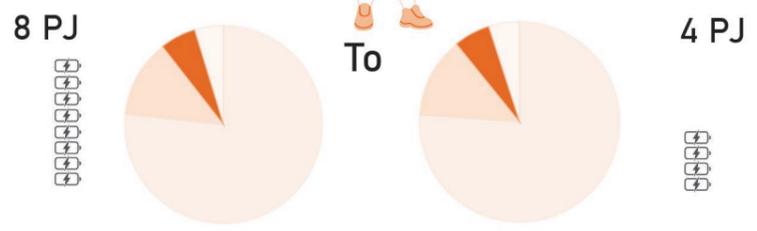
Industry:



Built environment:



Mobility:



Agriculture:

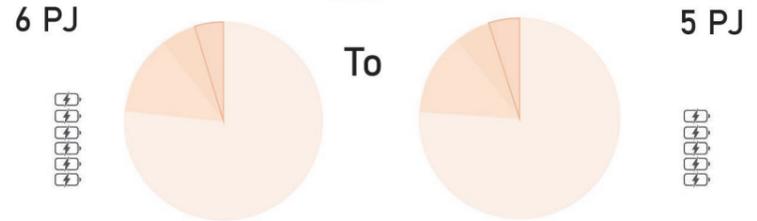


Figure 40: Regional energy demand by sectors. Based on (CE Delft, 2020).

REGIONAL ENERGY DEMAND BY SOURCE

According to the system study, the current demand is 134 PetaJoule (PJ) (CE Delft, 2020). This energy composition is spread across different branches, each using various sources of energy, some more sustainable than others. The current composition consists mainly of fossil fuels, such as methane and biogas. The large demand for methane currently comes from the industry branch, which uses 97 PJ of the total 112 PJ. This is primarily due to the chemical processes that are carried out within this sector (CE Delft, 2020). Additionally, the built environment uses around 12 PJ of natural gas, largely for heating purposes, and agriculture uses 3 PJ, mainly for greenhouse heating and specific machinery (CE Delft, 2020).

According to the system study and using the regional scenario for 2050, these branches will no longer use natural gas as a result of the ongoing energy transition. This transition will, however, bring along a need for green or blue hydrogen. Still, the overall demand will be much lower, around 17 PJ, mainly because the total energy demand of the sectors, especially industry, will decrease (CE Delft, 2020). Part of this 17 PJ accounts for YARA, which currently uses grey hydrogen. In the future scenario, this will be compensated by a cleaner hydrogen source, leading to this new estimated figure (CE Delft, 2020).

Because of the shift toward sustainable energy sources, a significant increase in electricity demand is probable across all sectors. The current composition includes 5 PJ of electricity for industry, 5 PJ for the built environment, and 1 PJ for agriculture (CE Delft, 2020). In 2050, the industry branch alone is expected to demand around 47 PJ. This is the result of closing high-consuming companies like DOW, YARA and Zeeland Refinery, while introducing new, more sustainable industrial activity (CE Delft, 2020). Within the built environment, there will most likely be a modest increase in electricity demand due to the growing integration of renewable energy sources and electric heating (CE Delft, 2020). For mobility, according to the regional scenario for 2050, there will be a need for around 3 PJ of electricity, caused by the electrification of both public and private transport (CE Delft, 2020). In agriculture, the system study also anticipates a small increase in electricity use from 1 to 2 PJ due to more advanced and energy-efficient techniques being used (CE Delft, 2020).

According to the system study, heat demand will increase from 2 to 5 PJ in 2050. This is mainly driven by developments in the built environment, where it goes from 0 to 3 PJ. This increase reflects the shift toward more sustainable heating systems such as district heating, as well as the need for low-temperature heating in new or renovated buildings (CE Delft, 2020).

Because of the continued use of biogas or green gas within the industry and built environment sectors, due to the energy transition not being completed overnight, there will still be a limited need for gas within these branches. The system study envisions a small increase in the use of these non-fossil gas sources, which still play a transitional role in the coming decades (CE Delft, 2020).

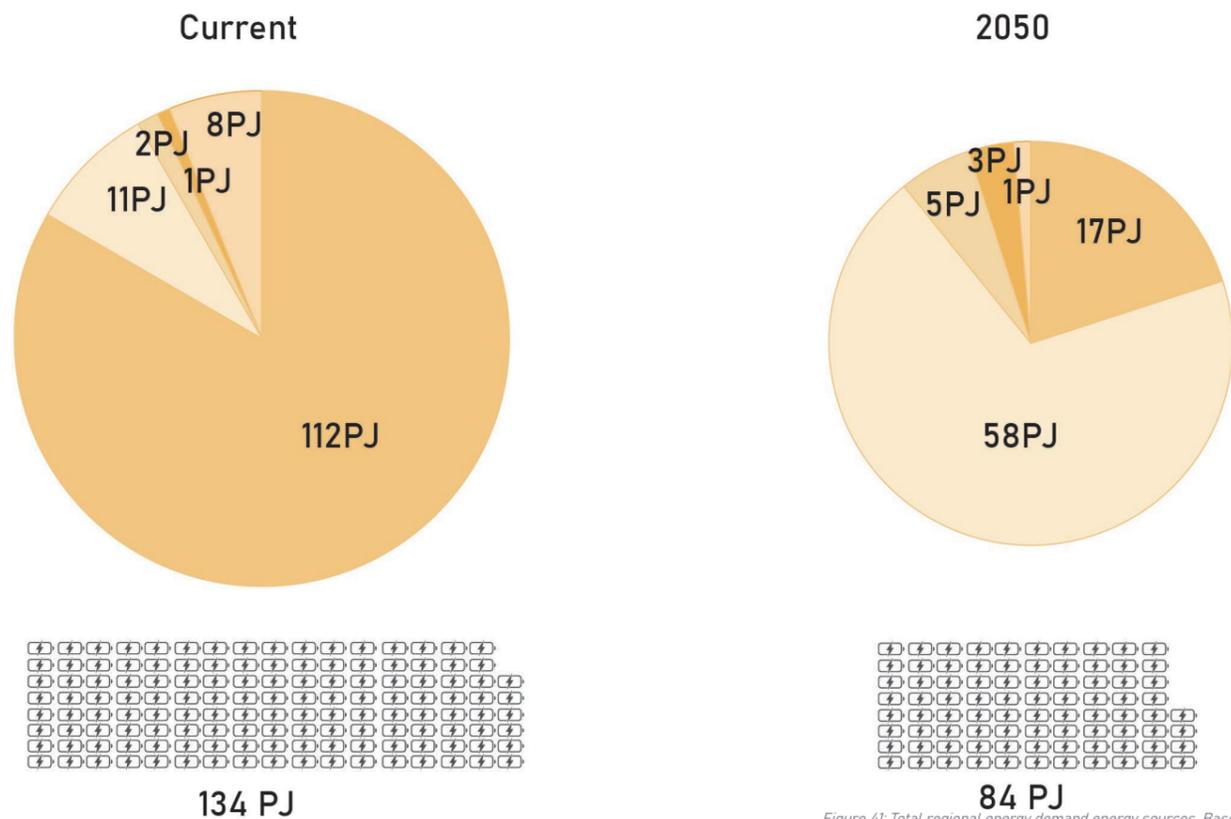


Figure 41: Total regional energy demand energy sources. Based on (CE Delft, 2020).

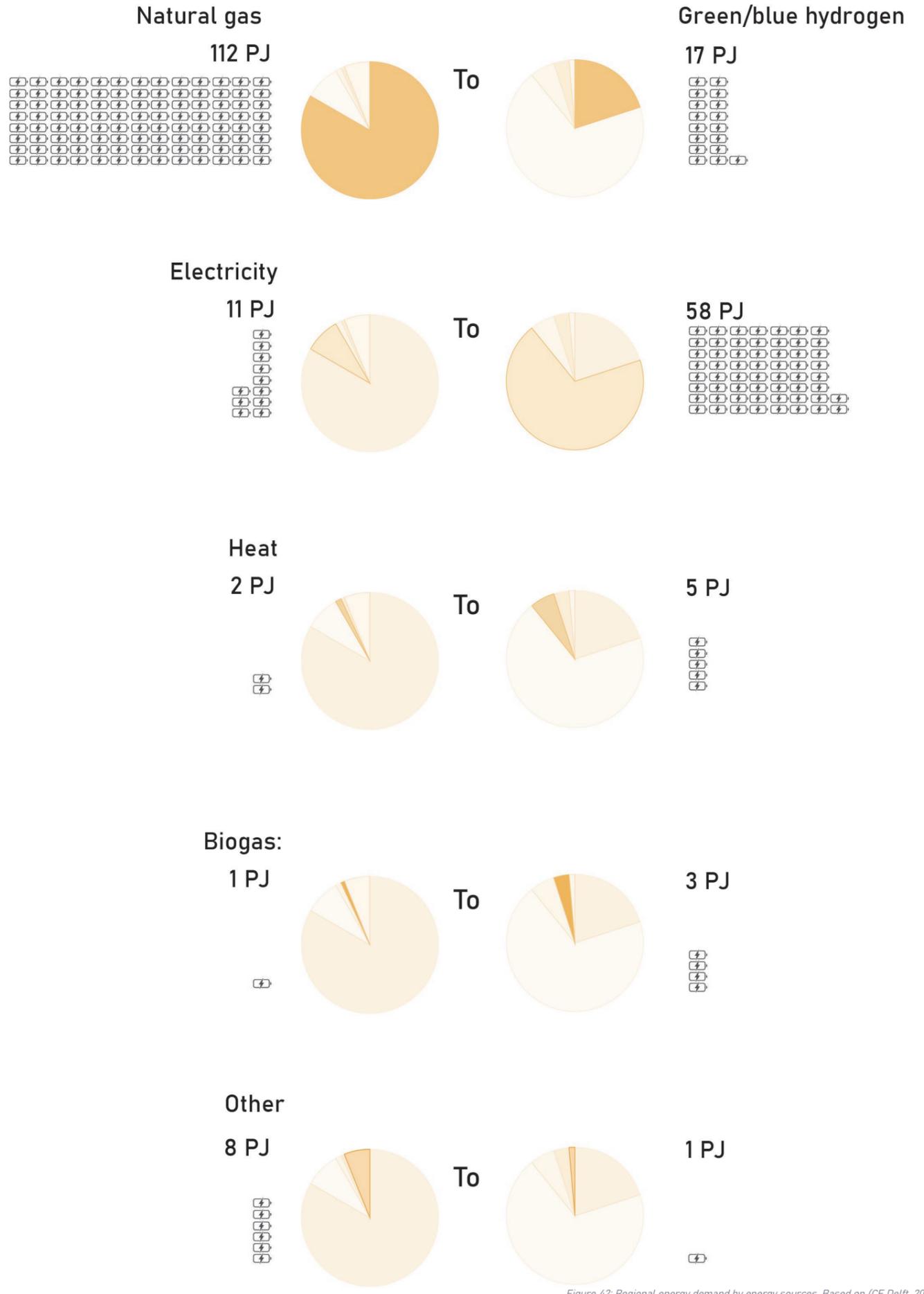


Figure 42: Regional energy demand by energy sources. Based on (CE Delft, 2020).

SPACE DEMAND FOR RENEWABLE ENERGY

In the future, energy systems will not be built around a single option, but rather a combination of multiple renewable sources. Based on the assumptions from the *Systeemstudie energie-infrastructuur Zeeland* (CE Delft, 2020), Zeeland is expected to need around 58 PetaJoule of clean or green energy. Comparing the different renewable energy sources shows that while some perform better in terms of required surface area, others score higher when it comes to the use of raw materials. A diagram adapted from *Landscape and Energy: Designing Transition* (Sijmons et al., 2014) helps to visualize these differences and the trade-offs between them.

To translate this future energy need into spatial consequences, calculations and elements from *Ruimtelijke verkenning energie en klimaat* (Klimaatkoord.nl, 2018) were used. The diagram that results from this shows the spatial impact if the full energy demand were to be met by only one renewable source. Although such a radical choice is unlikely, the visualization emphasizes the scale of space that would be needed. It highlights the importance of a balanced mix of energy sources to shape a realistic and future-proof energy landscape for Zeeland.

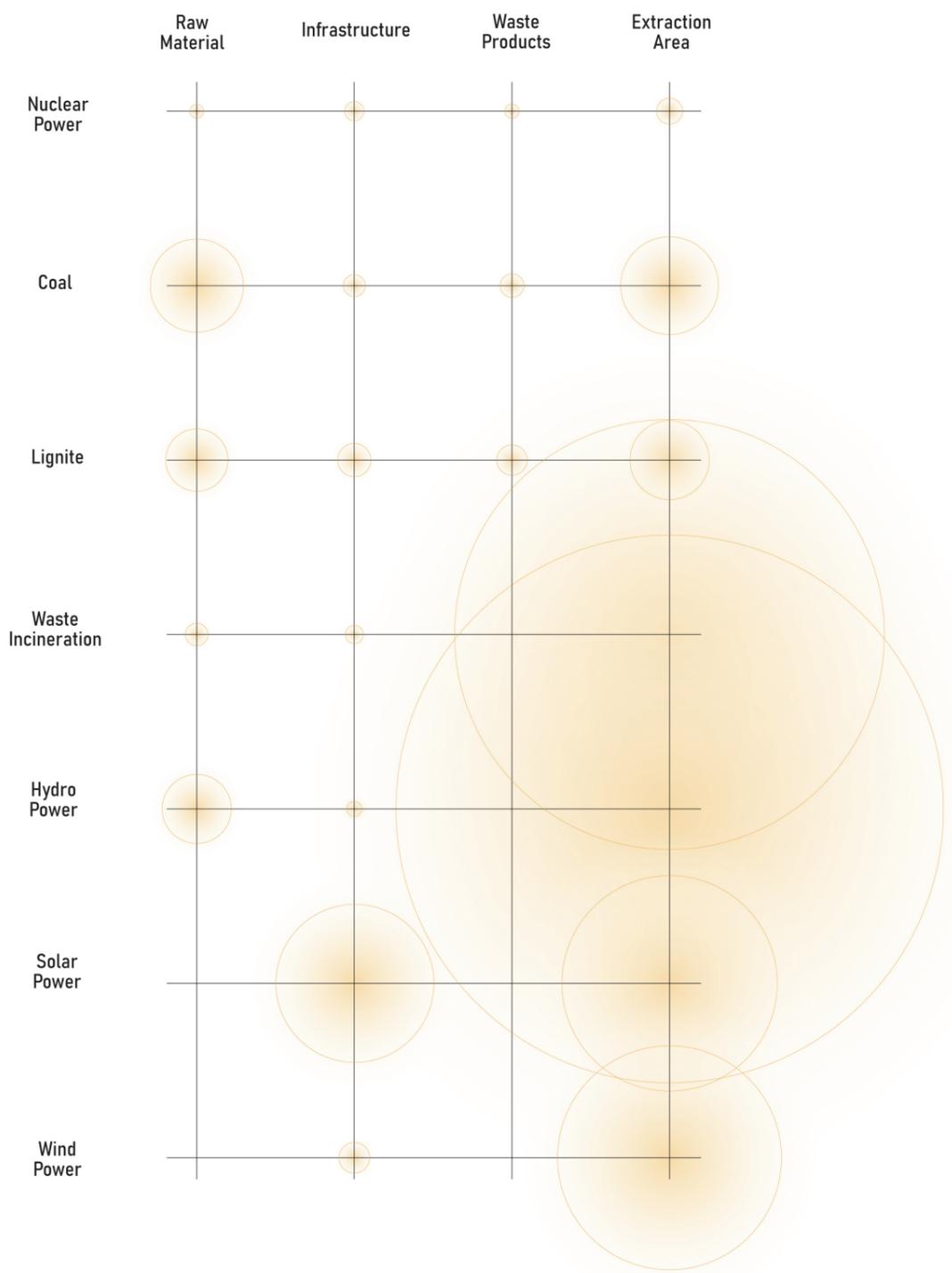


Figure 43: Comparison renewable energy sources. Adapted from (Sijmons, et al. 2014, p.143).

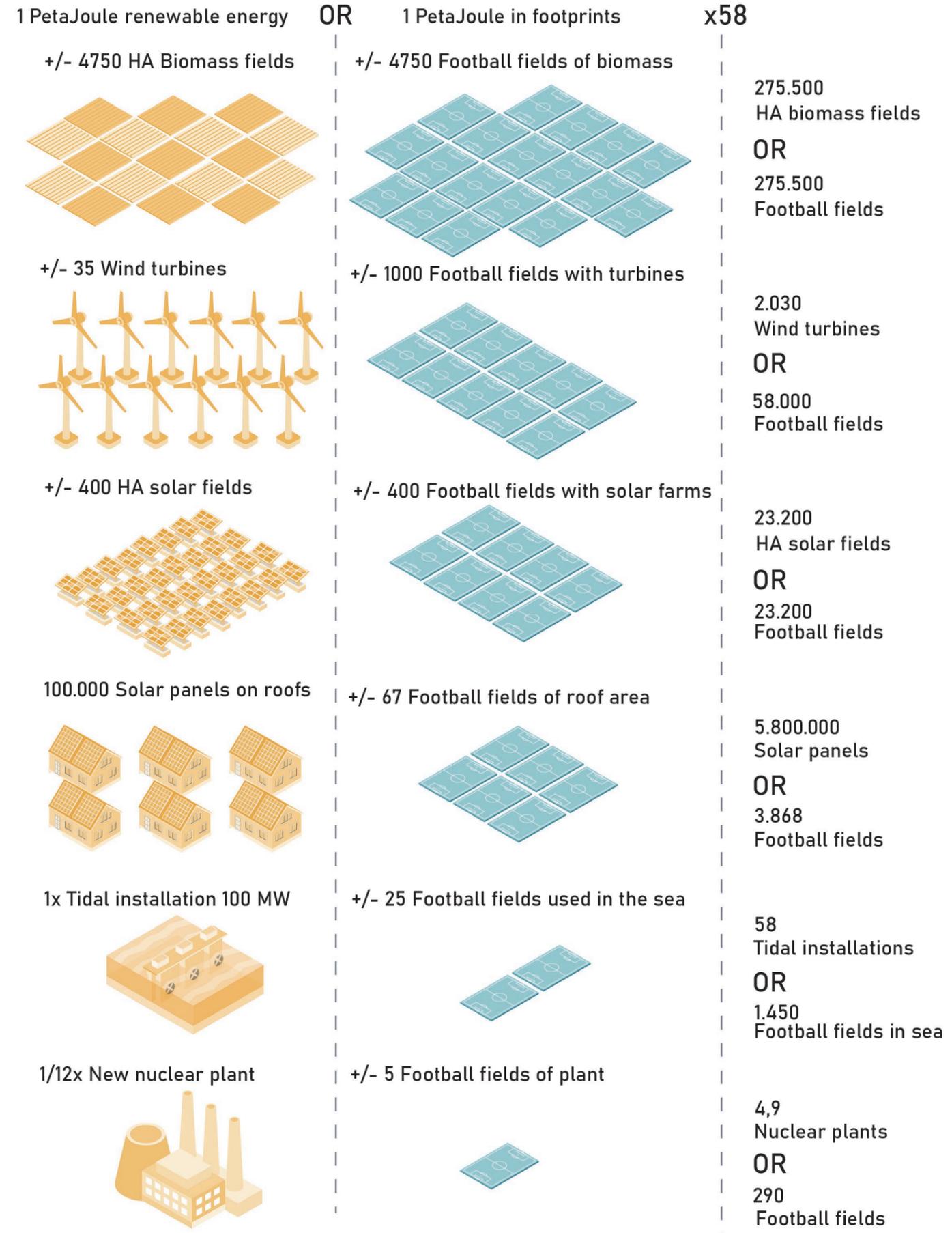


Figure 44: Spatial impact comparison and translation. Adapted from (Posad Spatial Strategies, et al., 2014, p.11).

S.W.O.T. ANALYSIS

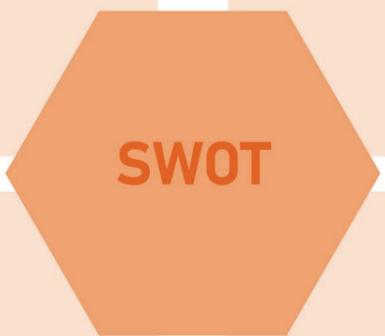
In conclusion to the analyses, a summary of Zeeland's strengths, weaknesses, opportunities, and threats has been made in order to inform the visioning phase.

STRENGTHS

- Protected waterscapes add ecological value to a landscape that is already rich with different types of soils and fauna.
- Existing cultural heritage is formed by a collection of historically valuable castles, forts, ruins, viewpoints, and other points of interest.
- Extensive cycling network that is well kept.
- The sector of tourism is already active, focussed mostly on ecotourism.
- The region's high potential for expanding solar energy production can help in electrifying some of the now polluting processes of industry.

WEAKNESSES

- Public transport infrastructure is very limited, with the railway network reaching no further than Middelburg.
- Powerful companies have a strong stake in the energy transition, but they benefit from thwarting progress in order to keep profiting as much as possible from their current practices. They benefit from postponing investments towards making their processes more sustainable.
- Current monofunctional labour landscape is not giving workers many options to choose from.



OPPORTUNITIES

- The Nationaal Plan Verduurzaming Industrie (NPVI) might be able to help transition industries toward more sustainable practices.
- National plans for the 6 harbor and/or port related NOVEX areas should act as a catalyst for even more progress in the energy transition.
- Expected population growth could function as a trigger to development.

THREATS

- Due to the effects of the worldwide climate crisis, salinization processes will make the soil in certain agricultural fields too salty to operate in its current forms. Sea level rise is also expected.
- The energy transition is incompatible with the current status quo of industry.
- Because of higher population numbers in other provinces, Zeeland has not been a priority in the development of public transport networks.



V.

VISION

VISION STATEMENT & CONCEPT

Working the Shift

From fossil-fuel based production giant to an integrated and diverse regional economy.

Zeeland stands at a turning point. Currently dominated by fossil-fuel-based industries, the region must embrace the fact that the energy transition leaves it no choice but to adapt. The regional economy must evolve beyond its current industrial monofunctionality to be resilient towards a future that is ever changing in increasingly unpredictable ways.

While renewable energy will play a vital role, the transformation cannot be limited to simply replacing one form of energy production with another. A narrow focus on energy risks creating yet another rigid system that limits opportunities for workers and communities. Instead, Zeeland must branch out to create a diverse and integrated economy where industries complement each other, workers have choices, and the region remains adaptable.

In order to empower the community of 5000 workers currently employed in fossil-fuel-based industries, this transition must be liberating instead of restrictive. Former industry workers need access to new career pathways, whether it be in clean and green energy, knowledge-driven sectors, tourism, or other.

“WE NEED A KIND OF THINKING THAT RELINKS THAT WHICH IS DISJOINTED AND COMPARTMENTALIZED, THAT RESPECTS DIVERSITY AS IT RECOGNIZES UNITY, AND THAT TRIES TO DISCERN INTERDEPENDENCIES. WE NEED A RADICAL THINKING (WHICH GETS TO THE ROOT OF PROBLEMS), A MULTIDIMENSIONAL THINKING, AND AN ORGANIZATIONAL OR SYSTEMIC THINKING”. - EDGAR MORIN

(Montuori, 2013, p. 13)

Through a focus on multifunctionality, smart land-use planning, and evolving its space identity, Zeeland can become a more dynamic region. Urban centers will grow by integrating brownfields and salinized land. Strengthening knowledge networks and improving mobility into and within the province will connect communities to opportunities.

By embracing diversity in economic sectors, spaces and voices, Zeeland will no longer be vulnerable to the monopoly of a single-sector economy. Instead, it will become a model for regional resilience; one that honors its industrial past while shaping a future full of possibility.

DL Diversification of labour landscape

The main goal of this vision is to strengthen the regional economy by moving from a monofunctional industrial landscape to a more varied one. Firstly, this will lead to more work options to choose from for the community of former fossil fuel workers. Secondly, it improves the stability of healthy economies, due to an integrated multi-sectoral approach allows for more collaborative problem solving (Dissart, 2003).

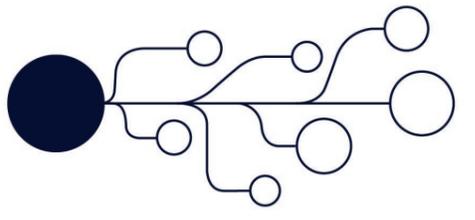


Figure 46: Diversification of labour

DS Diversification of spaces

The diversification of economy has a direct implication, that follows the need to re-evaluate the scale of spaces. Zeeland is currently a province with large open spaces, such as industrial estates and stretches of empty land on their borders that serve the purpose of keeping human activity at a distance from these less desirable looking areas. The presence of these big open spaces results in the disappearance of human scale. Within a vision that tries to diminish the dominance of the industry and its estates, there is also an opportunity to diversify the scale of spaces. Large estates or in-between waste spaces can be subdivided to allow a human scale to return here while supporting a range of more varied activities to take place.

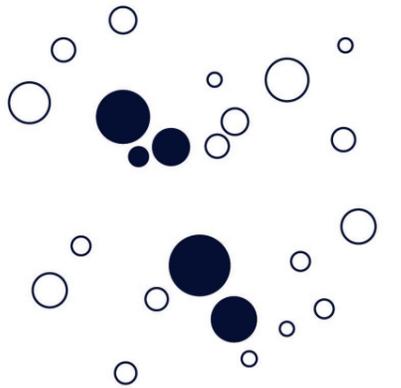


Figure 47: Diversification of spaces

DV Diversification of voices

A prosperous regional economy can only benefit from being a great place to work and live. A report by the Center for Strategic and International Studies (CSIS) concludes that communication strategies aligning with local sentiments and openness to change can foster community-led economic diversification. Engaging communities in the transition process ensures that the before-mentioned diversification efforts are tailored to local needs and contexts (Bandura & Bonin, 2024). Top-down development processes should adjust to incorporate more bottom-up involvement.

Any change on a regional scale means an integrated approach that has consequences for all affected groups; the community of fossil fuel workers are part of all citizens in Zeeland, who are in turn part of an even bigger group that are affected by structural changes in the province. This group includes all inhabitants of Zeeland, people that live nearby the border of Zeeland, and maybe even non-humans. A just transition includes these voices.

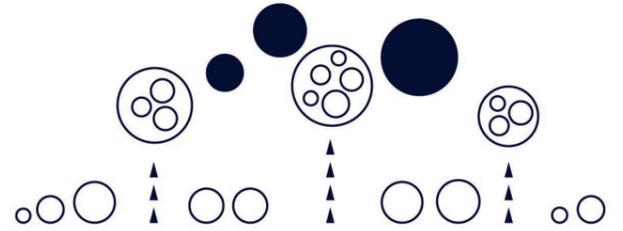


Figure 48: Diversification of voices

POTENTIAL COALITIONS & OBSTRUCTIONISTS

Several important actors present obstructions to Zeeland's energy transition due to economic, institutional or visionary concerns. One of most prominent obstructionist groups consists of the fossil fuel-based industries, which have for a long time been the economic backbone for Zeeland. Big industries like Dow, Zeeland refinery and Yara have energy transition plans but are too hesitant because of their economic and stability interests. Most industries aim to adapt gradually over time instead of doing a transformative shift. A potential significant obstructionist in Zeeland's energy transition is the Province of Zeeland, which despite officially being positive about sustainability, faces economic and spatial planning constraints. Policy documents such as the Omgevingsvisie Zeeland, the Provinciaal Omgevingsplan Zeeland (POP), and the Zeeuws Energieakkoord reflect the province's ambition to transition towards renewable energy while maintaining economic stability. However, this balancing act between environmental goals and economic interests places the province in a complex position. On one hand, it shares the vision of a sustainable future. On the other, they remain careful with the social and economic consequences of this transition, especially in terms of employment, where job certainty is fundamental. This duality puts the province between obstruction and coalition, making it a key stakeholder that could either slow down or accelerate change. To ensure that Zeeland commits to the "Working the Shift" vision, it is crucial to engage and align with the province's priorities, demonstrating that this energy transition and economic prosperity can go hand in hand.

Campus Zeeland is an important coalition in the energy transition, with the potential to play a key role in retraining workers and preparing them for new industries. As an educational and research institution, it can help workers move into clean energy, technology, and other growing sectors. However, its current programs are not yet fully aligned with the needs of a changing economy. If education (or knowledge sector) does not adapt fast enough, workers may struggle to find new opportunities, which could slow down the transition. By focusing more on practical training and new skills, Campus Zeeland can help make the transition smoother and more accessible for everyone.

Several key governmental bodies actively support Zeeland's energy transition by working in line with regional efforts. At the European level, the European Commission plays an important role through initiatives like the European Green Deal and the Blue Growth Strategy, which stimulate to decrease emissions of carbon. These policies encourage investments in clean energy, which is supporting Zeeland's transition. On the national level, the Ministries of Climate and Energy help drive the transition by making agreements such as the Paris Climate Accord, the Klimaatadaptatie Zeeland (from KGG), and the National Program for Circular Economy (NPCE). By strengthening emission guidelines and sustainability policies, these ministries can create a framework that makes it easier for Zeeland to move towards renewable energy.

At the regional level, public transport and infrastructure companies play a role in Zeeland's transition by improving connectivity and mobility. Their alignment with policies like the Structuurvisie Infrastructuur en Ruimte (SVIR) and the Ladder voor Duurzame Verstedelijking helps Zeeland's growing economy and accessibility. However, these actors can also pose challenges to the transition. Investments in infrastructure and resistance to changes in mobility patterns could slow down progress, making them potential obstructionists as well.

Zeeland's energy transition will be shaped by negotiation and compromise, as many actors can either drive or slow down the process. While fossil fuel industries remain the main obstructionists, several key players, such as governmental bodies, the Province of Zeeland, public transport and infrastructure companies, and educational institutions, generally lean toward supporting the transition. Even if they face challenges in fully committing for the transition. Industry workers are crucial to this shift since they want stability but, with a clear and well-planned approach, can become strong supporters of the transition. By ensuring that sustainability and economic diversity go hand in hand, Zeeland can move towards a clean energy future while keeping its industrial identity.



Figure 49: Coalition connections diagram

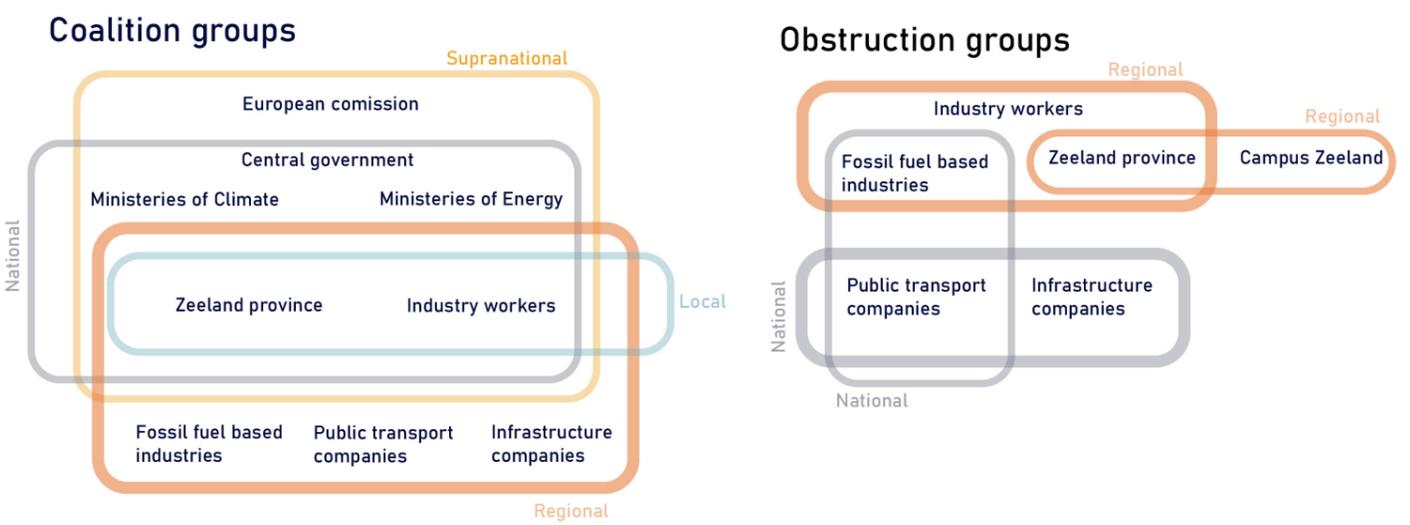


Figure 50: Coalition & obstructionist groups

SHIFTING GROUNDS

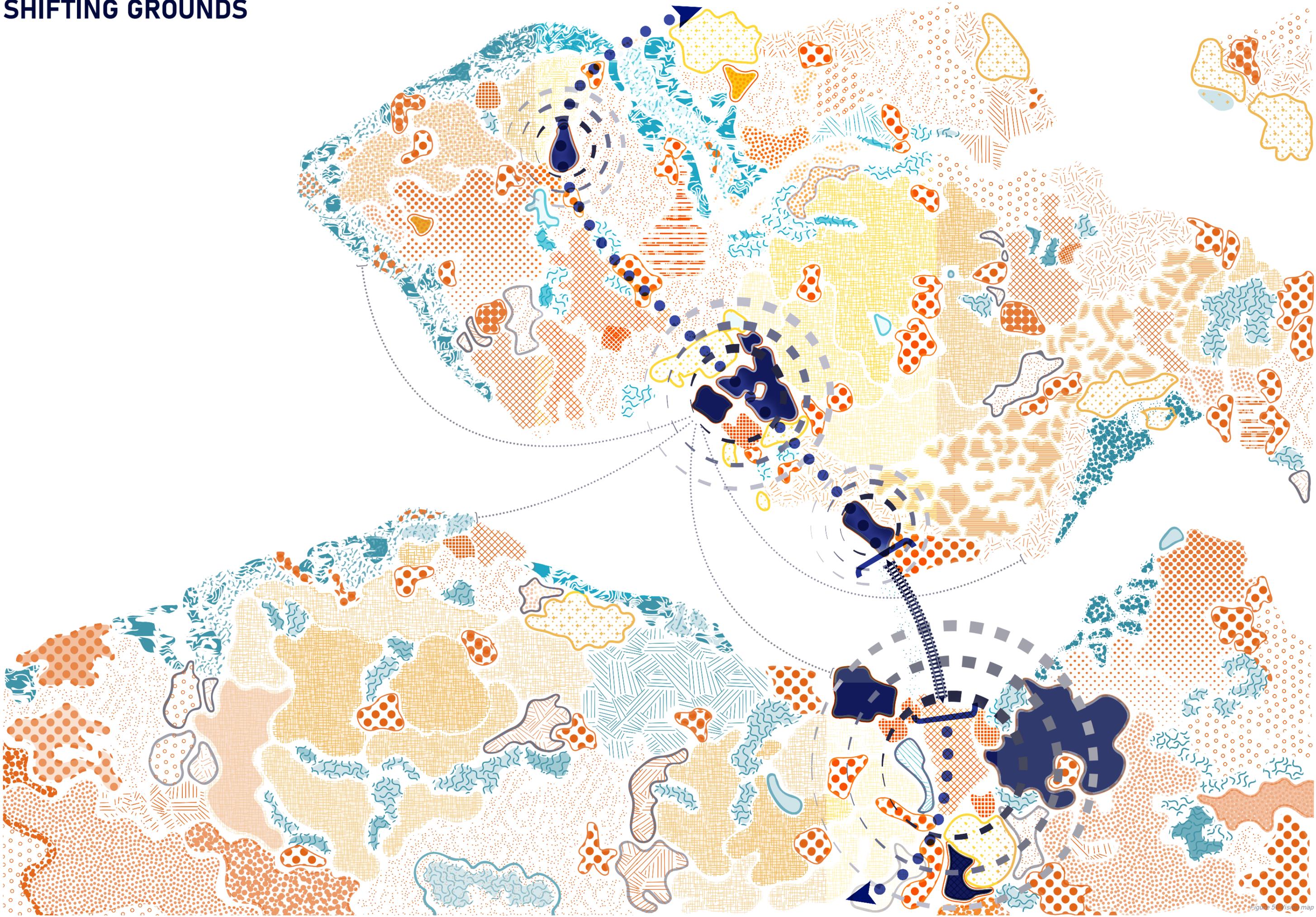


Figure 5: Vision map



VI.

STRATEGIES & INTERVENTIONS

STRATEGIC FRAMEWORK

In order to operationalize the vision, a strategic framework is followed. The strategy includes an integrated and cross-sectoral system. If all these (non-)spatial strategies and policies are overlaid immediately, the complexity would make it unreadable. This is why they are pulled apart to visualize them clearly, before converging into a synergy map which shows how they interact to induce a combined greater effect.

This diagram visualises the impact of spatial interventions, policies and strategies on three forms of diversification:

- DL Diversification of the labour landscape
- DS Diversification of spaces
- DV Diversification of voices

Different measures can contribute directly or indirectly to one or more of these types of diversification, and the impact can differ depending on the context and the extent of implementation.

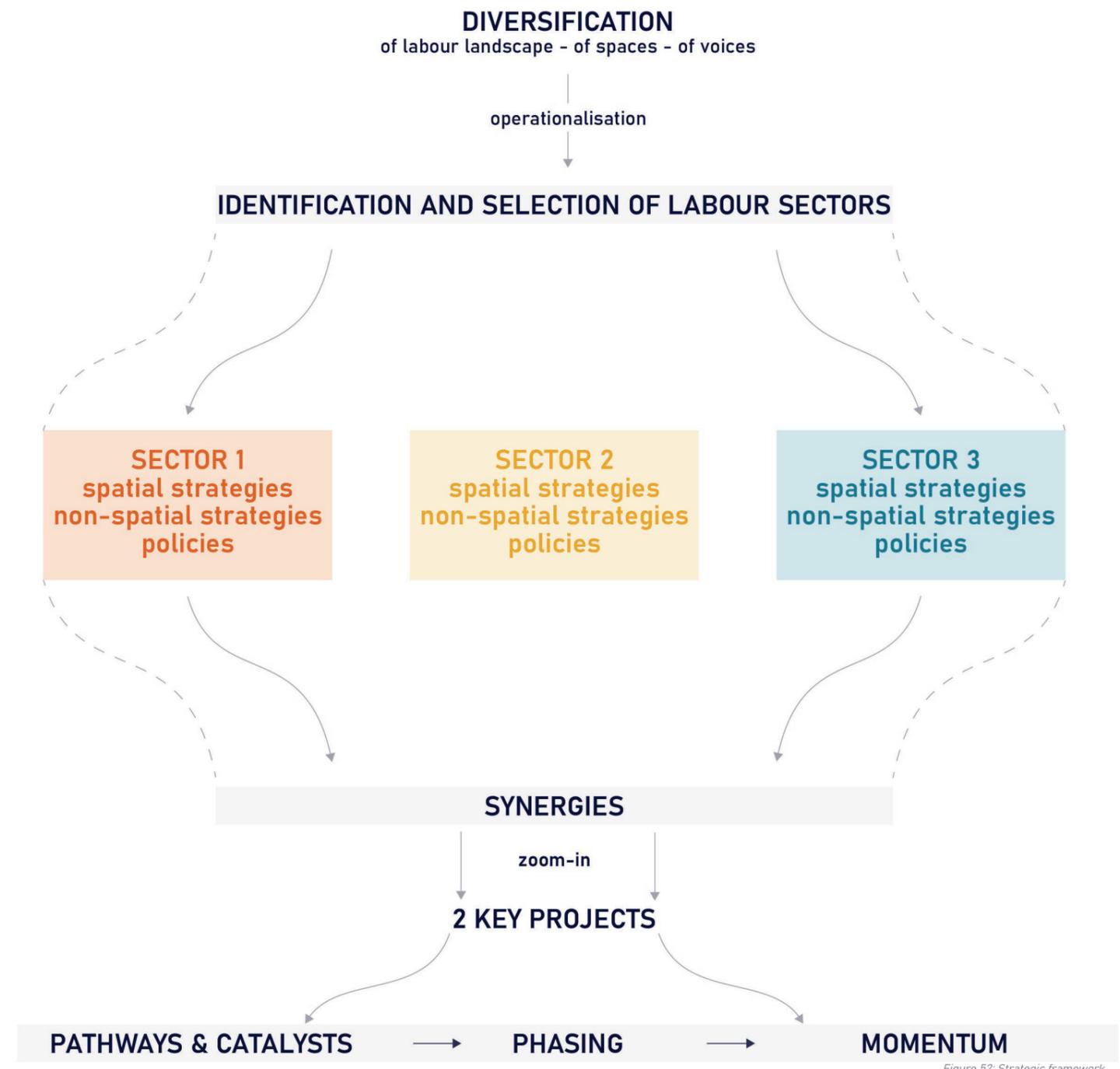


Figure 52: Strategic framework

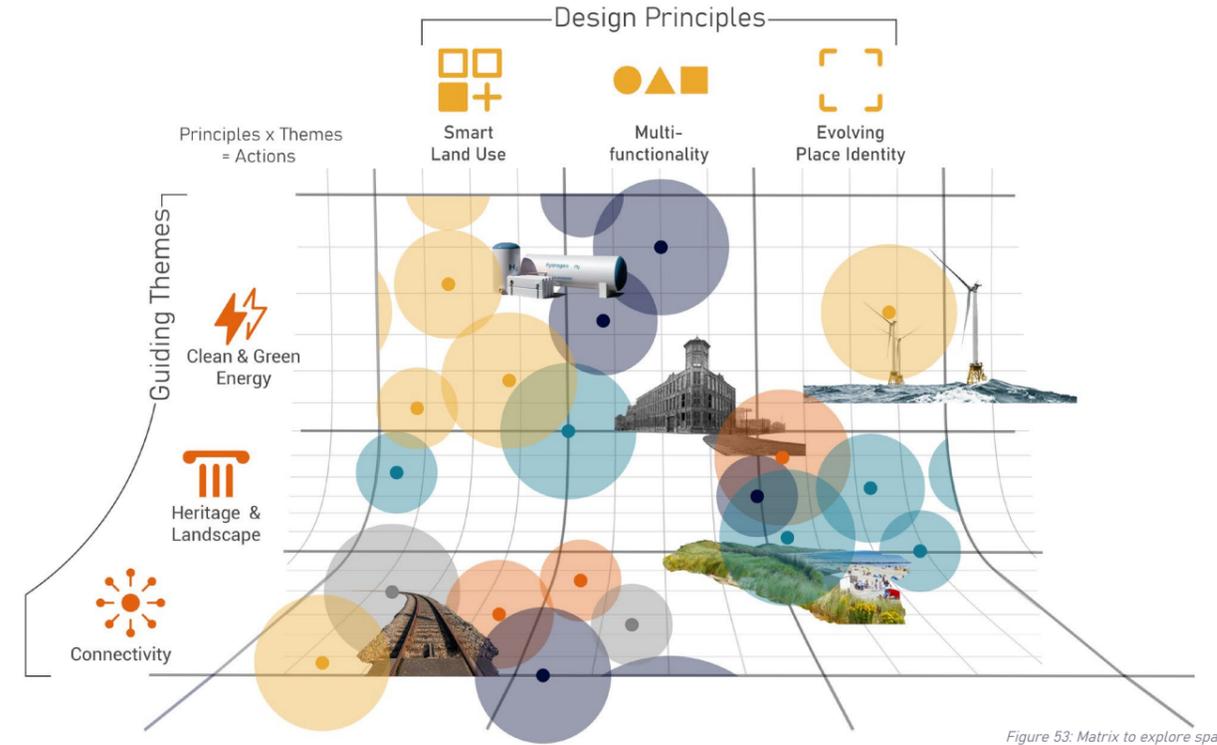


Figure 53: Matrix to explore spatial interventions

The explorative Matrix, as shown in the methodology chapter is activated by populating its cells through design explorations, spatial strategies, and narrative scenarios that reflect the diverse realities and ambitions of Zeeland's transitioning communities. This initial iteration is not intended as a fixed outcome but as a working document, one that enables continuous reflection and iterative refinement. By aligning each guiding theme with relevant design principles, the matrix becomes a tool for translating abstract ambitions into spatial approaches that are grounded, adaptable, and community-centered.

MULTIFUNCTIONALITY: CREATING SYNERGY BETWEEN DIFFERENT USES

Agrivoltaic farms produce food while generating solar energy at the same time. Mobility infrastructure doubles as energy corridors. Former industrial estates are divided to diversify the space and become multi-use zones, combining research, energy storage, tourism, and food processing. In urban centres, rooftops have solar panels and urban farms, while waterfronts integrate tourism, aquaculture, and reuse of old industrial buildings for heritage.

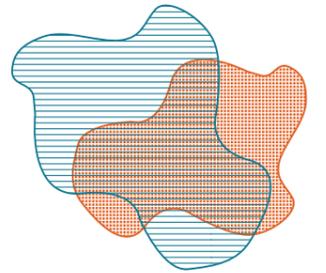


Figure 54: Creating synergy between different uses

SMART LAND USE: ADAPTATION INSTEAD OF EXPANSION

The reuse of brownfields and salinized farmlands is prioritized over the use natural landscapes. Former industrial estates are redeveloped to become hubs for clean and green energy production, innovative new ways of farming, and industrial heritage tourism. Floating farms and aquaculture hubs will make sure that the water surface becomes a production landscape as well, while wetlands and adaptive dike parks provide both flood protection and value towards the eco-tourism sector.

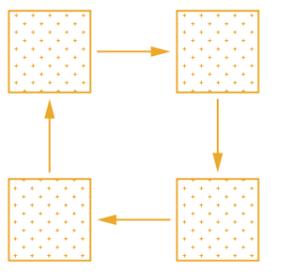


Figure 55: Adaptation instead of expansion

EVOLVING PLACE IDENTITY: HONORING THE PAST, BUILDING THE FUTURE

Zeeland's transformation should respect its industrial and ecological heritage but also adapt to fit the energy transition. Historic waterfronts and brownfields are reused to become cultural and economic centres, mixing heritage with innovation. Eco-tourism routes highlight Zeeland's natural beauty. Interactive visitor centres showcase the province's innovative adaptation strategies. Lastly, energy landscapes are integrated into the scenery to make sure that renewable infrastructure enhances Zeeland's identity instead of disrupting what is already there.

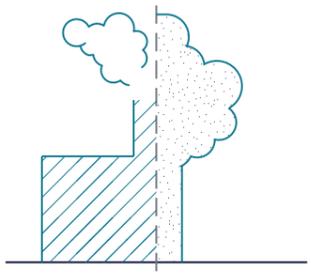


Figure 56: Honoring the past, building the future

IDENTIFICATION OF KEY LABOUR SECTORS

SECTOR IDENTIFICATION

There is no limit to the number of sectors that can be strengthened as part of the diversification of the regional economy, as the whole point of it is to branch out. Eight sectors have been highlighted because of their existing roots in Zeeland, easy retraining possibilities for fossil-fuel based workers, connection to the community, or undeniability due their general size and importance.

1. Tourism
Ecotourism and ecology-related job sectors. Focused on environmental sustainability, this sector includes: jobs in reforestation, ecological restoration, and conservation projects, initiatives for ecosystem regeneration and green infrastructure. Enhancing regional resilience through environmental protection and sustainable land management. In other projects aiming to diversify regional economies, developing the tourism sector had a positive effect on the income of low- and high-income households (Dissart, 2003).

2. Clean and green energy production
Existing wind and solar parks need maintenance and repair, and new parks that will be constructed throughout the energy transition will need manufacturing and installation, with research and design to create better technologies. The agricultural sectors provide organic waste that can be used for biogas and biofuel production, there are already biomass power plants in Sas van Gent and Sirjansland. A perspective for future development might be found in seaweed-based biomass. Green hydrogen... With the 2 projected nuclear facilities in Borssele, there is a need for plant operators, maintenance workers, and office personnel. Workers that will move to this sector will benefit from less rigorous retraining. For example, chemical engineering skills that were needed in the Zeeland refinery and DOW apply to the production of clean and green energy as well as hydrogen (Bandura & Bonin, 2024).

3. Food production
With parts of traditional farming becoming unsustainable due to salinized farmlands, new ways will have to be found to keep up food production. For example, urban farming and climate-adaptive crops may be a way forward. Greenhouses are already present in Zeeland, with Westdorpe having the largest greenhouse complex in the province. Dairy and beef livestock farming is currently most prominent in Zeeland. The role of aquaculture is similarly present in the province. The tidal conditions in Zeeland are productive for the cultivation of seaweed, which is traditionally used for dike reinforcement. Towns in Zeeland like Yerseke and Breskens have relied on fishing for centuries. The saltwater ecosystem in the Oosterschelde makes muscle and oyster farming an existing and continuing productive sector.

4. Sustainable construction
With construction being one of the most polluting sectors, it will undergo significant changes. To accommodate the growth perspectives shown during analysis, residential and commercial building will be necessary.

5. Logistics and maritime
The Sloehaven, or the North Sea Port collaboration at a bigger scale, is an undeniable presence in the working environments of Zeeland. Shipbuilding and maintenance, shipping and port-related, warehousing and transport are current subsectors that will remain present through the transition, even though it will have to incorporate more sustainable practices.

6. Education and knowledge
With all these changes to labour system, (re)training facilities will play a vital role in the transition. It requires an approach that integrates the current educational institutions as well as companies that play a part in practical training during working hours.

7. Services
There will be infrastructural work during the development of an extended mobility system. When this is physically realised or when current systems and schedules are intensified, it will require more workers to operate.

SECTOR SELECTION
Due to the time frame of this project, 3 sectors have been selected to work out specific strategies for. Clean / green energy will be worked out due to its close connection to the energy transition and the idea of Zeeland being a major producer of renewable energy. The food industry will be worked out because it is already very present in the region, making it interesting to see how the changes of the energy transition will impact it. Finally, the tourism sector will be worked out because of it being very different to the industrial work that our community is coming from, and because of corresponding values that were found during the analysis.

TOURISM

- Industrial heritage tourism
- Ecotourism
- Hospitality
- Restaurants
- Hotels

CLEAN/GREEN ENERGY PRODUCTION

- Wind turbines
- Solar parks
- Biomass
- Green hydrogen
- Nuclear facilities

FOOD INDUSTRY

- Food processing
- On water: Seaweed production
- Fisheries
- Muscle/ Oyster farming
- On land (Innovative) agriculture
- Horticulture
- Livestock farming

SUSTAINABLE CONSTRUCTION

- Residential and commercial building
- Civil engineering

LOGISTICS AND MARITIME

- Shipbuilding and maintenance
- Shipping and port-related
- Warehousing and transport

EDUCATION AND KNOWLEDGE

- Retraining
- Schools and higher education
- Research and innovation

SERVICES

- Public transit service
- Information technology
- Government

AND MORE

- Health and wellbeing
- Recycling and circular economy
- Etc.

Figure 57: Sector identification & selection

SECTOR SPECIFIC STRATEGIES

1 TOURISM

Tourism is an important part of Zeeland's transition toward a stronger and more varied economy. The map highlights key developments in this sector, showing different ways people from the community can get involved. From cultural heritage and nature-based tourism to agritourism, these projects help keep Zeeland's identity alive while creating new job and business opportunities.

BETTER MOBILITY AND CONNECTIONS

Extending the Zeeuws Toekomstbeeld Fiets (ZTF) cycling network to Breskens, Terneuzen and Antwerp will improve connectivity and make sustainable tourism easier. Thematic cycling routes will link heritage sites, nature reserves, and local food producers, while bike rentals at ferry terminals and train stations will make public transport more accessible. A coastal ferry with stops at tourist hotspots will reduce car dependency and offer a scenic alternative. Meanwhile, "Hop-on-Hop-off" transport loops within former industrial zones like Borssele and the Dow and Yara sites will help repurpose these areas for tourism and culture.

TOURISM AND HOSPITALITY GROWTH

To make Zeeland more attractive for visitors, hospitality clusters will be zoned to offer a mix of accommodation types, from eco-campsites to hotels. A unique addition will be sustainable water cabins that rise and fall with the tide, offering a new experience which highlights Zeeland's relationship with water. These developments will diversify the economy and create more options beyond traditional industry jobs.

NATURE AND ENVIRONMENT

As climate change affects Zeeland's landscape, some salinized farmland will be repurposed into wetlands and forests, creating new spaces for nature and recreation. Adaptive dike parks along the coastlines will serve as both flood protection and green public spaces. Expanding natural landscapes along the ZTF cycling routes will strengthen the link between tourism and nature. Floating platforms and birdwatching towers will give visitors more insights in Zeeland's biodiversity. To reduce the visual impact of energy developments, green buffers will be placed between industrial sites like EPZ and nature areas.

PRESERVING CULTURAL HERITAGE

Zeeland's history will be made more visible through signs in historic centres and outdoor art inspired by the region's landscapes. Industrial sites will be repurposed into spaces for culture and business. Historical waterfronts will be revitalized, turning them into lively areas with cultural centres. Small storytelling structures will bring Zeeland's rich history back to life. Also visitor centres will educate tourists on climate adaptation, making it part of the region's story since it is so important.

A STRONGER LOCAL ECONOMY

To expand economic opportunities, farmers will be encouraged with funding to welcome visitors for tours and tastings, offering a firsthand look at production of local food (oyster, mussel, seaweed, crops, cheese, etc.). This will help connect agriculture with tourism while creating new income streams. Some of the salinized farmlands will also be transformed into wetlands, offering them a new chance which also helps the environment.

To expand economic opportunities, farmers will be encouraged with funding to welcome visitors for tours and tastings, offering a firsthand look at production of local food (oyster, mussel, seaweed, crops, cheese, etc.). This will help connect agriculture with tourism while creating new income streams. Some of the salinized farmlands will also be transformed into wetlands, offering them a new chance which also helps the environment.

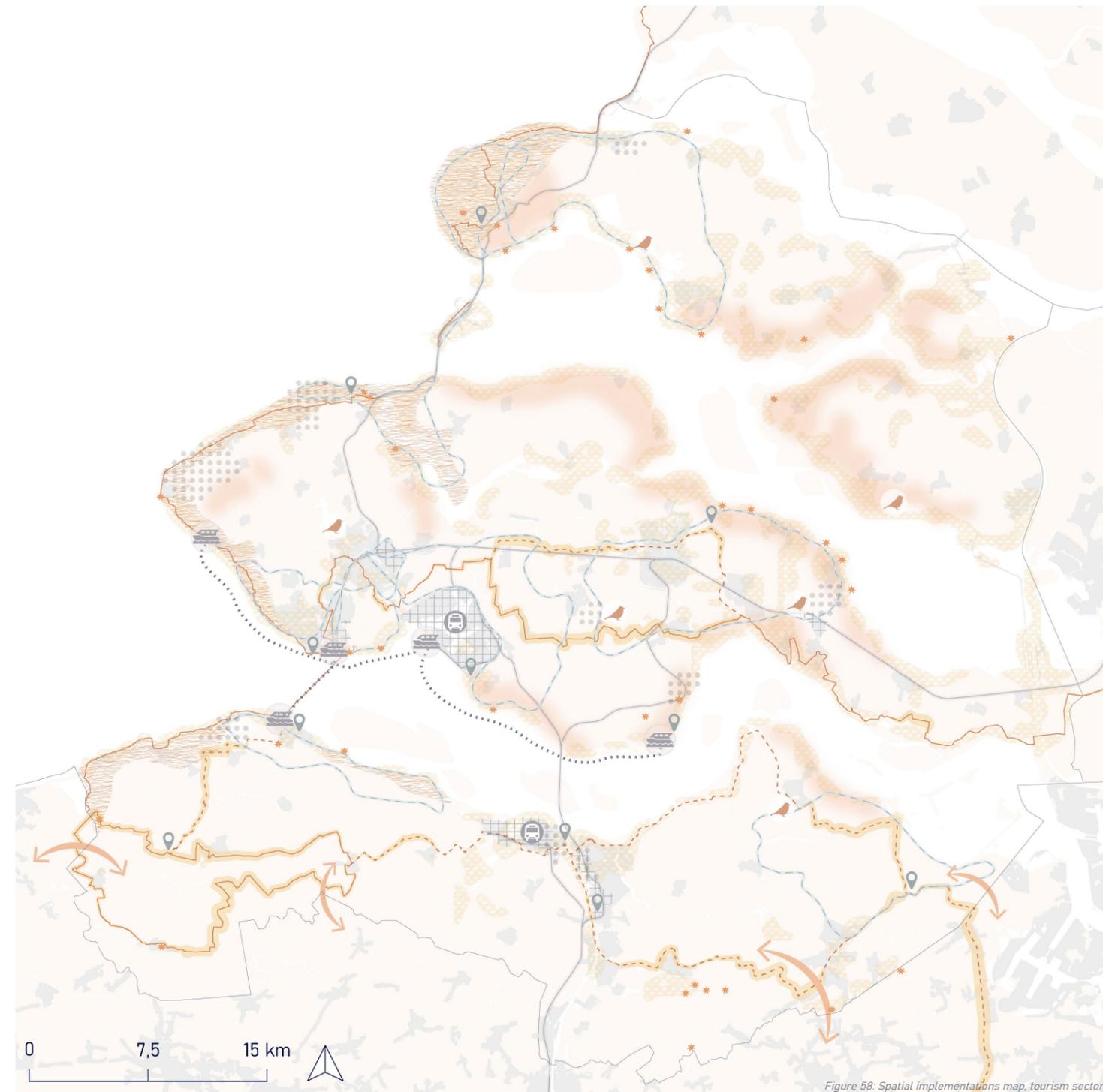
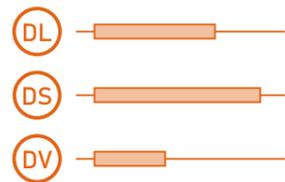


Figure 58: Spatial implementation map, tourism sector

Legend:

- Existing / projected ZTF routes
- Develop natural areas along ZTF
- Convert salinized farmland into multifunctional wetlands
- Develop adaptive dike parks through regulations and physical interventions
- Develop birdwatching spots in proximity to the main bird habitats
- Develop new visitor centers to attract and inform citizens and tourists
- Convert industrial structures into heritage or foster adaptive reuse for new functions
- Develop thematic touristic itineraries
- Implement "Hop on Hop off" public transport services within converted industrial estates
- Existing / projected ferry terminals
- Develop new ferry lines
- ↪ Foster touristic programmes between Zeeuws-Vlaanderen and Belgium
- Identified zones for new hospitality clusters (hotels, camping sites, etc.)
- Existing recreational nature
- ★ Main touristic attractions



SECTOR SPECIFIC STRATEGIES



1 TOURISM

POLICIES

1. SUSTAINABLE TOURISM & HOSPITALITY DEVELOPMENT

- Support for adaptive dike park development: Provide small grants or incentives for dike parks that combine climate resilience with tourism and recreation.
- Encouraging unique hospitality concepts: Promote affordable, Zeeland-inspired accommodations and experiences, such as saltwater spas and mobile hotels.
- Simple educational & experiential programs on climate adaptation: Develop basic programs to educate visitors about climate change adaptation with interactive elements.
- Highlight sustainable fishing and seaweed farming as affordable attractions.
- Visitor centres for information and engagement: Establish modest visitor centers at key crossovers to provide tourism information and promote local heritage.
- Basic digital tools for tourism promotion: Support low-cost digital platforms that enhance regional tourism marketing.
- Practical training programs for hospitality and tourism: Offer accessible training initiatives to boost service quality and workforce skills.

2. CULTURAL & HERITAGE PRESERVATION

- Low-cost revitalization of historical waterfronts: Support small-scale restoration and adaptive reuse of historic waterfront areas.
- Encouraging the re-use of heritage buildings: Offer simple incentives and flexible regulations to support the sustainable use of historic buildings.
- Public-private collaborations for heritage: Promote partnerships between local governments, businesses, and communities to protect heritage affordably.
- Adding cultural and historical signage: Install small-scale signs along bike and walking routes to share Zeeland's history.

3. ENHANCING MULTIMODAL TRANSPORT & INFRASTRUCTURE

- Better integration of bike rentals with public transport: Improve mobility by adding bike rental points at ferry terminals and train stations.
- Extension of the Zeeland transport fund (ZTF): Expand ZTF services to Terneuzen, Breskens, and Belgium to improve mobility.
- Introducing a new ferry route: Add a ferry service with a few strategic stops to enhance regional connectivity and cultural tourism.

4. ENVIRONMENTAL & LANDSCAPE ADAPTATION

- Helping farmers adapt to salinization: Offer basic support to farmers transitioning to new land uses.
- Enhancing natural experiences with small interventions: Install simple birdwatching towers and nature observation spots.

5. LOCAL ECONOMIC DEVELOPMENT & COMMUNITY SUPPORT

- Support for local food production and tourism experience along gastronomic routes: Provide small-scale funding for local producers who contribute to food tourism.
- Encouraging small recreational spaces along tourism routes: Provide modest funding for playgrounds, rest areas, and other small-scale public spaces.
- Outdoor art installations along tourism paths: Support simple public art projects to enhance cultural engagement.

6. DIVERSIFICATION OF VOICES

- Local Engagement in Tourism through Storytelling: Incentivise local narrative in tourism by having locals as guides in community walks, audio tours or heritage projects, for increased engagement.
- Small-scale and Social Tourism: Support local initiatives such as social enterprises and community projects, to make tourism benefit the community.



Figure 59: Collage tourism sector

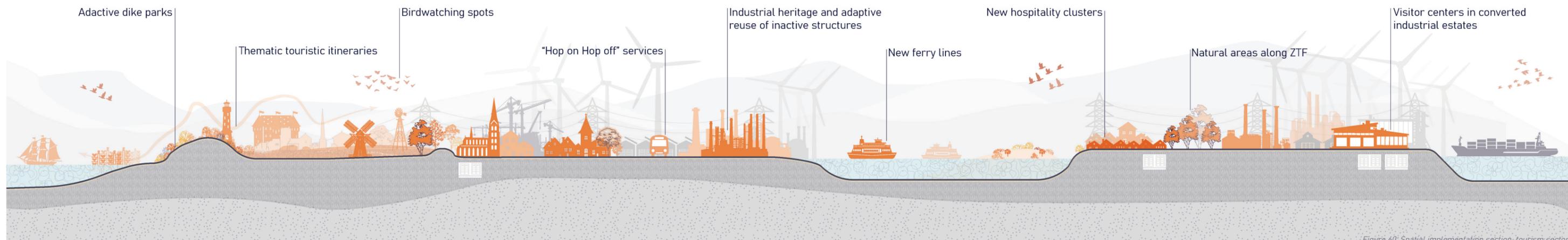


Figure 60: Spatial implementation section, tourism sector

SECTOR SPECIFIC STRATEGIES

2 CLEAN/GREEN ENERGY PRODUCTION

Zeeland is shifting away from fossil fuels toward a more flexible and diverse energy system. The map highlights key energy developments that reduces the need for fossil fuels while creating new opportunities for the local economy. This transition is not just about switching energy sources. It is about building a system that works for both people and the region. There are already plans which support parts of the vision. Policies like the RES, Zeeuws Energieakkoord, Provinciaal Omgevingsplan Zeeland, European Green Deal, and NOVEX Zeeland, are aligned with this energy transition.

EXPANDING WIND ENERGY

Wind energy plays a major role in Zeeland's future. The North Sea Port area is set to host 500 hectares of renewable energy production, with new offshore wind farms under consideration. These projects will bring jobs in wind turbine construction, maintenance, and grid operation, providing clear career paths for former fossil fuel workers. Retraining hubs will help workers transition into these roles with hands-on training in wind technology.

SCALING UP SOLAR ENERGY

Zeeland is making smart use of space to expand solar energy. Agrivoltaic clusters will combine certain crop farming and solar power, while mandatory solar panels on large buildings will push solar production further. Urban areas will see adaptive solar canopies, using sun-tracking technology to maximize energy capture. These developments will create jobs in solar installation, energy management, and landuse planning, with retraining helps the former industry workers lead the transition.

NEW ENERGY TECHNOLOGIES & INFRASTRUCTURE

Beyond wind and solar, Zeeland is investing in tidal energy, hydrogen production, and biomass plants to create a balanced energy system. Hydrogen clusters and new high-voltage networks will support large-scale renewable production, while old greenhouse clusters will be repurposed into advanced energy facilities. This will open up high-skill jobs in hydrogen production, bio-energy, and smart grid management, with retraining hubs providing these skills.



Figure 61: Spatial implementations map, clean/green energy production sector

Legend:

- New 380kv electricity station / substation (RES 2.0)
- Existing 380kv station
- Offshore wind energy landing (Borssele and IJmuiden Ver)
- New 380kv connection (CES 3.0)
- Electricity infrastructure network
- Develop integrated agrivoltaic clusters on non-salinized farmland
- Identified focus areas to develop solar energy on roofs
- Existing solar parks
- Identified concentration locations for wind turbines installation (RES 2.0)
- Additional proposed wind farms
- Integrated hubs for green hydrogen production and storage
- Proposed H2 underwater connection
- H2 european backbone (under development)
- Existing H2 underground pipeline
- Existing / projected tidal energy production sites
- Proposed nuclear power plants
- Mosaic landscape of renewable energy facilities and agriculture
- Renewable energy R&D and manufacturing hubs
- Convert greenhouse clusters into advanced energy facilities
- Convert extended parking lots into energy facilities

- DL
- DS
- DV

SECTOR SPECIFIC STRATEGIES



2

CLEAN/GREEN ENERGY PRODUCTION

POLICIES

1. AFFORDABLE RENEWABLE ENERGY IN URBAN & INDUSTRIAL AREAS

- Encourage solar panel installation in development projects: Work with developers to prioritize cost-effective solar panel installations on new and existing buildings.
- Basic renewable energy requirements for new buildings: Set practical insulation standards and promote solar panels where feasible, aligning with regional energy goals.
- Supporting renewable-powered industrial areas: Encourage businesses in industrial zones to transition towards renewable energy, including small-scale hydrogen production where viable.
- Encouraging small-scale green hydrogen initiatives: Support limited hydrogen production and storage projects in key industrial areas where economically feasible.
- Exploring biomass energy in existing circular clusters: Support low-cost biomass initiatives within circular economy hubs, using available waste streams efficiently.

2. COMMUNITY-DRIVEN RENEWABLE ENERGY SOLUTIONS

- Basic support for community energy projects: Provide small grants or low-cost loans for cooperatives to set up shared renewable energy initiatives.
- Encouraging locally owned energy cooperatives: Promote community ownership of small-scale solar, wind, or tidal energy projects to create local jobs and investment opportunities.

3. PRACTICAL SUPPORT FOR INNOVATIVE RENEWABLE ENERGY

- Targeted supports for experimental energy projects: Offer small-scale funding for non-traditional renewable energy, such as agrivoltaics and solar tree canopies.
- Collaboration for low-cost clean energy research: Promote simple partnerships between businesses, universities, and local governments to test affordable renewable solutions.
- Flexible zoning to enable small-scale energy innovation: Adjust zoning laws to allow space for practical, multi-functional renewable energy projects.
- Encouraging aesthetic integration of renewable energy: Develop simple guidelines to help renewable installations blend into the local environment without additional cost burdens.
- Supporting local research & production: Facilitate connections between research institutions and manufacturers to support efficient renewable technology development.

4. DIVERSIFICATION OF VOICES

- Community Energy Projects: Facilitate local involvement in clean energy projects, such as with Zeeuwind, where locals are co-owners of wind turbines. This empowers communities and ensures diversity of voices.
- Union based decisions: Encourage the formation of trade unions and ensure that at least 30% of stakeholders involved in policy-making represent the collective worker interest, such as trade unions or urbanists.



Figure 62: Collage clean/green energy sector

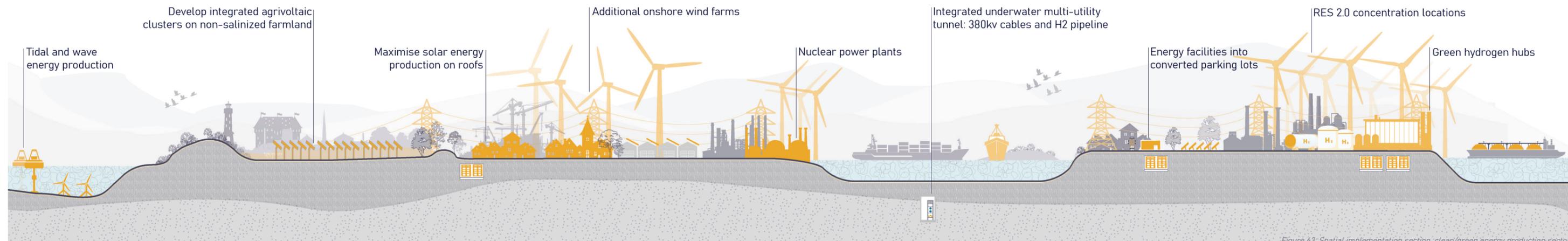


Figure 63: Spatial implementation section, clean/green energy production sector

SECTOR SPECIFIC STRATEGIES



3 FOOD INDUSTRY

Zeeland stands at a turning point. Historically reliant on fossil-fuel-based industries, the region must now embrace a broader transformation. The food industry sector will play a key role in this transition. This map highlights key food industry developments that create new job opportunities while also reinforcing Zeeland's identity as a hub for sustainable food innovation.

Expanding food industries is not just about producing more food; it is about creating a system that works for both people and the land. Policies like the CAP EU, Provinciaal Omgevingsplan Zeeland, and the European Green Deal support this shift. By integrating food production with mobility solutions, retraining hubs, and regenerative practices, Zeeland is building a future where industries work together and the workforce has real choices.

DEVELOPING ALGAE INNOVATION HUBS

Zeeland is establishing algae and seaweed hubs that combine production, processing, and research. Coastal algae farms and R&D labs will drive bio-based agrifood industries, offering sustainable alternatives to traditional food sources. These hubs will also provide former fossil fuel workers with opportunities in biotechnology and marine-based industries through retraining programs.

CIRCULAR NUTRIENT RECYCLING & AGRIVOLTAIC FARMING

Zeeland is a leading factor in circular nutrient recycling, converting agricultural waste into biofertilizers to enhance soil health. Agrivoltaic farming will optimize land use by combining solar energy with food production, helping to sustain agriculture while generating renewable energy.

ENHANCING MOBILITY & FOOD DISTRIBUTION NETWORKS

Connecting food production areas with distribution hubs is key to strengthening local food systems. New transport routes will link processing centres, urban food hubs, and ports, ensuring efficient movement of the food while also reducing emissions. Strategic locations for distribution centres and food hubs are being identified to reinforce short supply chains and increase local market access.

AGRI-TOURISM & PUBLIC ENGAGEMENT

food industry and tourism will be integrated through designated agri-tourism areas, fostering collaborations between farms and tourism enterprises. Culinary trails, interactive farm experiences, and educational programs will engage the public in sustainable food production.

Urban farming & repurposed greenhouse clusters

Underutilized urban spaces will be converted into vertical farming districts and aquaponics centres, supplying fresh products and also providing retraining for workers. Former greenhouse clusters will be refunctioned into agrifood facilities, that combine food processing and sustainable energy generation.

ZONING FOR AQUACULTURE & FLOATING FARMS

With rising sea levels, aquaculture hubs will be developed in brackish water zones. These hubs will cultivate shellfish and seaweed, diversifying the regional economy while reducing pressure on traditional farmland. Floating farms will also utilize underused water spaces for sustainable food production.

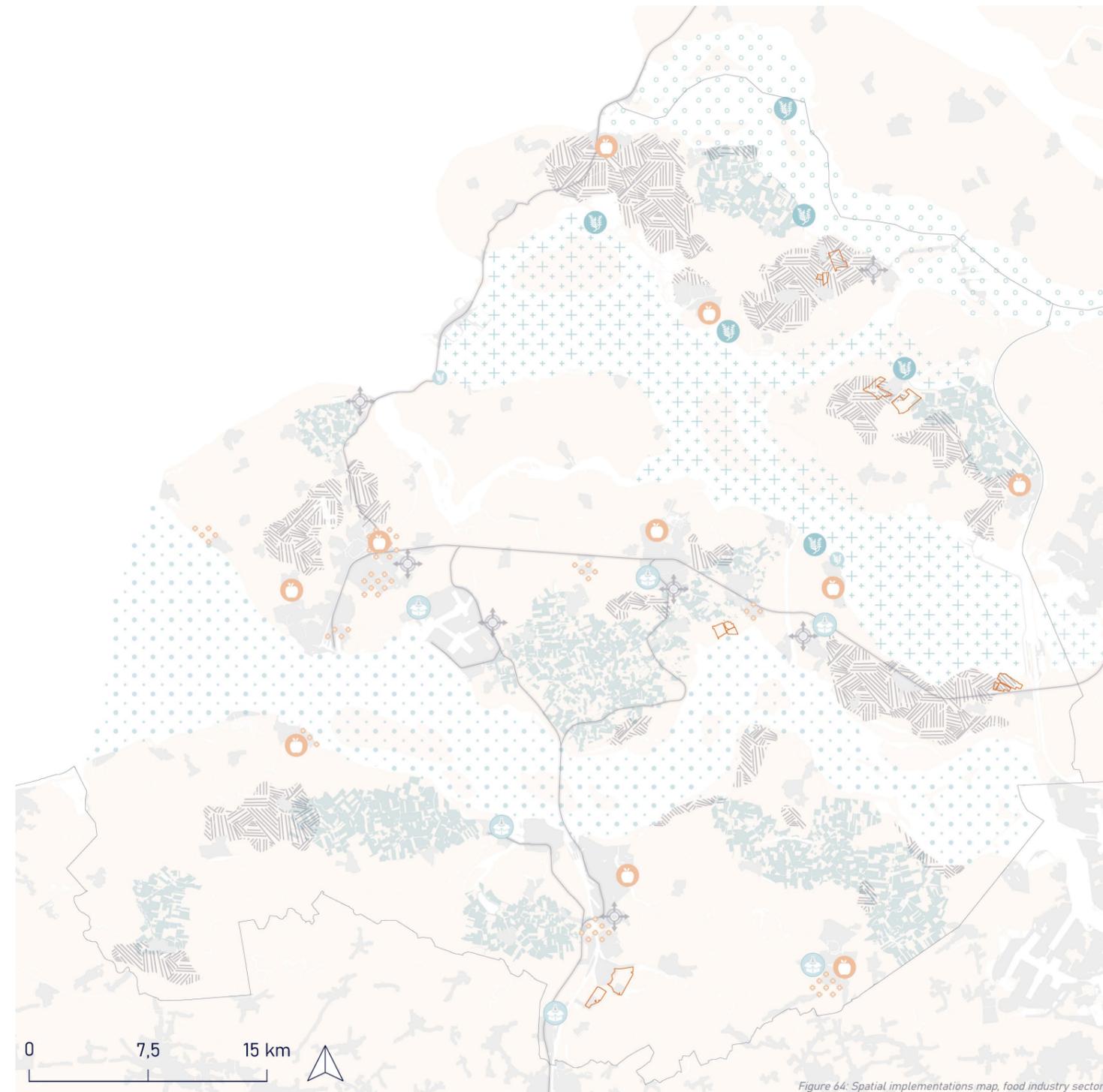
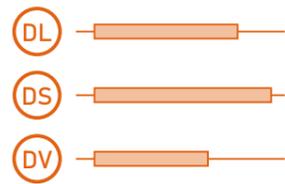


Figure 64: Spatial implementations map, food industry sector

Legend:

- Convert agriculture with crops suitable for agrivoltaic farming
- Develop salt-crops incubators for experimental resilient techniques
- Identified strategic locations for distribution centers to reinforce short supply chains
- Develop integrated agrifood processing parks inside converted industrial estates
- Convert greenhouse clusters into advanced facilities for food production and processing
- Convert underused urban spaces into urban farming districts
- Develop urban foodscapes in proximity to residential areas
- Develop algae innovation hubs along coastal areas
- Create the conditions for the development of diverse marine ecosystems:
- Grevelingenmeer - Mixed
- Eastern scheldt - Shellfishes and Oysters
- Western Scheldt - Fishery



SECTOR SPECIFIC STRATEGIES



3

FOOD INDUSTRY

POLICIES

1. STRENGTHENING SUSTAINABLE FARMING & SOIL PROTECTION

- Introduce farming standards for soil & water protection: Develop regulations that promote soil health, water conservation, and biodiversity in line with EU CAP policies.
- Encourage crop rotation for soil health: Set simple guidelines to help farmers alternate crops to maintain soil fertility, reduce chemical use, and adapt to changing soil conditions.
- Support salt-tolerant crop research and testing: Create test fields and incubators where farmers can trial saline agriculture with shared facilities and expert guidance.
- Expand aquaculture in brackish waters: Help farmers and fishers set up aquaculture hubs for shellfish and seaweed, reducing pressure on traditional farmlands.
- Identify and manage fishing zones by ecosystem: Define and regulate fishing areas based on different water conditions (salt vs. freshwater) to protect marine biodiversity.

2. LINKING AGRICULTURE WITH TOURISM & THE CIRCULAR ECONOMY

- Fund agri-tourism areas in key locations: Highlight regions where farms and tourism can work together, such as culinary routes or farm experiences.
- Promote partnerships between farmers and tourism Operators: Offer incentives for collaborations that bring visitors to farms, helping both sectors grow.
- Develop circular farming & nutrient recycling centers: Support projects that convert farm waste into useful materials like fertilizers, reducing waste and improving soil health.
- Encourage public-private partnerships for sustainable farming: Work with businesses, research institutions, and governments to improve food production methods and test new models.

3. IMPROVING LOCAL FOOD SYSTEMS & SHORT SUPPLY CHAINS

- Support for local food production along gastronomic routes: Provide small-scale funding for local producers who contribute to food tourism.
- Helping local producers offer tourism experiences: Assist farmers and food producers in organizing tours and tastings.
- Convert greenhouse clusters into modern food hubs: Upgrade greenhouse areas to serve as centers for food production and processing.
- Develop urban food parks: Establish small-scale farming areas in cities and expansion zones to grow fresh produce for local markets and communities.
- Connect local farmers to consumers: Set up programs that link local producers directly to consumers, following the Km0 short supply chain model.
- Support food distribution centers & hubs: Provide funding and logistical support to create local food hubs that improve storage and distribution.

4. DIVERSIFICATION OF VOICES

- Stimulate local co-operatives in which farmers, consumers and other actors work together: This can help strengthen local community participation in the food industry sector and give them a voice in food production and distribution.
- Have at least 30% of the seats in agricultural advisory councils or food boards reserved for the representatives of: Small-scale farmers, Consumer organisations and other minority communities in the agriculture sector.



Figure 65: Collage food industry sector

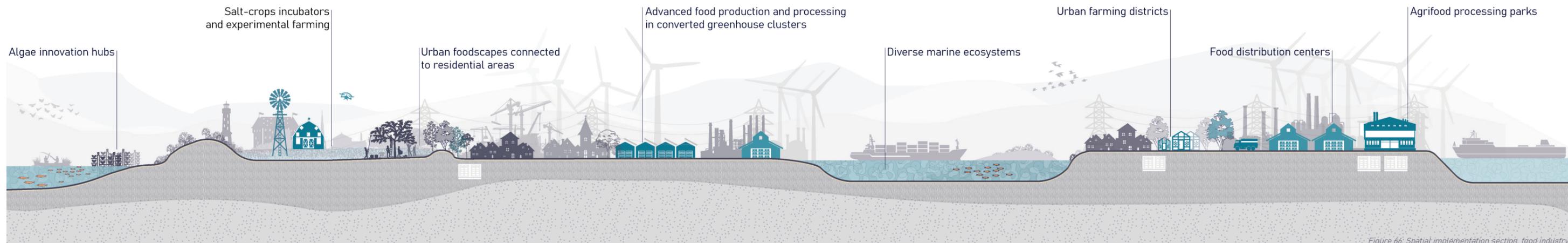


Figure 66: Spatial implementation section, food industry

SYSTEM SYNERGIES

This subchapter aims to demonstrate the synergies of the future regional system, imagined as a flexible combination of work sectors that could be developed to achieve the diversification of Zeeland's regional economy. It is important to recall that the first form of diversification, namely Diversification of Labour (DL), is proposed in an exploratory rather than an exhaustive manner. Since the strategic phase of the project is focused on the three economic sectors that emerged as the most promising, the various spatialities represented on the map, reflecting the Diversification of Spaces (DS) as a direct consequence of DL, are not meant to be prescriptive, but rather indicative possibilities.

In key locations, the coexistence of multiple functions would foster more complex and varied geographies. Even with the exclusive strategic development of the three selected sectors, 'hotspots' defined by high densities already emerge across the region, spaces where multiplicity flourishes in line with the Design Principle of Multifunctionality. As a result, these areas become attractive hubs where diversification is the driving force, hence enabling combined synergies and benefits between inherent functions and exchanges.

Building on the aforementioned content, a set of fundamental elements that will drive the development and strength of the region has been spatialised. Central to these set is the Theme of Connectivity, understood in both its tangible and intangible aspects.

Strategically positioned across the region, integrated training hubs are introduced as multifunctional centres for worker retraining in response to the energy transition. These hubs serve not only as spaces for re-skilling professionals but also for fostering versatile and diverse skill sets among broader groups of individuals. The selection of locations is based on the emergence of new spatialities tied to the development of the three key economic sectors explored.

Secondly, a significant extension of the railway network is proposed, including the restoration of existing, disused lines (in line with the principle of smart land-use) and the development of new, essential connections. The most important of these would be the northern link to the Randstad, which would greatly enhance regional accessibility from various points across the national territory. Also very important is the southern connection to Ghent, which would substantially strengthen ties and exchanges with Belgium. The stations locations along the network are proposed to increase internal accessibility, composing a diffuse system that reaches all major urban centers.

In addition, the map highlights areas suitable for the expansion of existing urban centres that are currently agricultural lands expected to be converted due to the future salinization of surface soils.

Lastly, are being represented locations for the development of new places dedicated to public debate and social gatherings. These spaces are envisioned as inclusive forums where citizens, workers, and, more in general, all civil stakeholders can come together. Such spaces play a vital role in achieving the Diversification of Voices (DV), the third key conceptual dimension of the vision.

Legend:

-  Integrated training hubs
-  Strategic urban expansions on salinized farmland
-  Projected spaces for social gathering and public debates
-  Existing railway network
-  Railway network extension
-  Train stations

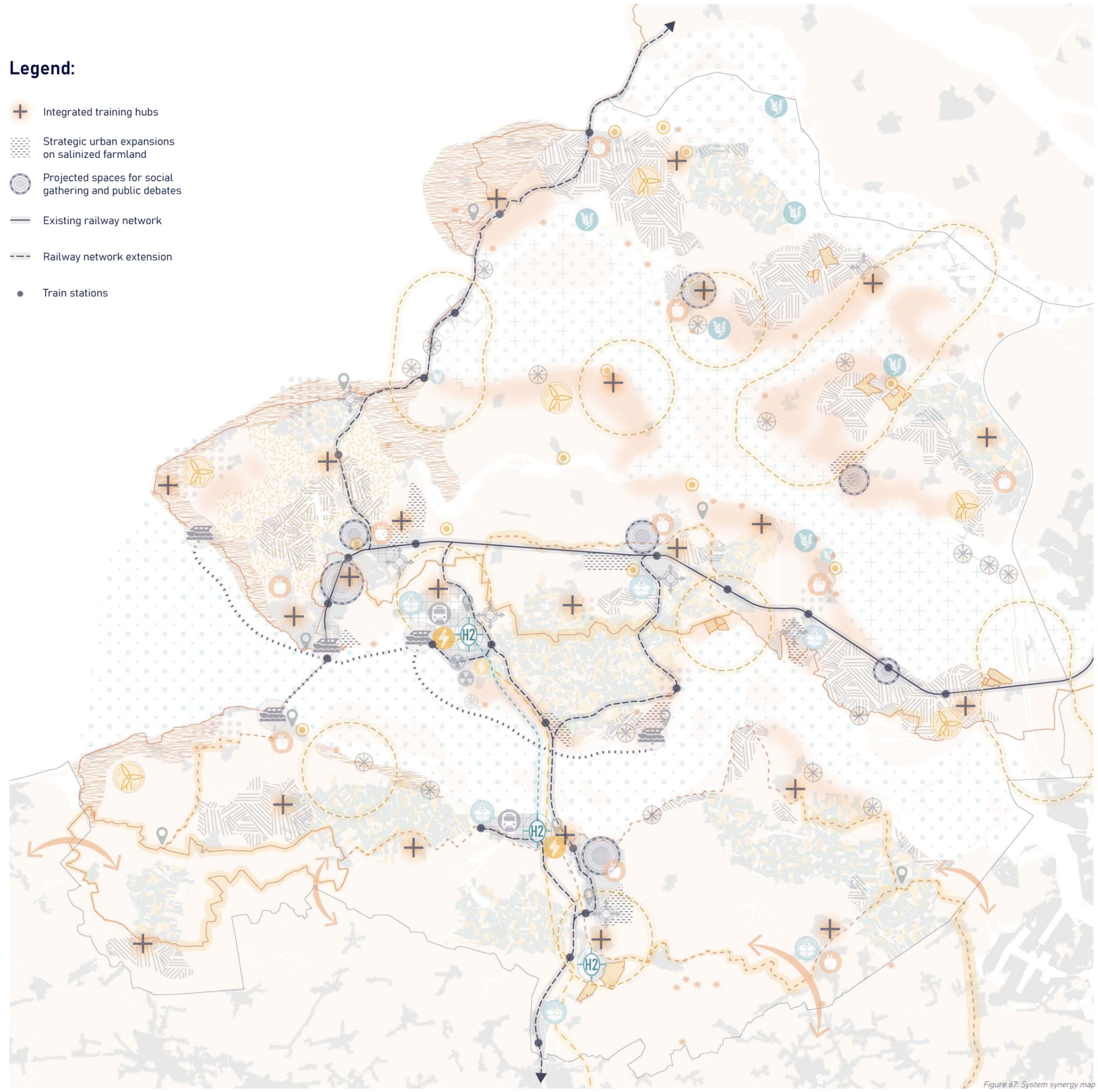
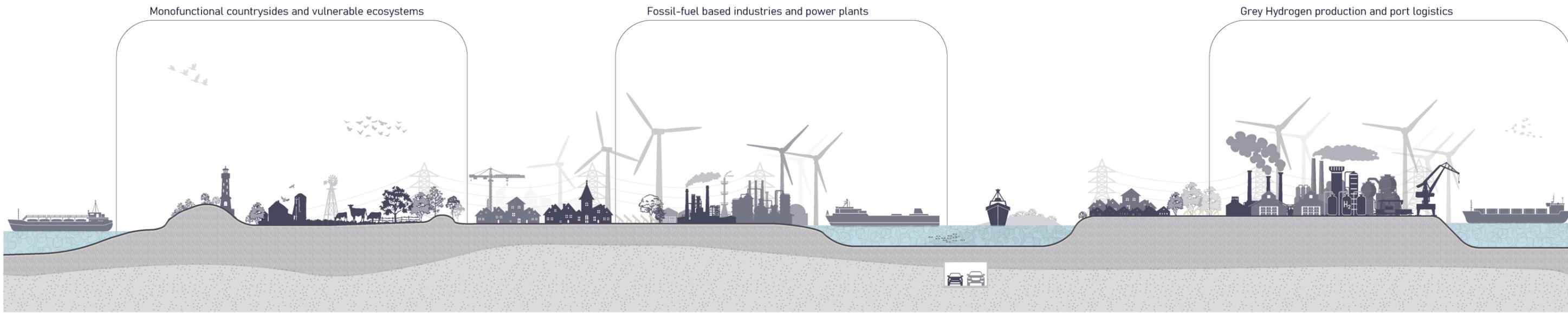


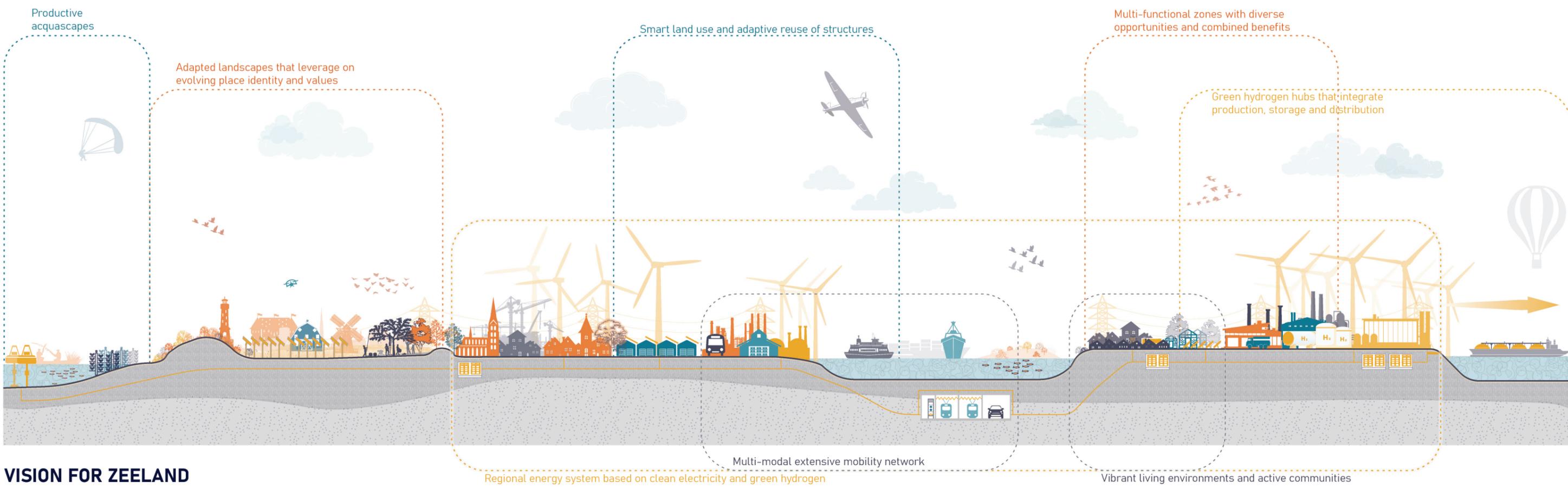
Figure 67: System synergy map

SYSTEM SYNERGIES



CURRENT SITUATION

Figure 68: Systemic section current situation



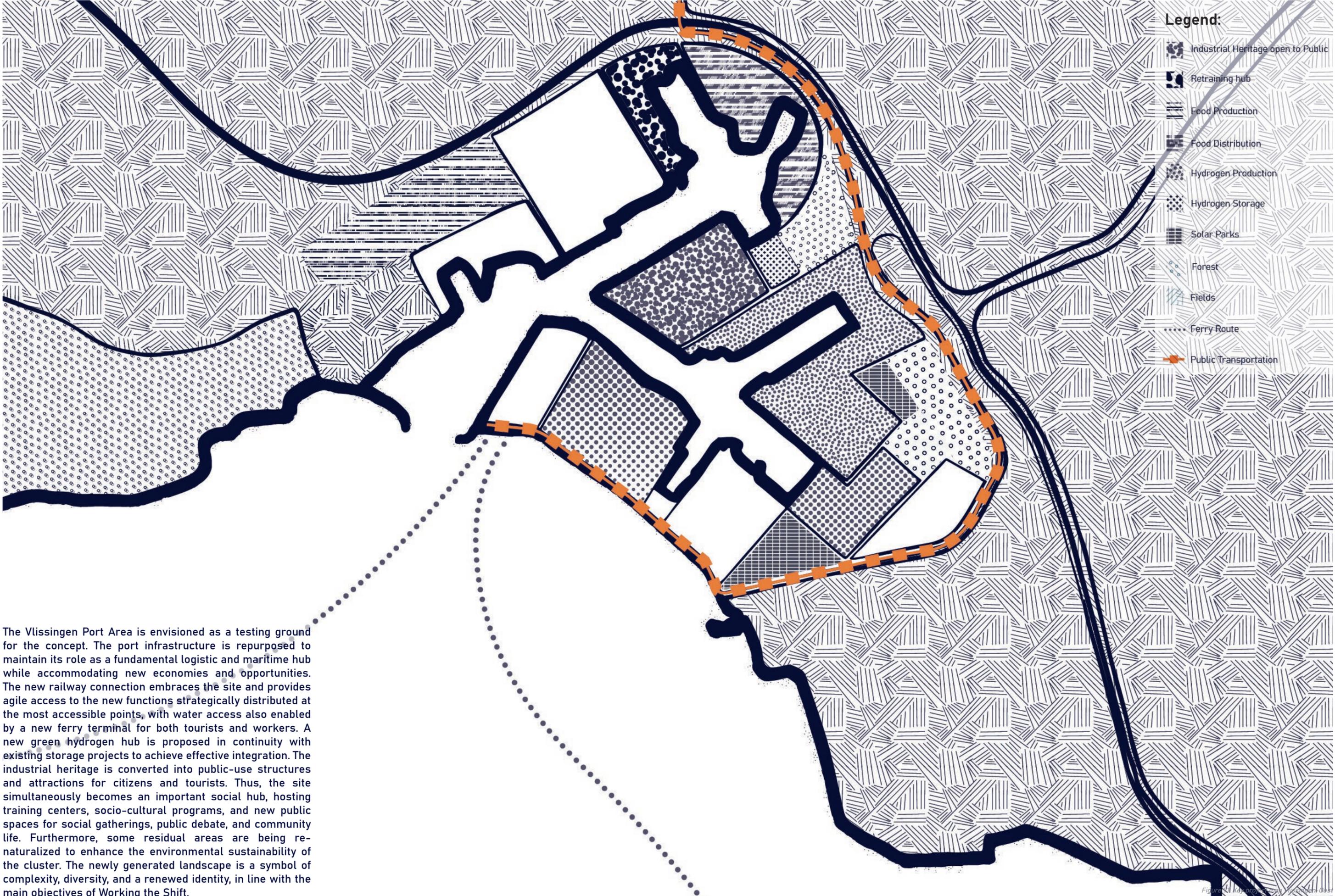
VISION FOR ZEELAND

Figure 69: Systemic section vision for Zeeland



Figure 70: Collage, Working the Shift

KEY PROJECT 1: VLISSINGEN OOST



The Vlissingen Port Area is envisioned as a testing ground for the concept. The port infrastructure is repurposed to maintain its role as a fundamental logistic and maritime hub while accommodating new economies and opportunities. The new railway connection embraces the site and provides agile access to the new functions strategically distributed at the most accessible points, with water access also enabled by a new ferry terminal for both tourists and workers. A new green hydrogen hub is proposed in continuity with existing storage projects to achieve effective integration. The industrial heritage is converted into public-use structures and attractions for citizens and tourists. Thus, the site simultaneously becomes an important social hub, hosting training centers, socio-cultural programs, and new public spaces for social gatherings, public debate, and community life. Furthermore, some residual areas are being re-naturalized to enhance the environmental sustainability of the cluster. The newly generated landscape is a symbol of complexity, diversity, and a renewed identity, in line with the main objectives of Working the Shift.

Figure 11 Key project 1: Vlissingen Oost



Figure 72: Key project impression Vlissingen-Oost

KEY PROJECT 2: DOW SITE

At the DOW site, industrial legacy is shaped to meet future needs and open interesting opportunities and combinations. This area evolves into a hybrid multi-functional landscape where energy infrastructure, innovative industries and ecological regeneration coexist. Central to this transformation is the establishment of a central public area that leverage on adaptive reuse of industrial buildings, complemented by a hydrogen production and storage hub and an extensive area of educational and training facilities. These retraining facilities are a connectors between the site, the city of Terneuzen and its envisioned expansion. Additionally, there are new public transport stations proposed in proximity to the readapted tunnel that will run between Vlissingen and Terneuzen underneath the Western Scheldt. This second key project celebrates the Zeeland's history of energy and industrie while actively shaping its futue, rooted in diversity, social resilience, and local empowerment.

- Legend:**
-  Industrial Heritage open to Public
 -  Retraining hub
 -  Food Production
 -  Hydrogen Production
 -  Hydrogen Storage
 -  Solar Parks
 -  Forest
 -  Fields
 -  Public Transportation



Figure 73: Key project area DOW site



Figure 74: Key project impression DOW site

PATHWAYS & CATALYSTS

To support the vision of diversification, Pathways maps were developed. Pathways are defined as the following. Pathway: 'the movement of the community through the sectors'. This means that each pathway is its own possible route that workers can take based on the sector.

In this, spatial hotspots have been identified for each sector, these hotspots are connected by the pathways and show all the different possibilities based on the three sectors

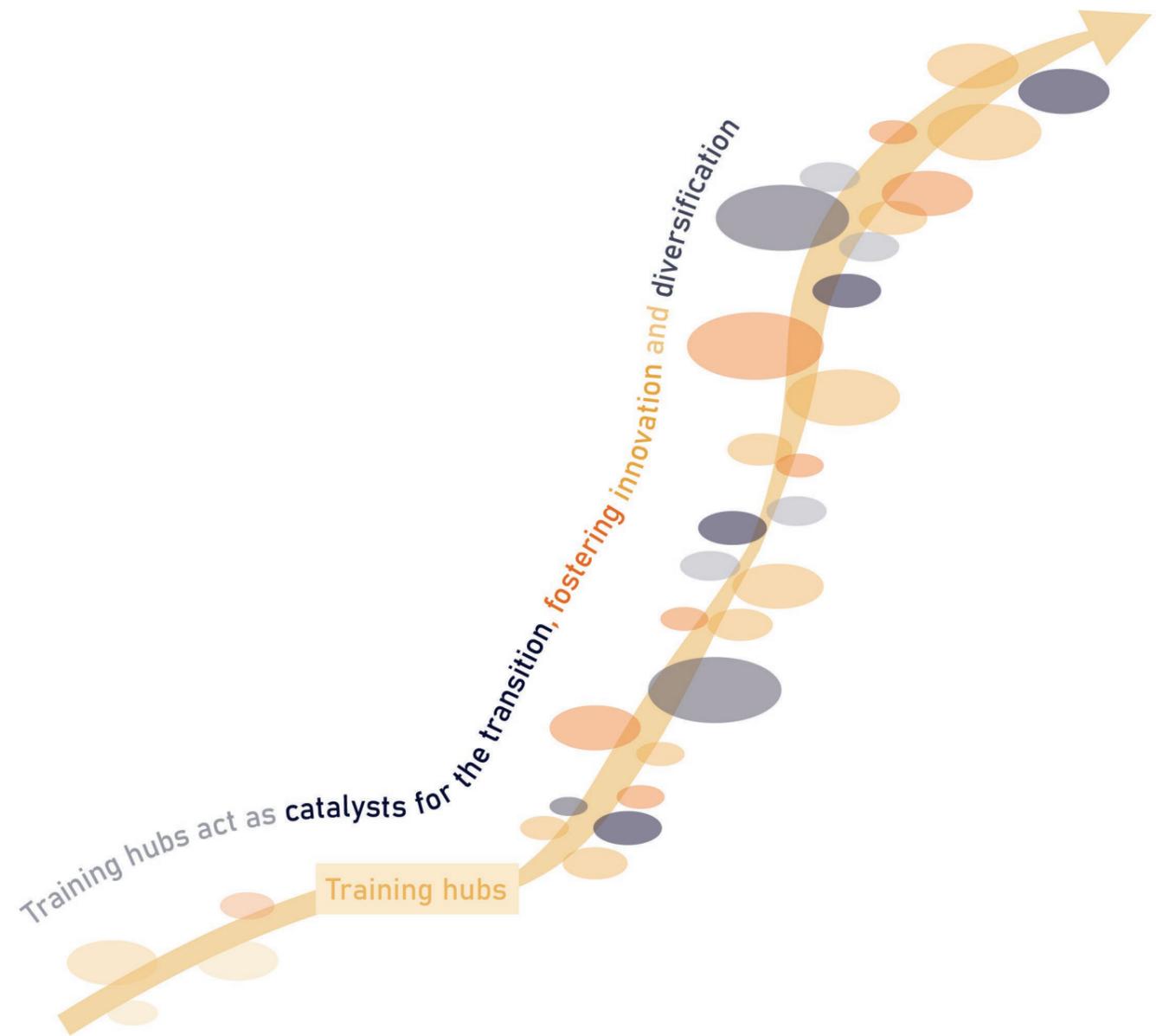
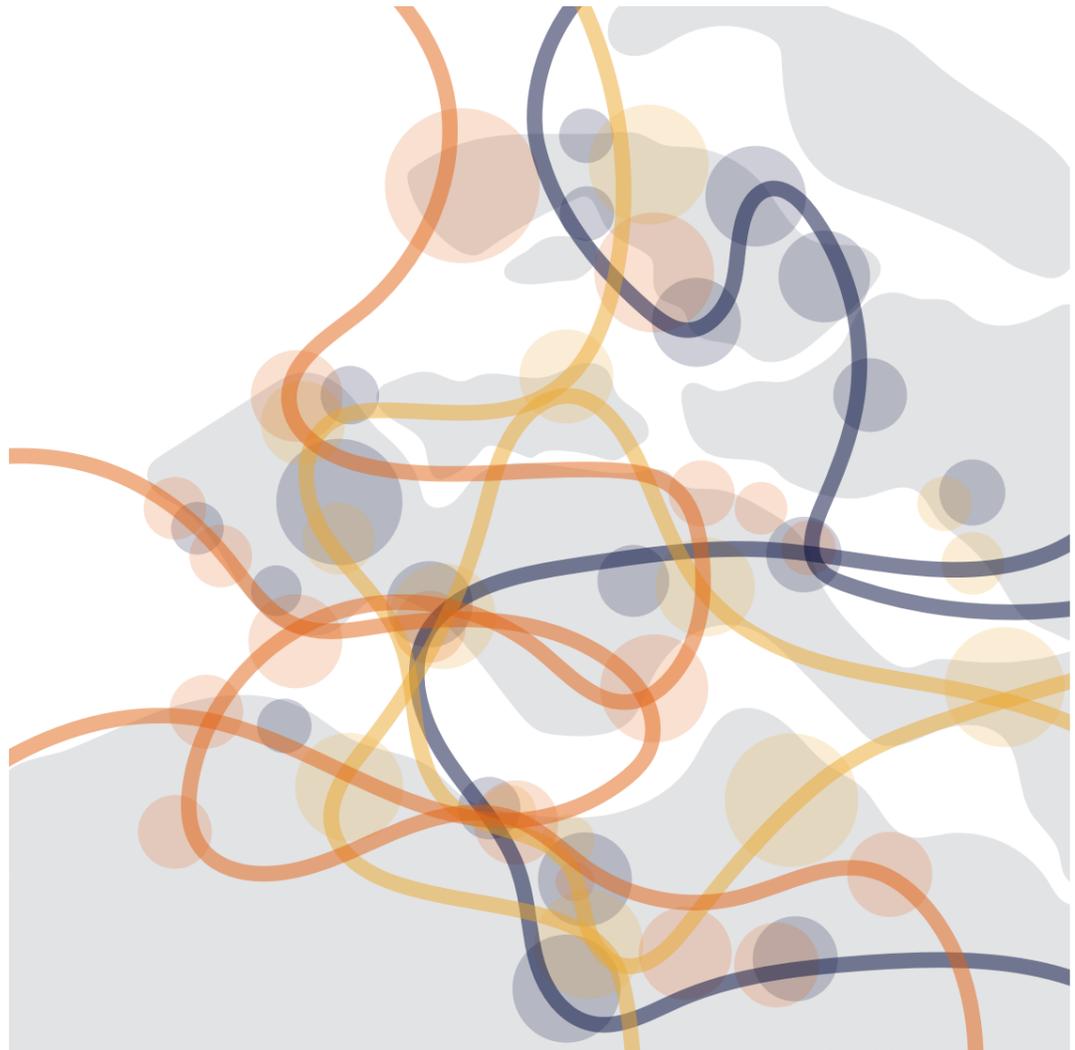
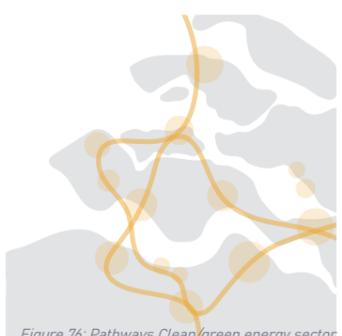
Whereas the sectoral pathways only show internal connections, they generate intersections and crossovers as soon as these overlap. Intensive hotspots become visible, which are zones where sectors intersect and can potentially merge, which will trigger new opportunities. These intensive hotspots are used to define the functions and placements of the catalysts.

These intersections illustrate a design method that has no predetermined end goal. It has the potential to be extended through a variety of new sectors, which may be developed or researched in the near or distant future. These future additions will create new intersections and crossovers leading to potential new intensive hotspots and therefore new catalyst spots.

What connects the pathways is the connectivity. Multisectoral Training hubs are placed strategically to support the actions that the different sectors are based on, acting as catalysts or preparation for the transition. These are not endpoints but part of the connective fabric of the pathways.

These training hubs emerge as crucial nodes in the strategy, not just functionally but as a form of preparation for transition. They mark locations where communities could begin engaging with the transition ahead. Rather than defining them too rigidly, they are open frameworks for learning, collaboration, and future-making, adaptable to local needs and evolving over time. The pathways design tool supports this adaptable design method, offering a flexible structure to guide and refine the positioning and purpose of these hubs within a changing regional landscape. Because these training hubs are important for the community being able to transition. These should be realized before the main spatial interventions take place, this defines their positioning within the phasing diagram.

As such, they have the potential to act as catalysts in the regional transformation, setting things in motion, attracting attention, and creating early momentum for broader diversification. While the hubs are a central part of our current story, this method could also support other interventions or hybrid spaces which could act as catalysts in the future.



PHASING

The energy transition is a long-term process that unfolds in different phases. It is not just a technical challenge but also a social transformation, impacting civil society, public bodies, and private companies. Since many stakeholders are already interconnected, change in one sector can influence the broader system. This phasing offers a framework, but the transition remains dynamic, with no fixed end date. It focuses on key sectors, though many others will also shape the future. The "Working the Shift" strategy is outlined in four phases to guide its development.

The first phase, Immediate Action (2025–2030), works within existing policies and visions, acting in the short term to create opportunities for the future. This includes policy adjustments and financial incentives for clean and green energy.

The second phase, Structural Foundations (2030–2050), builds further on current milestones and prepares Zeeland for a sustainable future, with hydrogen expected to play a key role.

In Systemic Transformation (2050–2070), renewable energy becomes dominant, fossil fuel use is drastically reduced, and governance structures adapt. This phase involves major shifts in industrial practices, community roles, and economic models.

The final phase, Evolving Futures (2070–onward), represents an open-ended transition. The system will continue to evolve based on emerging societal needs, technologies, and challenges, with communities playing a growing role in shaping policy and infrastructure. If new sectors become relevant in future research, the phasing diagram can be extended further. This openness allows for continuous reflection, innovation, and resilience as new opportunities or disruptions arise.

LEGEND

- ONGOING INTERVENTION
- SET INTERVENTION
- ROOM FOR DELAY
- MAINTENANCE
- POLICIES
- PROJECTS
- CONNECTION

RELATION TO STRATEGY

- DL DIVERSIFICATION OF LABOUR LANDSCAPE
- DS DIVERSIFICATION OF SCALES OF SPACES
- DV DIVERSIFICATION OF VOICES

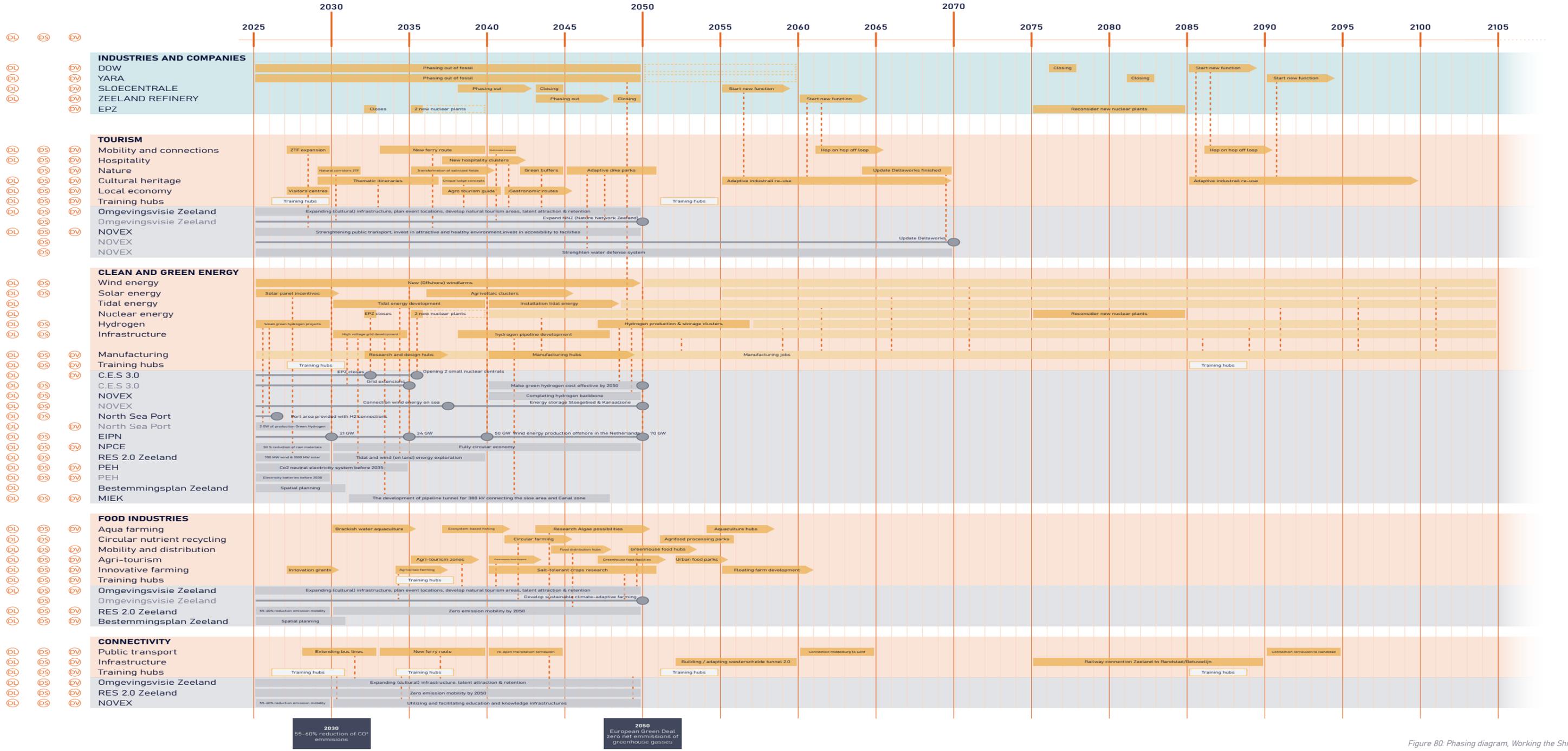


Figure 80: Phasing diagram, Working the Shift STRATEGIES & INTERVENTIONS 123

PHASE 1: IMMEDIATE ACTION

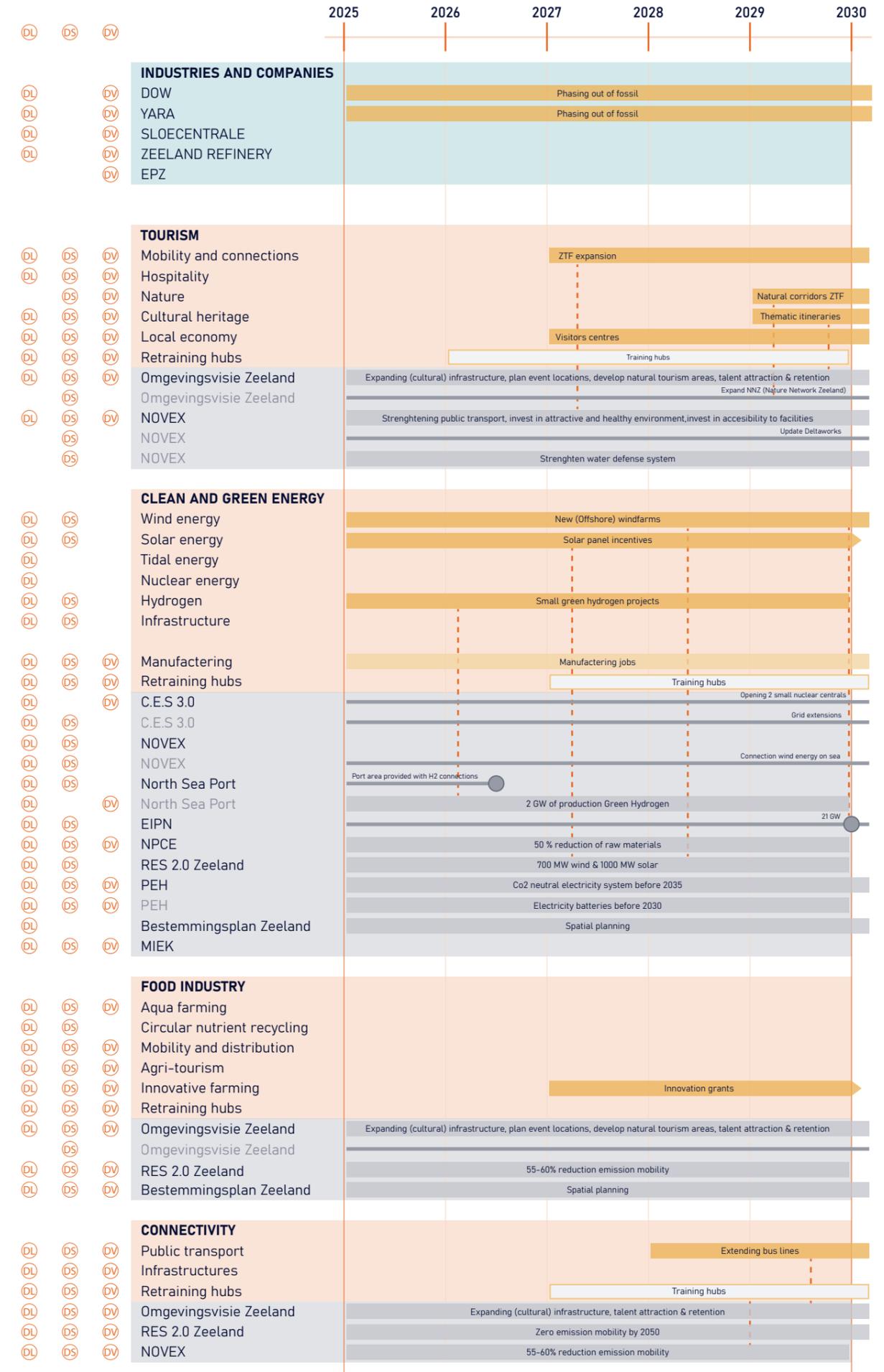
The first phase of the "Working the Shift", called Immediate Action (2025-2030), focuses on immediate steps that build on existing policies and visions, creating momentum for a sustainable future. This phase includes targeted actions across industries, tourism, energy, and connectivity, all grounded in present-day policy frameworks.

Industrial companies like DOW and YARA will begin their transition by phasing out fossil fuels in alignment with the European Green Deal (2019). Due to their size and significance in the job market, their shift will take longer. Meanwhile, the Zeeuws Toekomstbeleid Fiets (ZTF) will expand, incorporating new visitor centres tied to the Omgevingsvisie Zeeland (2024). Surrounding these routes, newly created natural areas will stimulate ecotourism and promote biking developments that will begin during the ZTF expansion and continue beyond.

To support this interconnectivity, retraining hubs will be introduced as catalysts for the transition. Based on developments in tourism, these hubs will facilitate the need for training and tourist centres at key crosspoints. This will prepare the workforce for upcoming changes.

In terms of energy, solar panel incentives will be introduced to stimulate solar energy adoption. Small green energy hubs will be established, drawing from the information of the North Sea Port (2025), Regionale Energie Strategie Zeeland (RES Zeeland) (2020), and Programma Energiehoofdstructuur (2024). These innovations also warrant the development of training hubs focused on clean and green energy, envisioned in this timeframe, to support energy transition and job diversification. These retraining hubs are also rooted in the Omgevingsvisie Zeeland (2024), focusing on manufacturing, research, and energy innovation.

Another significant step is the extension of bus lines, supported by RES Zeeland (2020), Omgevingsvisie Zeeland (2024), and the Nationale OmgevingsVisie EXecutiekraacht (NOVEX) vision, improving the regional mobility and reinforcing the coexistence layer that connects sectors and regions. (NOVEX, 2023)



2030
55-60% reduction of CO₂ emissions

Figure 81: Phase 1, Immediate action

PHASE 2: STRUCTURAL FOUNDATION

The second phase, Structural Foundation (2030-2050) builds on existing milestones and lays the groundwork for systemic change, especially in preparing Zeeland for a hydrogen-powered future. The focus is on deeper structural transitions within industries, tourism, energy, and food.

Industries like DOW and YARA will continue their gradual fossil fuel phase-out under the European Green Deal (2019), while the Sloecentrale begins phasing out around 2040 and completes its closure by 2045. Similarly, Zeeland Refinery will not align with the "Working the Shift" vision and is planned to shut down between 2045-2050. The EPZ nuclear facility, scheduled to close in 2032 based on their own policy, will be replaced by two smaller nuclear plants, creating the backbone for a new energy system (EPZ, 2025).

Tourism will flourish through the expansion of ZTF routes and the addition of new thematic itineraries. These complement new attractions and natural spots. A new ferry route, part of the NOVEX (2023) vision, will further enhance multimodal transport, paired with more rental bikes at stations and ferry stops. New clusters of hospitality will emerge in line with the Omgevingsvisie Zeeland (2024), reflecting Zeeland's identity—think water cabins, nature camping's, and heritage hotels. Natural areas along ZTF routes will be complemented by transforming salinized farmlands into either salt-resistant crop fields or wetlands, improving climate resilience. Gastronomic and agro-tourism routes will be introduced, and new buffers around energy landscapes will be designed as nature zones. As part of the strategy and Omgevingsvisie Zeeland (2024), adaptive dike parks will be created along coasts affected by erosion, improving both ecological quality and flood resilience.

In energy, innovation and momentum will continue with the construction of training hubs. Offshore wind turbines will be added throughout this phase, based on Verbindingen Aanlanding Wind Op Zee (VAWOZ). Economisch Investeringsprogramma Noord- en Midden-Zeeland (EIPN) and NOVEX policies. Agrivoltaic farming, combining crops with solar panels, will become increasingly common. Tidal energy systems will be refined and developed between 2030-2040 to contribute to Zeeland's sustainable energy supply. (VAWOZ, 2023), (EIPN, 2024) (NOVEX, 2023). The new energy system will be backed by infrastructure upgrades between 2030-2035, including a high-voltage station as proposed in the Programma Energie Hoofdstructuur (PEH). From 2038-2048, hydrogen pipelines will be developed in alignment with NOVEX (2023) and Bestuurlijk Overleg Klimaat & Energie (MIEK), followed by the emergence of hydrogen production zones, in line with CES 2.0 (2024), finalizing the setup for a hydrogen-based energy system. (PEH, 2024) (MIEK, 2021)

The food industry will undergo a transformation too. Brackish aquaculture will be introduced between 2030-2035 and act as a precursor to eco-based fishing and algae research (post-2043). These efforts align with the Omgevingsvisie Zeeland (2024), promoting climate-adaptive and circular farming.

Training hubs, especially around 2035, will prepare the workforce for these changes, ensuring job certainty. Agrivoltaics will continue to evolve, and food distribution hubs will expand in response to the Nationale Programma Circulaire Economie (NPCE) goal of a circular economy by 2050. (NPCE, 2023)

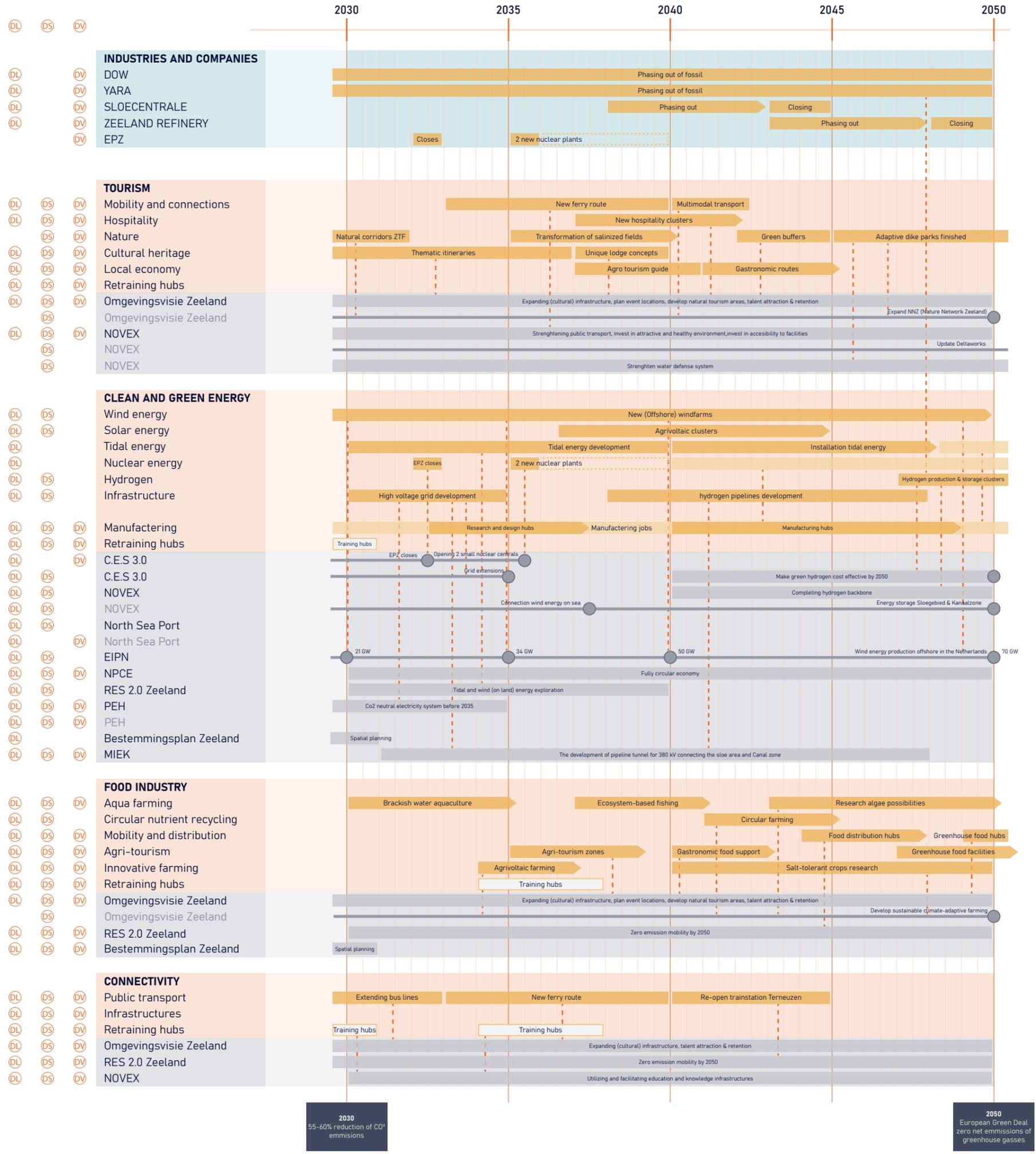


Figure 82: Phase 2, Structural foundation

PHASE 3: SYSTEMIC TRANSFORMATION

The Systemic Transformation phase (2050-2070) marks a full transformation where renewable energy dominates and systemic shifts reshape Zeeland's economy and community structure. The phase embraces adaptive reuse, workforce retraining, and major infrastructure upgrades.

The fossil fuel transition of companies like DOW and YARA may extend to 2060, acknowledging their massive scale and importance. Around 2055, the Sloecentrale and Zeeland Refinery areas will undergo adaptive reuse, potentially gaining new sustainable functions. Zeeland Refinery's transformation is expected to be complete around 2064.

As these major transitions unfold, existing training hubs will be supplemented by additional ones to manage the long-term workforce impact. These hubs will act as key catalysts for adaptation and innovation.

Tourism will benefit from new functions in former industrial zones. These repurposed areas will feature hop-on hop-off loops to facilitate movement across wide distances, based on tourism development goals. The NOVEX-backed updating of the Deltaworks, set for completion by 2070, will further enhance regional appeal and safety (NOVEX, 2023).

In energy, continued innovation from earlier phases will necessitate ongoing maintenance, installation, and production. This ensures lasting employment opportunities and supports the resilience of the energy sector.

The food system will mature with the introduction of greenhouse food hubs, aquaculture facilities, urban food parks, and even floating farms. These projects build on earlier innovations and may vary in timing depending on technological development and policy support.

Connectivity becomes essential in this phase. To support sector-wide growth and integration, a new tunnel will connect Zeeuws Vlaanderen to Walcheren via public transport. Furthermore, a new railway connection to Gent will reinforce cross-border accessibility, improving Zeeland's integration with Belgium and beyond.

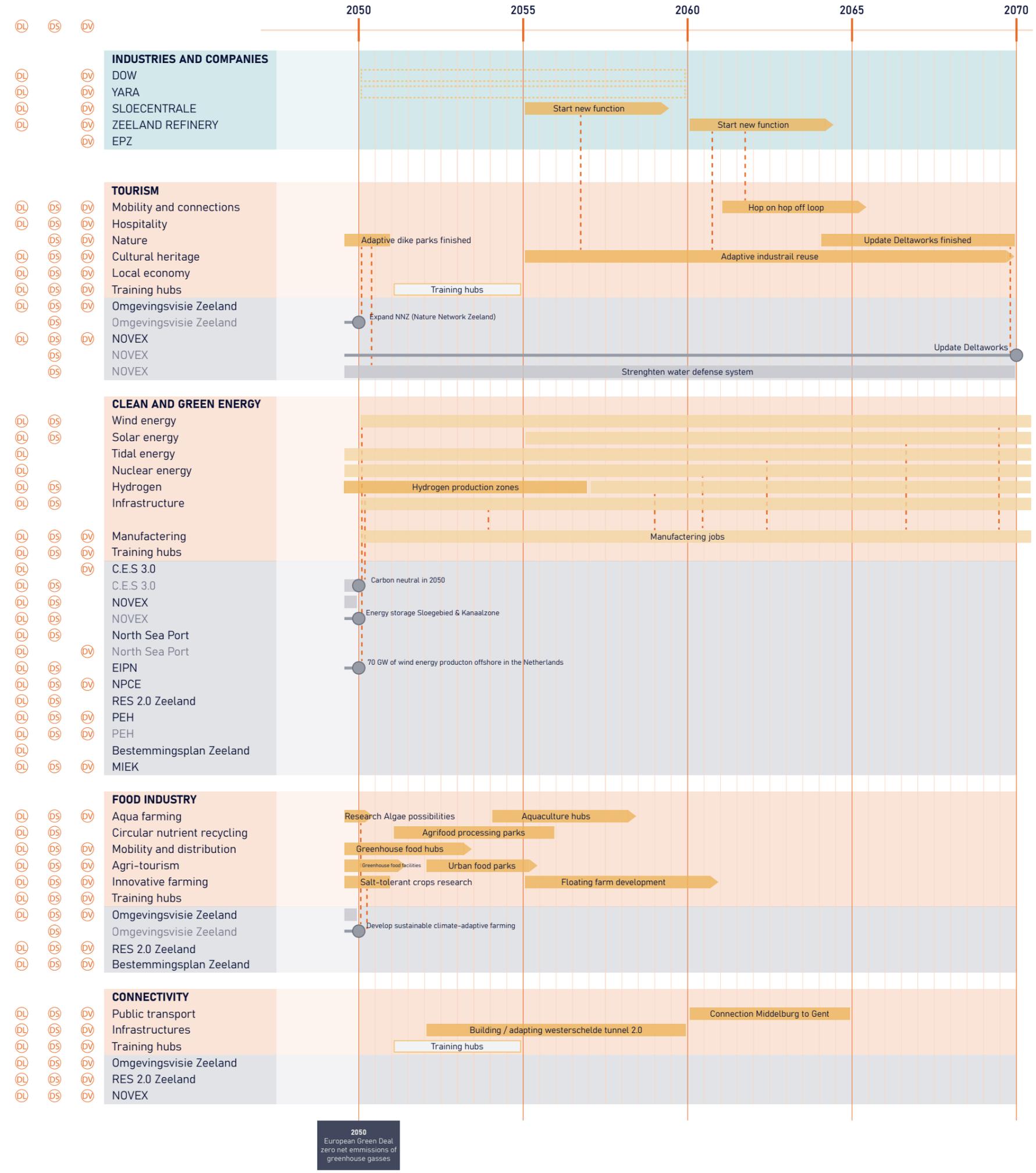


Figure 83: Phase 3, Systemic transformation

PHASE 4: EVOLVING FUTURES

The final phase, Evolving Futures (2070-beyond), embraces ongoing transformation without a fixed endpoint. In this evolving landscape, societal needs, technology, and governance will continuously reshape Zeeland's systems. Communities will play a greater role in shaping future developments.

By this time, the two smaller nuclear plants replacing EPZ may be outdated (EPZ, 2025). Whether or not they will be replaced depends on future energy needs. Nuclear energy might no longer be necessary, or reliance on it could increase. This remains open-ended and should be reconsidered as developments unfold.

Between 2075 and 2095, DOW and YARA will fully transition into their new sustainable roles. These new functions, possibly related to renewable energy, are still speculative but align with the adaptive reuse program. These large company transitions may also require a new generation of training hubs to act as catalysts for continual evolution.

These transformations are also spatial—lands formerly used for industrial purposes will be repurposed for sustainable energy generation. Meanwhile, a major shift in Zeeland's connectivity will take place. A new railway is envisioned to connect Zeeland to the Randstad and the Betuwelijn, potentially integrating with the Deltaworks. This monumental development could redefine Zeeland's position within the Netherlands.

This phase extends well beyond 2100, acknowledging that additional sectors or innovations may emerge over time. The open-ended character of this phase allows for continuous adaptation, making space for future challenges and opportunities that cannot yet be foreseen.

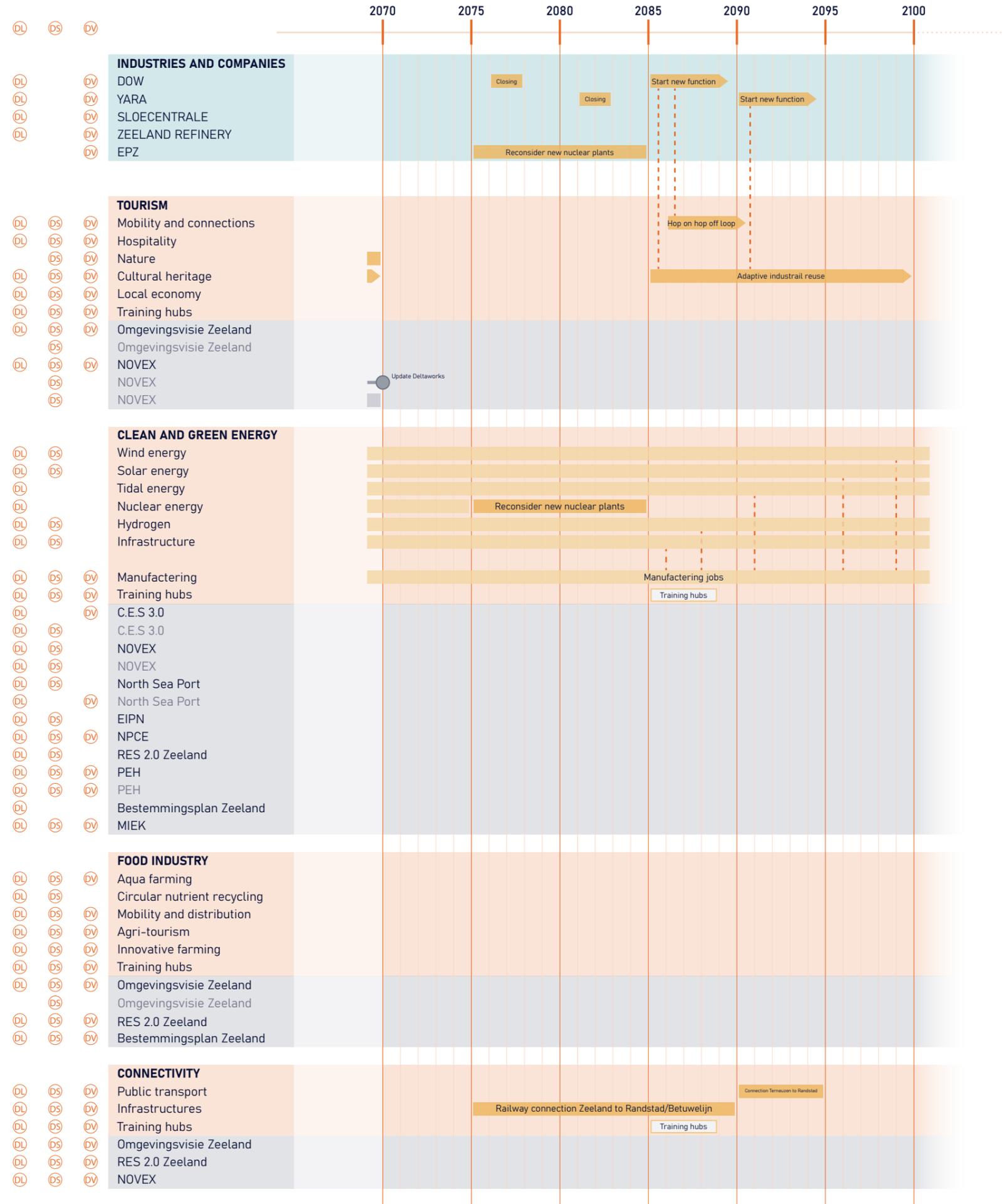


Figure 84: Phase 4, Evolving futures

MOMENTUM & COALITIONS

The pathways highlight key locations for training hubs—spaces that act as catalysts for Zeeland’s transition. Positioned early in the process, these hubs prepare communities and regions for upcoming spatial and policy interventions. Their placement aligns with what is identified in the phasing diagram as acceleration points: key timeframes when sectoral transitions intensify, and major programs take shape. These moments signal peak momentum in the transition process.

At these acceleration points, training hubs play a central role in building capacity, knowledge, and cooperation. They enable Zeeland to act on its ambitions, translating strategy into action. Figure 85 shows four such acceleration points, based on the timing of training centre development and the concentration of spatial and policy interventions. These points don’t just mark technical progress, they reflect when the transition requires active coalition-building.

Coalitions are crucial at these moments. The complexity of the transition demands new forms of collaboration across public and private actors, from governments and cooperatives to industries and infrastructure providers. Figure 86 outlines the coalitions needed for each acceleration point. These coalitions vary in size and composition depending on the sector, such as tourism, energy, or food, but all represent the shared responsibility and interdependence of the transition process.

MOMENTUM 1A – TOURISM:
Central government, cooperatives, Zeeland province, infrastructure companies, public transport companies, industry workers

MOMENTUM 1B – CLEAN & GREEN ENERGY-:
Ministries of climate, cooperatives, infrastructure companies, public transport companies, Zeeland province, industry workers

MOMENTUM 2 – FOOD INDUSTRY:
Central government, fossil fuel-based industries, infrastructure companies, public transport companies, cooperatives, Zeeland province, industry workers

MOMENTUM 3 – TOURISM:
Ministries of economics and climate, cooperatives, fossil fuel-based industries, public transport companies, Zeeland province, industry workers

MOMENTUM 4 – CLEAN & GREEN ENERGY:
European Commission, central government, ministries of climate and energy, cooperatives, Zeeland province, infrastructure companies, public transport companies, fossil fuel-based industries, industry workers

This is not a final structure. Zeeland will continue to evolve, and emerging sectors or innovations within existing ones may trigger new interventions and fresh moments of acceleration—either within the timeframe shown or beyond it. The adaptability of both training hubs and coalitions makes this transition resilient and future-ready.

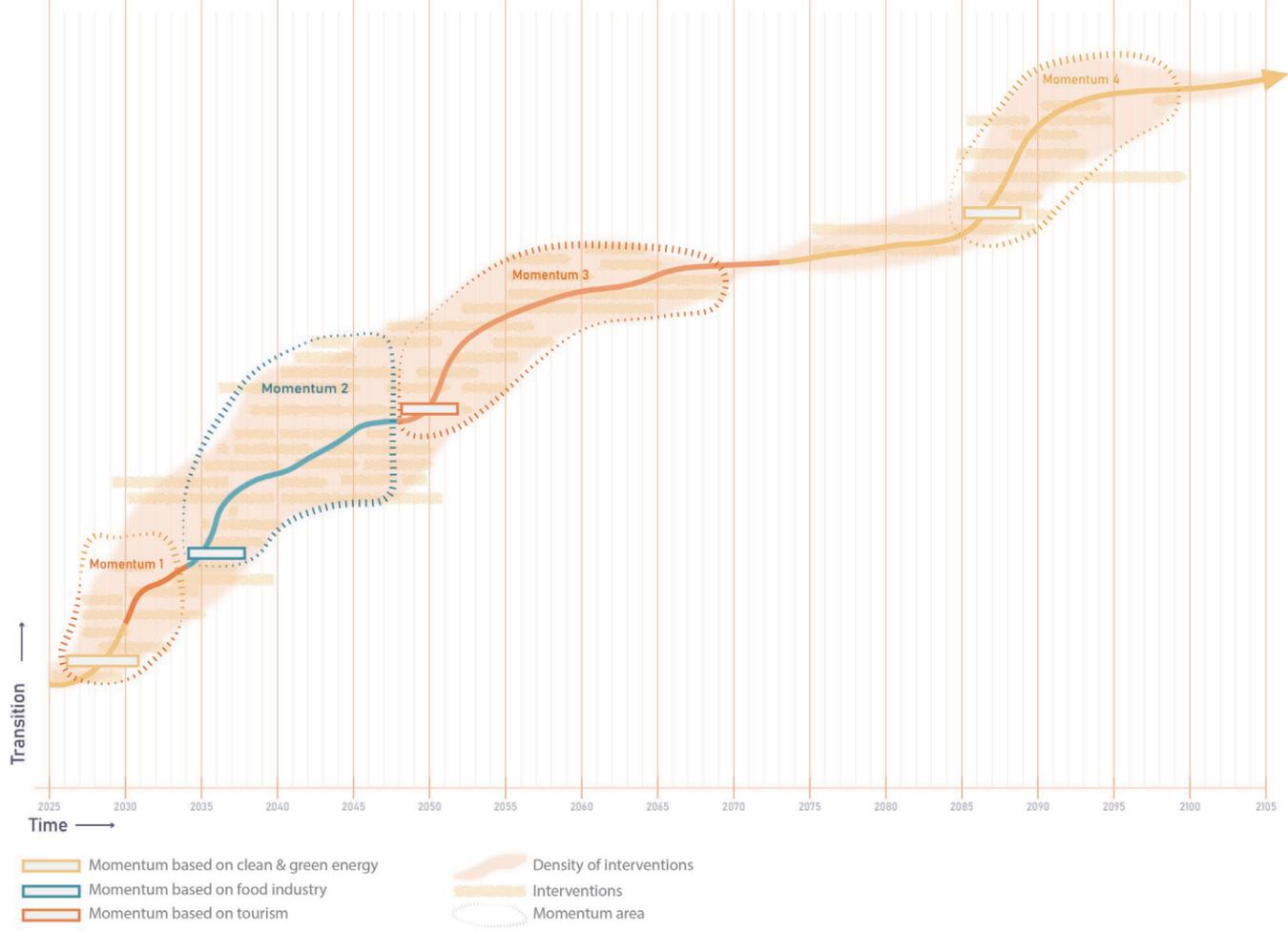
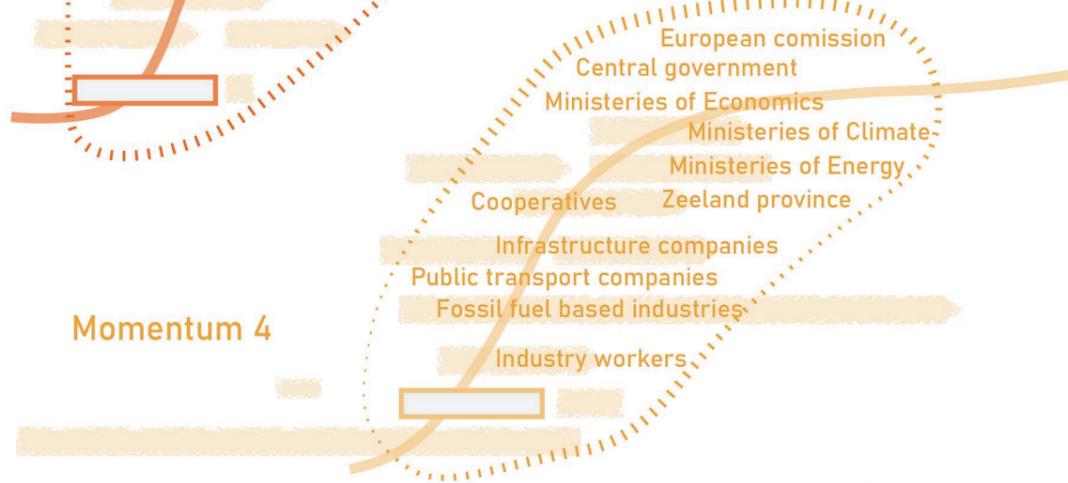
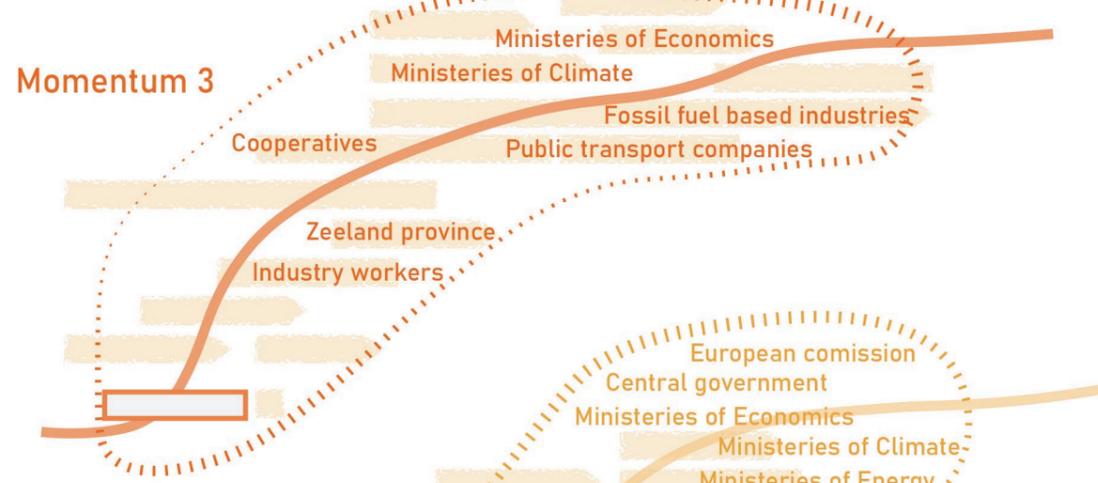
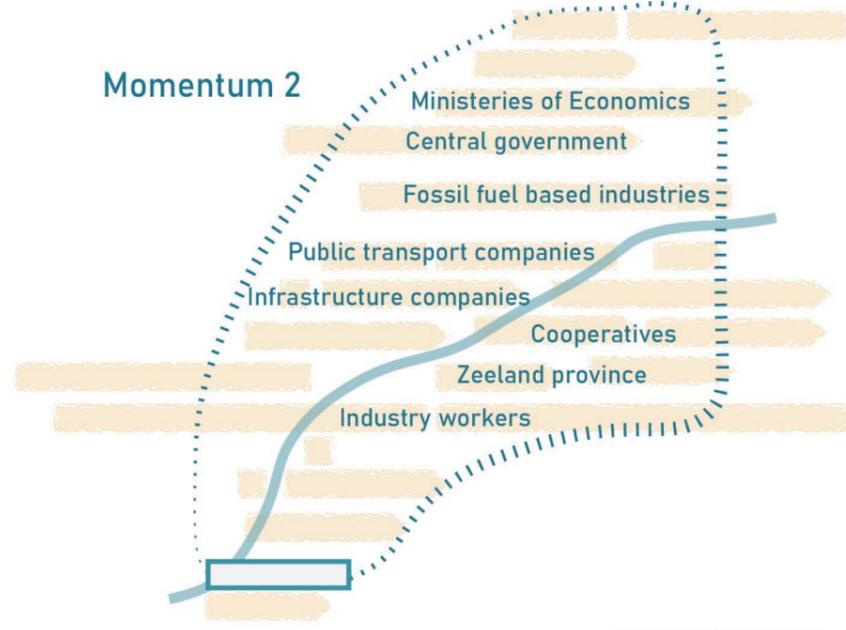
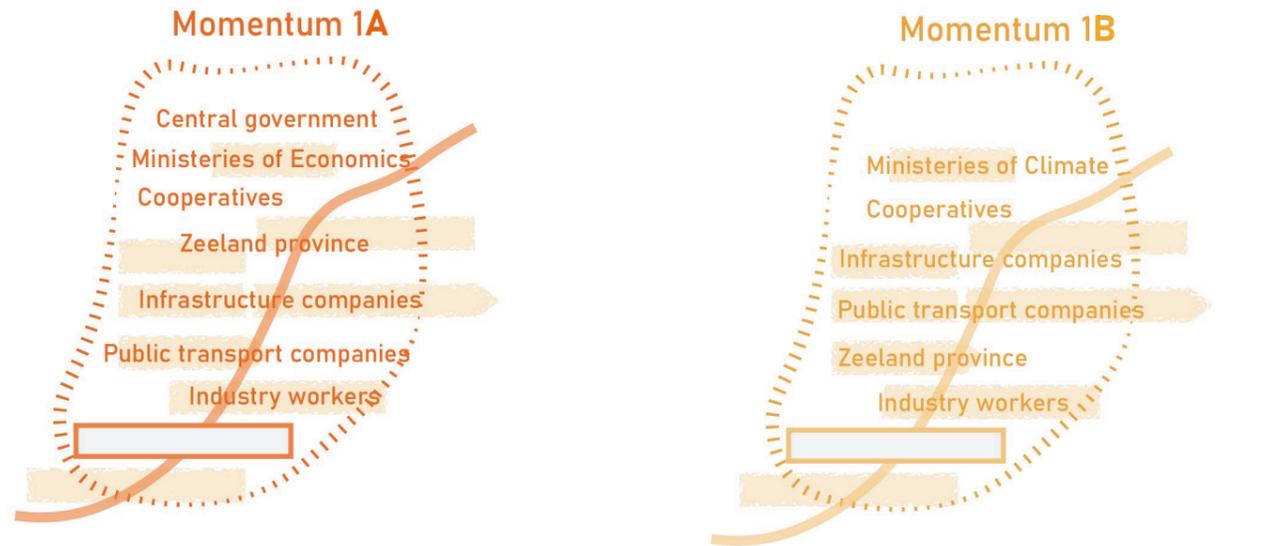


Figure 85: Momentum phasing

Figure 86: Coalition groups per momentum



VII.

CONCLUSIONS

ANSWERS TO THE RESEARCH QUESTIONS

IN WHAT WAYS CAN (THE SPACE OCCUPIED BY) THE FOUR MOST POLLUTING FOSSIL FUEL-BASED INDUSTRIES BE ADAPTED TO FIT INTO A REGIONAL ECONOMY THAT IS TRANSFORMED BY THE ENERGY TRANSITION?

The Sloe Centrale, Zeeland Refinery, DOW, and Yara have no place in a post-fossil fuel Zeeland. Their large industrial estates can host a multitude of different functions including agrifood processing parks, clean/green energy production, sustainable forms of industry, and more. Some the remaining buildings can be kept as industrial heritage sites that will support a new form of tourism that entertains as well as educates, highlighting the industrial past as a vital stepping stone that can be learned from, instead of a form of shame.

WHICH SPATIAL STRATEGIES CAN DIVERSIFY THE REGIONAL ECONOMY TO GRANT THE LOCAL WORKERS MORE OPTIONS BESIDES THE INDUSTRIAL PRODUCTION LANDSCAPE?

This project encourages the development of as many sectors as possible to keep from falling into the same pitfall of creating a new dominant labour sector. The sectors of tourism, clean/green energy production, and food industry are essential to the newly evolved system. Added functions will reuse the spaces of former fossil fuel industries as well as salinized farmlands instead of completely undeveloped free space.

WHAT NEEDS TO CHANGE ABOUT ZEELAND'S MOBILITY NETWORK ON A LOCAL AND REGIONAL SCALE TO SUPPORT THE DIVERSIFIED ECONOMIC ACTIVITY LANDSCAPE AND ITS WORKERS?

The mobility network will be extended to connect Zeeland to the rest of the Netherlands, which will enable the discussed new developments as well as unforeseen others, for which the province has plenty of space. Old disused railways will be restored instead of building completely new infrastructures. The new connection towards Ghent works in unison with plans surrounding the collaboration of the North Sea Port.

WHICH POSSIBLE SPATIAL TRANSFORMATIONS IN ZEELAND LEVERAGE THE ENERGY TRANSITION TO DIVERSIFY THE REGIONAL ECONOMY, EMPOWER INDUSTRY WORKERS SHIFTING FROM FOSSIL FUELS, AND STRENGTHEN ITS ROLE AS A MAJOR RENEWABLE ENERGY PRODUCER?

The result is an integrated multisectoral system, summarized figure 87. It will allow former fossil fuel-workers, that were displaced due to the energy transition, to make their own choices of where they wish to work. These benefits will extrapolate to other groups as well due to the regional scale of the project. Better connections will enable new opportunities for development, and an instream of outsiders into the province to stimulate heritage-based tourism. The future will hold many more uncertainties, whether it be due to climate change or other factors. That is why a diverse and adaptable system is essential to keep the region stable through many more shifts.

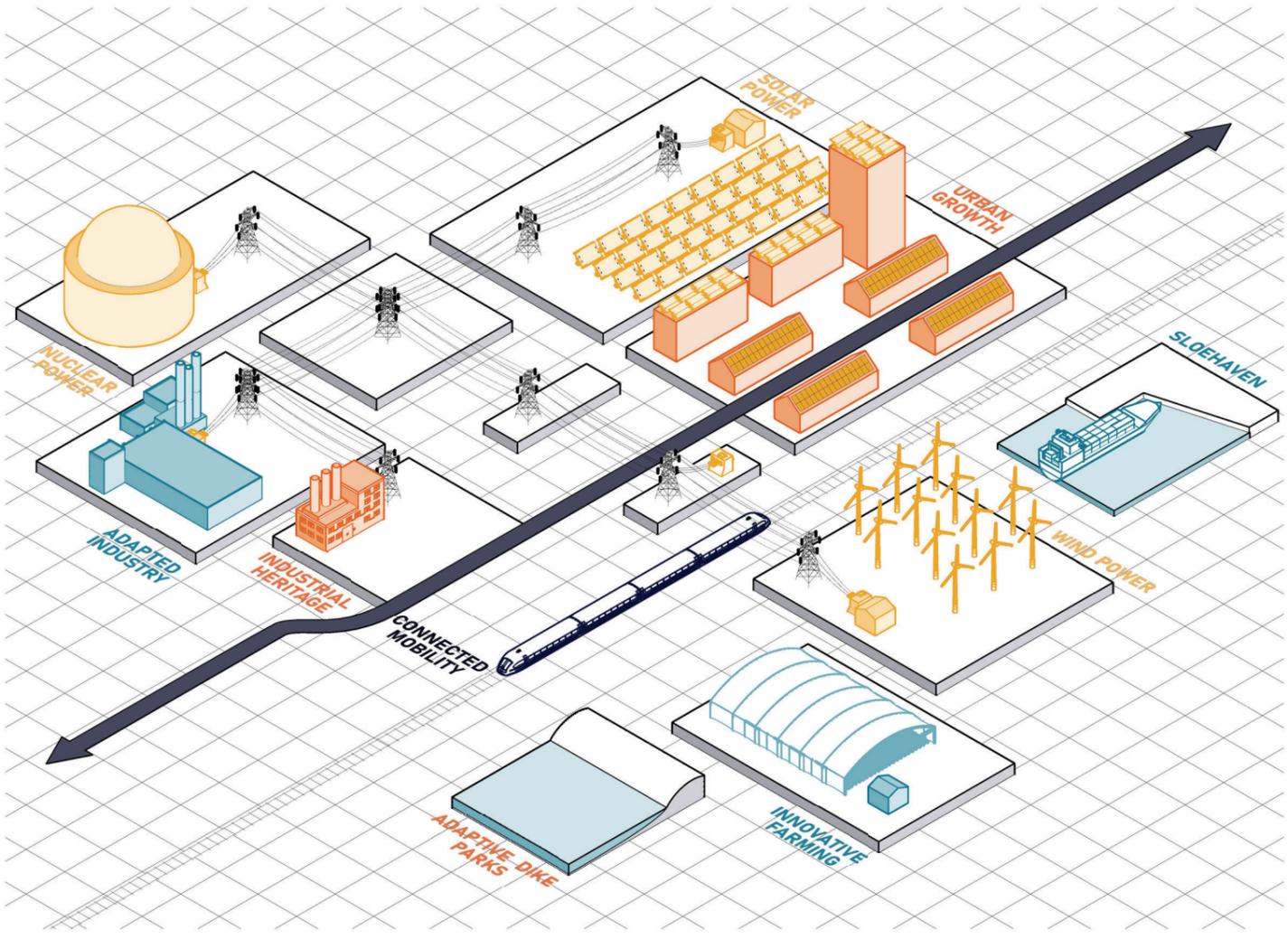


Figure 87: Integrated system isometric

SDG EVALUATION

4 QUALITY EDUCATION

4. QUALITY EDUCATION
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

By adding training hubs, we provide educational opportunities for all people in the region, people starting out in a profession or shifting from another sector
Lessons can be taken from the industrial past that can be used in the current transition.

7 AFFORDABLE AND CLEAN ENERGY

7. AFFORDABLE AND CLEAN ENERGY
Ensure access to affordable, reliable, sustainable and modern energy for all

In the current situation, a lot of fossil fuels are used which will be phased out through the transition.
The expansion of wind turbines and solar panel fields contributes to the growth of sustainable energy

8 DECENT WORK AND ECONOMIC GROWTH

8. DECENT WORK AND ECONOMIC GROWTH
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Shifting from a monofunctional labour landscape to a multi-sector labour landscape will create a more inclusive economy.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

9. INDUSTRY, INNOVATION AND INFRASTRUCTURE
Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

The big change and place of chaos will occur at the moment the big polluters close. This closure will contribute to the possibilities for a new and sustainable industrial future

11 SUSTAINABLE CITIES AND COMMUNITIES

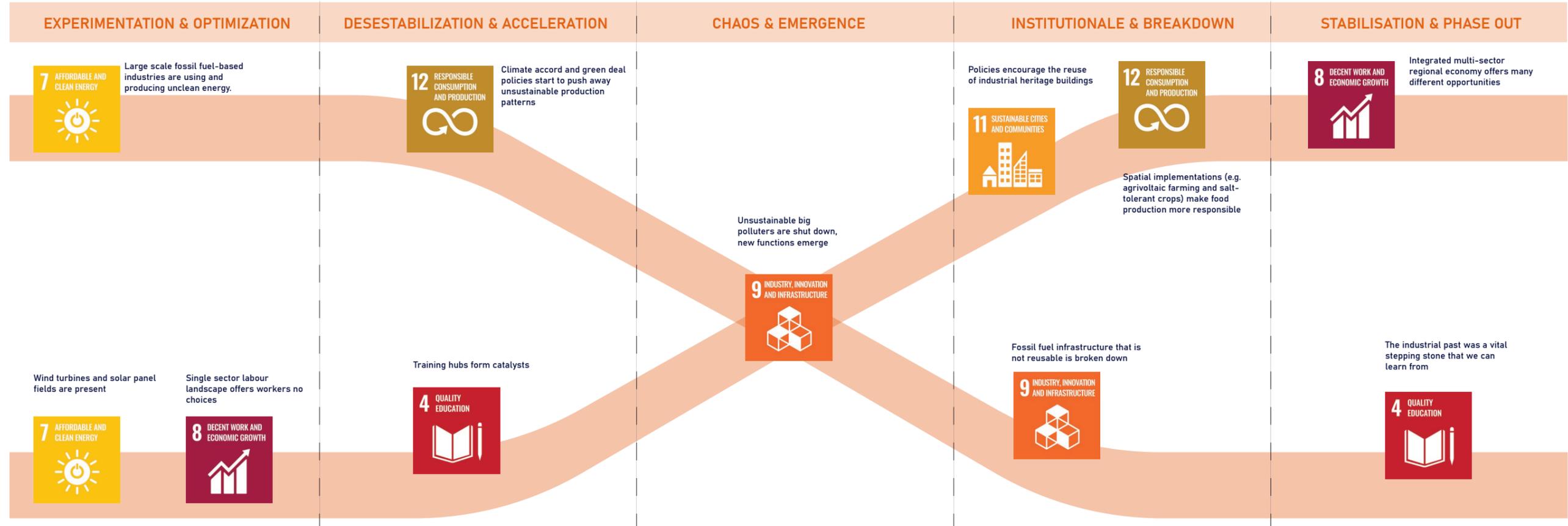
11. SUSTAINABLE CITIES AND COMMUNITIES
Make cities and human settlements inclusive, safe, resilient and sustainable

Reusing industrial buildings safeguards the identity of Zeeland combined with sustainable reuse.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

12. RESPONSIBLE CONSUMPTION AND PRODUCTION
Ensure sustainable consumption and production patterns

By exploiting innovative ways of agriculture and sustainable forms of energy, combinations are feasible such as agrivoltaic farming
Current agreements, such as the green deal and the climate agreement, will ensure that forms of unsustainable production patterns will disappear.





VIII.

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REFERENCES & RESOURCES

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IX.

REFLECTIONS

GROUP REFLECTION

SUSTAINABILITY IS “DEVELOPMENT THAT MEETS THE NEEDS OF THE PRESENT WITHOUT COMPROMISING THE ABILITY OF FUTURE GENERATIONS TO MEET THEIR OWN NEEDS”

(United Nations General Assembly, 1987, p. 43).

Reflecting on our work we came to the conclusion that, having a clear understanding of what sustainability is at its core, is not a given fact to anybody. Therefore we think that we cannot criticize the people who do not have the knowledge because they do not have the awareness about the climate crisis yet.

VALUES

The transition community this project are industry workers whose jobs change drastically or are lost due to the energy transition. These people have chosen career paths because of how dominant this sector is (meaning there are open positions here) and sometimes simply because these jobs pay well. Throughout this project, it became clear that these people do not mind if they work for heavily polluting companies or for more sustainable options since it benefits them in the short term. It is not fair to place the responsibility of the climate crisis on individuals or communities like these. They understandably have bigger personal problems to consider, before they worry about the greater good. At the same time, the work these people do have intergenerational consequences, since their/the actions lead to a climate crisis. It is essential that these communities are informed and involved to enact changes so that future generations can still live on this earth. Since these communities act for their own benefits, they are thinking intragenerational, but if they would be informed about the intergenerational problems they are causing, they would maybe change their way of thinking. An evolving but grounded identity through structural changes is in our opinion very much a value. The natural landscape. Existing natural and cultural heritage as well as the newly forming industrial heritage to be able to create new opportunities.

PUBLIC GOODS

Since we are talking about the changes that communities can go through, we would like to mention also their ideas about Clean energy. Which is, or at least should be, a public good. Energy production is traditionally managed by private companies. In our policies, an aim is stated to promote initiatives where locals are co-owners of production, as is the case with wind turbines in Zeeuwind. Policies like these work towards a transition that is (at least partially) locally owned. This project covers public transport. Discussing it now, this seems like it should be a public good as well.

Another public good is Space. The space we get in a design is a scarce public good, which you use for developments. An important question to ask is then: Is this a fair use of a public good? Does it exclude anyone? For example, non-humans were not included within the scope of this project. A more just transition should include that group (and others) as well. Manufacturing infrastructure which enables the energy transition, uses materials, even non-renewable ones. As this project was designed from and for a place where these materials are imported from other regions of the world, it can be easy to overlook injustices when it comes to the acquisition of these materials. Who gathers these materials, and who profits? Is this the fairest and best use of these materials? These questions do not have simple answers.

PROCESS

As urban designers, our tools are focused on spatial interventions. For example, the spatial implications for the diversification of the labour and spaces are relatively concretely visible on maps. When looking at the diversification of voices, these cannot be put on a map as easily, but need a different approach which is on this scale more abstract. Because of this, the undeniably important aspect of community participation or involvement was difficult to show as much and clear as the spatial principles within our regional strategies.

Halfway through this project, there was a tipping point. Most policies focus on economic stability now instead of just endless growth. In this project, one of the more radical assumptions is the closing of four polluting companies. In reality, the future of these companies is very uncertain, but at first we let them still function since they are such big stakeholders. Not considering the fact that they were non-renewable. We got as feedback that these companies could maybe not have a future and that they might close or radically change their processes in order to stay in business with a different capacity. The “removal” of such economically important companies will have many consequences, some of which will be negative for inhabitants of Zeeland. If it is not the jobs that will get lost (which will hopefully) get replaced in the diversified Zeeland, the profits that these companies made would otherwise have contribute to taxes, which can in their turn be used to fund projects that have great positive impacts. In the end, these types of development projects are very complicated. This refers back to the ‘wicked problems’ mentioned in the booklet ‘Do Artefacts have Politics?’ by Roberto Rocco (2021).

INDIVIDUAL REFLECTIONS

GIOVANNI

MY PERSONALITY TYPE IS: ENTJ-T (COMMANDER)

64% extroverted (in relation to introverted)
74% intuitive (in relation to observant)
67% thinking (in relation to feeling)
97% judging (in relation to prospecting)
64% turbulent (in relation to assertive)

I believe that one of the most meaningful aspects along this intense process was realizing that we were unintentionally limiting ourselves. We started with the intention to address diversity in our regional vision, but as the midterm deadline approached and pressure increased, we began narrowing our focus. We were speeding up the process, and in doing so, we were compromising the depth and richness of our concept. This subtle shift, in my opinion, risked flattening the complexity we initially wanted to explore.

What I value most is that we didn't stop there. As a group we had the courage to question our trajectory and take a step back. This was not an easy decision, especially within the tight timeframe. Anyway, we were strongly convinced that diversity could be a radical, original, and powerful foundation for imagining a better future for Zeeland. What has happened as a consequence is that we went back to the story board, not to simply adjust, but to transform significantly our vision and to reflect more about our goals and ambitions. We realized that diversity was not just a theme but also a narrative structure, something that could also help to communicate our vision. We saw how building a story that includes multiple lived experiences and perspectives could contribute to a more inclusive and democratic form of planning. By trying to do this we were not designing just for the Region, but for its people and all the flows that enter and leave the system. A crucial shift in this was also being more radical, that's the reason why we opted to phase out the main industries completely at the end.

By doing so, we were able to engage with the complexity of Zeeland. We didn't try to simplify or solve everything. On the contrary, we embraced ambiguity and uncertainty and accepted that our vision does not have all the answers. I feel that this gave to our work humility, but at the same time also added strength. Our working method, in this sense, became a tool for both internal group reflection and external communication. It allowed us to recognize that our own identity as planners influenced how we framed problems and, as a direct consequence, imagined visionary futures. By acknowledging our positionality, we moved towards a form of communication and planning that tries to convey also feelings, shared values and concerns.

Finally, another strength of this process was the way discussion shaped our decisions. I believe worked as a real team through long debates, debates, critical thinking and also conflicts when needed. Our shared commitment to design for diversity helped us to align our ethical values as planners. I strongly think that we aimed to create something that could improve people's lives, support our community (or communities), and strengthen regional role and identity.

FLEUR

MY PERSONALITY TYPE IS: INTP-T (MEDIATOR)

63% introverted (in relation to extroverted)
60% intuitive (in relation to observant)
79% feeling (in relation to thinking)
68% prospecting (in relation to judging)
81% turbulent (in relation to assertive)

HOW CAN YOU DESIGN FOR SMALL COMMUNITIES IN BIGGER REGIONS?

What I found most interesting about this course was designing from a clear, defined community. This approach has not been covered in the course before. At the same time, it immediately raised the question: to what extent is it possible to design on a regional scale with the needs of one specific community as a starting point?

A region is a place of convergence of different communities. Shouldn't design then focus on integration and cohesion, rather than on a single group?

In my view, within almost every community there is a desire for some degree of self-reliance. However, what exactly that means varies greatly from one group to another. This raises the ethical question: to what extent may or should the desires of one community outweigh those of others within the same region?

Within our group, in my opinion, we have found a balanced approach. We started from one specific community, but used it as a driver to formulate broader issues. We translated the challenges we identified within this group, in particular around energy transition, into a vision relevant to a wider audience. This allowed us to look from a broader perspective and create more support for the interventions chosen.

CONFLICTED OPINIONS IN GROUPWORK

In general, I experience group work as a valuable way of learning. It provides space for constructive discussions, sharing different perspectives and jointly seeking solutions to complex issues. During this project, I certainly experienced these aspects as positive. At the same time, the collaboration also brought some challenges. Within our group, opinions and approaches varied widely at certain times, which sometimes made it difficult to reach a common direction. Finding the common denominator required patience and compromise.

To gain more insight into our cooperation, we took the 16 Personalities test as a group. This revealed interesting differences. Two group members turned out to have distinct personalities, especially when it came to expressing wishes and taking a critical approach to ideas. I myself am someone who by nature takes a more wait-and-see approach to group processes. I prefer to observe first and only give my opinion when I fully support it. Although this has never really been an obstacle in previous collaborations, I noticed in this intensive project that this attitude could sometimes lead to tensions or misunderstandings. Yet I don't see this as a negative experience. It made me aware of my role within a group and of the importance of assertiveness in certain situations. During the project, I took personal steps in this regard by being more active in making my voice heard.

TYCHO

MY PERSONALITY TYPE IS: ENTJ-A (COMMANDER)

83% extroverted (in relation to introverted)
51% intuitive (in relation to observant)
51% thinking (in relation to feeling)
76% judging (in relation to prospecting)
74% assertive (in relation to turbulent)

Being a commander personality type, I found myself struggling again in this project to take the lead with the people around me. Partly because there was also another commander within our group, However, I had never worked on a project of this scale, with so much workload and theoretical depth. I did my bachelor's degree at a university of applied sciences, where I learnt a lot about groupwork. But working on such a big project with this much work and theory I had never done. I think this is why I was a bit less in control of the project and the tasks, giving me a hard time because I was not used to this dynamic within the group.

REFLECTION ON PROCESS, PRODUCT AND LEARNING

How was the process of the design like? Were there complications? Planning issues or errors with documentation? Problems outside the study?

What did I learn from this scale? What new techniques did I learn? What new methodology?

Do I think we managed to do all the steps we had to make during the process to come up with our products?

The process of designing this project involved a lot of discussion and debate. This was sometimes frustrating due to the perceived loss of time, but in hindsight, those conversations led to meaningful insights and a more cohesive outcome. However these discussions lead to meaningful insights for the project itself. In my opinion this contributed to a more cohesive and thoughtful process. Working with the group was very nice, but it also had lots of complications. Personality clashes and different ideas taught me new skills. I often acted as the mediator, trying to ensure everyone felt heard and helped resolve minor interpersonal issues within the group. While there were some minor problems between people within the group, I tried to calm them down and make sure everyone felt listened to, so the problem could be solved between them.

One of my pitfalls is not trusting others with the work. During this project I tried to work on this pitfall and I would say that I have improved myself. The amount of work forced me to let go of control and trust others with tasks. I hope that my team would also agree with this. I started this project with a self assessment that I brought, based on one of the classes from Remon Rooij at the beginning of the quarter.

This project was also the first time I worked at a regional scale. I believe I improved significantly in strategy and vision making, especially by grounding ideas in theory we studied together. Especially basing it on theories that we have been going through with the group. I do also think this method restricted us in our creative thinking process. As mentioned in the group reflection, we had some feedback during the midterm presentation, we came to the conclusion that we had to be more radical in our ideas about the future. In my eyes we did not think of this because we were too much focused on the theories and data that we found.

REFLECTION ON INTERACTIONS

Reflecting on my own interactions with teammates, I am certainly proud. I worked a good amount, tried to help teammates if necessary and tried to mediate them through the process together. But I also think I could improve on certain points, working with other cultures and other working styles I have had times where I got frustrated a bit with groupmates. This leading to me being curt in a few instances. I have the idea that this is only in stressful moments, so in my head everybody has this. However I think I could improve myself in being able to handle these situations. Working together with all these new people on such a big project gave me new insights on how to talk to everybody properly and with respect. Although my personality test shows that I am assertive and judging, I noticed that I adapted by becoming more flexible and open (more "turbulent and prospecting") when others took the lead. I am however not sure yet if I think this is a good or a bad thing.

REFLECTION ON MYSELF

What are advancements that I made for myself during the course?

Did I get new ethical values? During this project Usually, I don't notice many personal improvements during a course, but this time was different. During this project I have learned to appreciate life more, during this process I lost my father in law, which was my first closely beloved loss. I realized I tend to ignore my emotions by working, which can be helpful, but also prevents me from processing what I feel. Another thing I learnt about myself had to do with my values as a person. I had a groupmate, Fleur, she taught me some things about politics. I was myself not too much informed about this topic, beforehand I had more right politic ideas, and Fleur is more of a left person. I never was interested in politics but because of the interactions with her I found things out, and started to also agree with lots of things she mentioned. I believe my political stance has shifted thanks to these new insights, probably because I had previously held uninformed views. This could be because I was badly informed related to my non-existent interest, so this is my own choice and ideas about this. Another thing I learned about myself, was during the methodology classes and discussions. This course helped me too, to broaden my perspective on the world. Especially the 'JUST' ideas were inspiring to me. This might be again, because I was disinformed, and now got to know some things about them. I think my ideas about this have also changed and I feel more inclined to look at the 'JUST' topics even further. In fact, I have been made aware of other ideologies other than my own, causing me to want to have a better understanding of other people's stories and ideas.

INDIVIDUAL REFLECTIONS

ROSA

MY PERSONALITY TYPE IS: INFP-T (MEDIATOR)

51% introverted (in relation to extroverted)
74% intuitive (in relation to observant)
60% feeling (in relation to thinking)
81% prospecting (in relation to judging)
83% turbulent (in relation to assertive)

What did I learn during this project that I did not know before? Going into this project, it was clear that it was unique to me in two ways. It operates on the largest scale I have seen during my studies, and working together closely every day with a group of five students is something I had not done as well.

REFLECTION ON REGIONAL SCALE AND PROCESS

The scale of regional development was completely new to me. When designing for a neighbourhood, its area of effect spans the surroundings of the neighbourhood. More indirectly, the city it belongs to will be affected by the changes as well. When designing for regional development in Zeeland, that expands to an impact on at least the 400,000 inhabitants, but it indirectly affects everyone in the Netherlands (even beyond). Designing on a regional scale also incorporates many tools and methods that were new to me. Doing qualitative research has seemed less scientific to me in the past. During workshops that focused on the research tool Atlas.ti, we learned about its method to quantify sentiments from a variety of sources. This has changed my perspective on qualitative research, and I will take this with me into new projects. Lastly, the importance of politics has added to my understanding of the social and organizational aspects of development. Like suggested by Wang and Lo (2021), an interconnected web of influential actors is essential to enact meaningful changes, yet literature on the understanding of these relations is scarce. Potential coalitions and obstructionists can form one of the bottlenecks that can make or break a regional development plan.

REFLECTION ON GROUP DYNAMICS AND INTERACTIONS

I knew beforehand that I am sensitive to stress, perfectionistic, and eager to improve. This relates to the turbulent personality aspect of the 16-personalities test that our group did to understand our group dynamics better. I am usually also adaptable and flexible, which relates to the prospecting personality trait. During this project, I learned that I could react less flexibly during stressful situations. I am most comfortable when people are aligned, yet during this project, there were many conflicting opinions. There were also differences in ideology, and combined with strong passions, this led to many discussions. Though sometimes uncomfortable, these discussions eventually led us to more nuanced and complex results. As a part of the methodology course, we learned about wicked problems that are complex due to changing situations and interrelated actors, concepts, and institutions. It could be said that our group dynamics mirror this. I learned how to deal with conflicting communication styles and how to have constructive discussions effectively yet respectfully during collaborative decision-making.

Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research & Social Science*, 82, 102291. <https://doi.org/10.1016/j.erss.2021.102291>

MEGHA

MY PERSONALITY TYPE IS: ENFP-T (CAMPAIGNER)

56% extroverted (in relation to introverted)
71% intuitive (in relation to observant)
88% feeling (in relation to thinking)
57% prospecting (in relation to judging)
68% turbulent (in relation to assertive)

As a Campaigner personality type, I tend to lead with enthusiasm and curiosity. I am strongly inclined to reading situations with a certain extent of emotional belonging which conveniently helped me orient myself to the community-focused lens of the project. My ability to connect with underlying emotions and narratives helped me remain attentive to the human stories behind territorial transitions—especially those of Zeeland’s fossil fuel communities.

In regional design, vision acts not only as a guide but also as a mediator across scales, actors, and timeframes. Within our group project, the formulation of a shared vision was central to structuring both our process and product. Rather than beginning with fixed outcomes, we developed a vision that acknowledged uncertainty and positioned change as continuous. I felt that my eye for detail might risk developing the larger picture holistically, however, it worked as an asset when developing the methodology of the matrix and detailing of the vision. Throughout the process, I learned to zoom out, and to see design not as a finished object, but as an evolving trajectory. Our group’s collective effort made the vision drawing more coherent and helped me better understand how to spatialize long-term thinking. This is especially important for me, since I was working on this scale as well as designing a regional vision for the first time. While translating abstract ambitions into a spatial vision proved challenging, the collaborative process gave structure to this ambiguity. The group work also highlighted some new skills I was otherwise prone to going against. The discussions within our group were vital for both our project and our individual personal growths. I have always been interested in setting narratives and storylines, however, during this process, I also often found myself embracing the role of a mediator, facilitating conversations and bridging differences perspectives. This also contributed to maintain a personal calm and composed demeanor that in the past has been difficult for me in certain stressful situations.

The choice to foreground Zeeland’s fossil fuel workforce not only humanized the transition but also grounded our vision in a specific and tangible reality. Designing with transition communities in mind complicated the visioning process, but in productive ways. It allowed us to filter the complexity of regional design through a more focused lens. It forced us to consider plural narratives, conflicting interests, and uneven capacities. While it is unrealistic to fully “understand” the hopes and dreams of all actors, the regional design process offered us a framework to surface and negotiate these narratives. Rather than being overwhelmed by the vastness of Zeeland, we designed from the ground up, allowing the community’s needs to influence the direction of the larger region. Our interviews and stakeholder mappings were not exhaustive, but they offered starting points for more inclusive engagement.

In retrospect, this project has sharpened my ability to think long-term while remaining grounded in social realities. Visions must be bold enough to inspire action yet grounded enough to be implementable. Understanding vision as a dynamic tool, rather than a prediction of the future, is a critical lesson I carry forward from this process. In our case, the vision of a diversified, resilient, and inclusive post-carbon region became a testing ground for development strategies that addressed not only energy transition, but also social justice, economic viability, and ecological restoration. It reinforced the value of community as both a subject and a partner in design and taught me how regional design can become a platform for empowerment, inclusion, and meaningful transition, values that align strongly with my personal aims and development.



X.

APPENDIX

APPENDIX 1.1: INTERVIEW 1 (DUTCH/ENGLISH)

MATTHEW – ZEELAND REFINERY (ORIGINAL DUTCH)

PERSONLIJKE BETROKKENHEID EN GEMEENSCHAP

Hoe zou je de band omschrijven met je collega's en de gemeenschap rondom het bedrijf?

Een familie sfeer, er wordt gewerkt met een shift van 13 man en werkdagen van 7. Je bent dus best lange tijd met elkaar.

Wat betekent deze baan voor jou?

Ideale uitkomst, met wisselende diensten is er veel vrijheid.

Zijn er in je omgeving veel mensen die in dezelfde sector werken?

Ja, zeker.

Hoe praten jullie over de toekomst van de industrie?

Veel over de energie transitie en CO2 reductie. Vooral met de opkomst van groene waterstof.

Denk je dat er in de nabije toekomst ontwikkelingen gaan plaatsvinden op jouw werk wat betreft nieuwe manieren van met energie werken?

Ja, ik denk het wel. Als Zeeland Refinery niet mee doet aan de transitie zal deze uiteindelijk failliet verklaard worden.

ZORGEN EN VERWACHTINGEN OVER DE ENERGIETRANSITIE Heb je het idee dat de energietransitie invloed gaat hebben op je werk?

Ja, enorm. Met het betalen van CO2 rechten. Zeeland Refinery stoot nu al 1.2 kTon CO2 per jaar uit. Dit kost enorm veel geld.

Wat zijn je grootste zorgen als je baan zou verdwijnen door de overstap van fossiele naar duurzame energie?

Er blijven toch operators nodig ookal is het bij een kernfabriek of groene waterstof fabrieken

Is er genoeg steun vanuit de overheid of bedrijven die werknemers zoals jij helpt omschakelen naar ander werk?

Ik denk het niet, uiteindelijk wordt je uitgekocht door het bedrijf en wordt het zoeken naar een andere job.

Denk je dat er kansen zijn om een community op te bouwen met mensen die dezelfde zorgen hebben?

Ik denk het wel, alleen ik heb zelf de zorgen niet.

Zouden hier veel anderen in geïnteresseerd zijn?

Ik heb geen idee, misschien de ouderen die minder makkelijk kunnen schakelen en die niet zo gewild zijn bij een ander bedrijf.

Wat als er een deel van de banen verloren gaan door deze transitie, wat zou je daarvan vinden?

Best vervelend, je bent best lang nog aan het leren op fabrieken om helemaal rond te komen buiten en vervolgens achter het controlepaneel

Zou jij bij het deel zitten dat mag blijven werken?

Lastig in te schatten, ik ben een stuk goedkoper dan de oudere, alleen minder ervaring.

TOEKOMST EN OMSCHOLING

Zou je openstaan voor omscholing naar een baan in duurzame energie? Waarom wel waarom niet?

Dat ligt eraan, als het in dezelfde sector is wel met wisselende diensten. Ze zijn van plan een elektrolizer te bouwen die van water (H2O) naar waterstof (H2) onder elektrolyse m.b.v. een windmolen park te plaatsen.

Welke vaardigheden of banen in de duurzame sector spreken je aan?

Een elektrolizer, vooral om dat wij veel waterstof maken/gebruiken op onze olie raffinaderij.

Welke ondersteuning zou je nodig hebben om een overstap naar een nieuwe sector te maken? (bijv. opleiding, financiële hulp, begeleiding, etc.)

Ik denk voor een andere sector dat er wel een opleiding van pas kan komen.

Zou een toekomst met meer duurzame energie in Zeeland, waarin zeeland een energie hub wordt voor de rest van het land, je aanspreken?

Zeker, het waterstof net waar ze over spreken voor alle fabrieken in Nederland.

Hoe zou jij dit voor je zien, vooral op zee of ook op het land? Zou je denken dat er veel zou veranderen voor jou en de rest van Zeeland?

Ik denk dat de prijzen zullen stijgen voor alle consumenten.

Denk je dat er veel frictie zou komen van deze veranderingen?

Ja, mensen betalen al erg veel voor brandstof, hierdoor zal de prijs steeds verder stijgen. Het kan altijd duurzamer, door de uitstoot te verminderen en meer op zonne/wind energie te draaien.

PERSPECTIEF OP DE ENERGIETRANSITIE

Denk je dat de energietransitie kansen kan bieden voor werknemers zoals jij? Welke kansen zie je?

Dat er meer werk komt op de raffinaderij door elektrolizers. Deze hebben tenslotte ook operators nodig om bediend te worden.

Wat zou het bedrijf volgens jou moeten doen om werknemers zoals jij goed voor te bereiden op deze veranderingen?

Scholing, op de hoogte houden van de stappen, hoe meerdere projecten lopen, wanneer de projecten worden opgestart.

In hoeverre denk je dat deze toekomst voor Zeeland mogelijk is?

Als de bedrijven bereid zijn om de investeringen te doen, dan zeker. Ik vermoed alleen zonder subsidie dit erg lastig wordt.

MATTHEW – ZEELAND REFINERY (TRANSLATED)

PERSONAL INVOLVEMENT AND COMMUNITY

How would you describe your connection with your colleagues and the community around the company?

A family atmosphere, there is a shift of 13 and working days of 7, so you are together for quite a long time.

What does this job mean to you?

Ideal outcome, with alternating shifts there is a lot of freedom.

Are there a lot of people near you that work in the same sector?

Yes, definitely.

In what ways do you talk about the future of industry?

A lot about the energy transition and CO2 reduction. Especially with the rise of green hydrogen.

Do you think there will be developments at your work in the near future in terms of new ways of working with energy?

Yes, I think so. If Zeeland Refinery does not participate in the transition, it will eventually be declared bankrupt.

WORRIES / EXPECTATIONS ABOUT THE ENERGY TRANSITION

Do you feel that the energy transition is going to affect your work? In what ways?

Yes, immensely. With paying for CO2 allowances. Zeeland Refinery already emits 1.2 kTon of CO2 a year. This costs a huge amount of money.

What are your biggest concerns if your job were to disappear due to the switch from fossil to renewable energy?

Operators will still be needed even if it is at a nuclear plant or green hydrogen plants

Do you think there is enough support from the government or companies to help workers like you transition to other work?

I don't think so, eventually you will be bought out by the company and you will be looking for another job.

Do you think there are opportunities to build a community with people who have the same concerns?

I think so, I'm just not very worried for myself/

Would many others be interested in this?

I have no idea, maybe the older ones who can't shift gears as easily and who are not as sought after by another company.

What if some of the jobs are lost because of this transition, how would you feel about that?

Pretty annoying, you spend quite a long time still learning at factories to know your way around outside and then even more to work behind the control panel.

Would you be part of the group that will still have a job?

Hard to estimate, I'm a lot cheaper than the older ones, just less experience.

FUTURE AND RETRAINING

Would you be open to retraining for a job in renewable energy? Why?

That depends, if it is in the same sector though with changing shifts. They plan to build an electroliser that converts water (H2O) to hydrogen (H2) under electrolysis using a wind farm.

What skills or jobs in the sustainable sector appeal to you?

An electroliser, mainly because we make/use a lot of hydrogen at our oil refinery.

What support would you need to make a transition to a new sector? (e.g. training, financial help, mentoring, etc.)

I think for another sector, training could come in handy.

Would a future with more renewable energy in Zeeland, in which Zeeland becomes an energy hub for the rest of the country, appeal to you?

Sure, the hydrogen network they talk about for all plants in the Netherlands.

How would you envisage this, mainly at sea or also on land? Would you think much would change for you and the rest of Zeeland?

I think prices will rise for all consumers.

Do you think there would be much upheaval stemming from these changes?

Yes, people already pay a lot for fuel, this will cause the price to keep rising. It can always be more sustainable, by reducing emissions and running more on solar/wind energy.

PERSPECTIVE ON THE ENERGY TRANSITION

Do you think the energy transition can provide opportunities for workers like you? What opportunities do you see?

That there will be more work at the refinery by electrolisers. After all, these also need operators to be controlled.

What do you think the company should do to properly prepare employees like you for these changes?

Training, keeping abreast of the steps, how multiple projects are running, when projects will be launched.

To what extent do you think this future is possible for Zeeland?

If the companies are willing to make the investments, then sure. I only suspect that without subsidies this will be very difficult.

APPENDIX 1.2: INTERVIEW 2 (DUTCH/ENGLISH)

MITCHELL – DOW (ORIGINAL DUTCH)

PERSOONLIJKE BETROKKENHEID EN GEMEENSCHAP

Hoe zou je de band omschrijven met je collega's en de gemeenschap rondom het bedrijf?

De band is normaal binnen het bedrijf. Iedereen respecteert elkaar en er is zeker geen discriminatie binnen het bedrijf waar ze ook veel tijd en geld aan besteden.

Wat betekent deze baan voor jou?

Deze baan betekent niet heel veel voor mij persoonlijk.

Zijn er in je omgeving veel mensen die in dezelfde sector werken? Hoe praten jullie over de toekomst van de industrie?

In de omgeving zijn er zeker wat mensen in dezelfde sector. Ik hoor eigenlijk alleen maar positieve verhalen en bij het ene bedrijf een betere toekomst dan de ander wat natuurlijk verschillend is per bedrijf wat ze maken en/of doen.

Denk je dat er in de nabije toekomst ontwikkelingen gaan plaatsvinden op jouw werk wat betreft nieuwe manieren van met energie werken?

Er zijn zeker dingen veranderd de laatste tijd qua energieverbruik en uitstoot etc. De fabrieken/bedrijven zijn heel goed voor de economie, maar ze produceren ook vaak slecht dampen/stoffen voor het milieu en mens.

ZORGEN EN VERWACHTINGEN OVER DE ENERGIETRANSITIE

Heb je het idee dat de energietransitie invloed gaat hebben op je werk? Op welke manier?

Ja zeker, je ziet dat ze verschillende dingen moeten veranderen en hierdoor meer moeten bezuinigen om de gewenste doelen te halen en om nog te mogen produceren en uitstoten van de overheid.

Wat zijn je grootste zorgen als je baan zou verdwijnen door de overstap van fossiele naar duurzame energie?

Ik heb geen zorgen hierover, omdat dit niet snel zal gebeuren aangezien we toch een beetje onmisbaar zijn geworden voor de mens. Hierin verandert het bedrijf goed in mee en zie je dus zeker wel dingen veranderen nu en in de toekomst.

Is er genoeg steun vanuit de overheid of bedrijven die werknemers zoals jij helpt omschakelen naar ander werk?

Ik hoop het wel, maar dit ervaar ik (nog) niet.

Denk je dat er kansen zijn om een community op te bouwen met mensen die dezelfde zorgen hebben? Zouden hier veel anderen in geïnteresseerd zijn?

Ik denk dat deze er al is. Kijk maar naar de protesten over ons milieu.

Wat als er een deel van de banen verloren gaan door deze transitie, wat zou je daarvan vinden? Zou jij bij het deel zitten dat mag blijven werken?

Het zal natuurlijk zonde zijn voor de mensen die hiervan de dupe zijn, maar mensen zullen het wel snappen.

Zou jij bij het deel zitten dat mag blijven werken?

Ik denk dat ik wel bij het deel zit wat mag blijven werken aangezien wij zorgen voor de productie.

TOEKOMST EN OMSCHOLING

Zou je openstaan voor omscholing naar een baan in duurzame energie? Waarom wel of niet?

Als het evengoed betaald en de optie openliggen misschien wel.

Welke vaardigheden of banen in de duurzame sector spreken je aan?

Hierin ben ik nog niet geïnteresseerd om verder te kijken.

Welke ondersteuning zou je nodig hebben om een overstap naar een nieuwe sector te maken? (bijv. opleiding, financiële hulp, begeleiding, etc.)

Begeleiding en hulp en tijd voor een opleidingstraject.

Zou een toekomst met meer duurzame energie in Zeeland, waarin zeeland een energie hub wordt voor de rest van het land je aanspreken?

In de toekomst misschien wel.

Hoe zou jij dit voor je zien, vooral op zee of ook op het land? Zou je denken dat er veel zou veranderen voor jou en de rest van Zeeland?

Vooral de fabrieken op land. Als we dit echt gaan doorzetten dan zal wel het een en ander flink veranderen.

Denk je dat er veel frictie zou komen van deze veranderingen? Durf ik niet te beantwoorden.

PERSPECTIEF OP DE ENERGIETRANSITIE

Denk je dat de energietransitie kansen kan bieden voor werknemers zoals jij? Welke kansen zie je?

Nog niet heel veel. Waarschijnlijk een kans voor een andere job of bedrijf.

Wat zou het bedrijf volgens jou moeten doen om werknemers zoals jij goed voor te bereiden op deze veranderingen?

Goed laten zien wat de plannen zijn en hoe de toekomst eruit gaat zien van de bedrijven over de aanpassingen en hierbij steun geven waar nodig.

In hoeverre denk je dat deze toekomst voor Zeeland mogelijk is?

Ik zie zelf dat het een en ander veranderd, maar dit gaat veel tijd en geld kosten. Maar een toekomst in duurzame energie zit er zeker in, het duurt alleen even!

MITCHELL – DOW (TRANSLATED)

PERSONAL INVOLVEMENT AND COMMUNITY

How would you describe your connection with your colleagues and the community around the company?

The bond is normal within the company. Everyone respects each other and there is definitely no discrimination within the company which they also spend a lot of time and money on.

What does this job mean to you?

This job does not mean a lot to me personally.

Are there a lot of people near you that work in the same sector?

Nearby, there are definitely some people in the same sector.

In what ways do you talk about the future of industry?

I really only hear positive stories and with some companies a better future than others which is of course different for each company what they make and/or do.

Do you think there will be developments at your work in the near future in terms of new ways of working with energy?

Things have certainly changed recently in terms of energy consumption and emissions etc. Factories/companies are very good for the economy, but they also often produce bad fumes/substances for the environment and humans.

WORRIES / EXPECTATIONS ABOUT THE ENERGY TRANSITION

Do you feel that the energy transition is going to affect your work? In what ways?

Yes definitely, you see they have to change several things and as a result have to cut back more in order to meet the desired targets and still be allowed to produce and emit by the government.

What are your biggest concerns if your job were to disappear due to the switch from fossil to renewable energy?

I have no worries about this, because this is not going to happen anytime soon as we have become somewhat indispensable to people anyway. In this, the company is changing well with us and so you definitely do see things changing now and in the future.

Do you think there is enough support from the government or companies to help workers like you transition to other work? I hope so, but I am not experiencing this (yet).

Do you think there are opportunities to build a community with people who have the same concerns? Would many others be interested in this?

I think this one is already there. Just look at the protests about our environment.

What if some of the jobs are lost because of this transition, how would you feel about that?

Of course, it will be a shame for the people who suffer from this, but people will get it.

Would you be part of the group that will still have a job?

I think I am part of the group who can stay, because we take care of production.

FUTURE AND RETRAINING

Would you be open to retraining for a job in renewable energy? Why?

If it pays as well and the option is open maybe so.

What skills or jobs in the sustainable sector appeal to you?

In this, I am not yet interested in looking further.

What support would you need to make a transition to a new sector? (e.g. training, financial help, mentoring, etc.)

Guidance and help and time for a training programme.

Would a future with more renewable energy in Zeeland, in which Zeeland becomes an energy hub for the rest of the country, appeal to you?

In the future, it might.

How would you envisage this, mainly at sea or also on land? Would you think much would change for you and the rest of Zeeland?

Especially the factories on land. If we really go ahead with this then things will change quite a bit.

Do you think there would be much upheaval stemming from these changes?

I dare not answer.

PERSPECTIVE ON THE ENERGY TRANSITION

Do you think the energy transition can provide opportunities for workers like you? What opportunities do you see?

Not very much yet. Probably an opportunity for another job or company.

What do you think the company should do to properly prepare employees like you for these changes?

Explaining well what the plans are and what the future will look like from the companies about the adjustments and providing support where needed in doing so.

To what extent do you think this future is possible for Zeeland?

I see things changing myself, but this is going to take a lot of time and money. But a future in renewable energy is definitely possible, it just takes time!

APPENDIX 1.3: INTERVIEW 3 (DUTCH/ENGLISH)

CARLO - DOW (ORIGINAL DUTCH) PERSOONLIJKE BETROKKENHEID EN GEMEENSCHAP

Hoe zou je de band omschrijven met je collega's en de gemeenschap rondom het bedrijf?
Gemoedelijke sfeer, met een groot oog voor veiligheid. Daarnaast word je goed opgeleid tot een professional en heeft iedere starter een begeleidende mentor.

Wat betekent deze baan voor jou?
Je kan een impact maken vanuit binnenuit. Daarnaast zijn de connecties in de industrie snel gelegd en is er een open cultuur.

Zijn er in je omgeving veel mensen die in dezelfde sector werken? Hoe praten jullie over de toekomst van de industrie?
Niet van toepassing.

Denk je dat er in de nabije toekomst ontwikkelingen gaan plaatsvinden op jouw werk wat betreft nieuwe manieren van met energie werken?
Ja, met name het decarboniseren van de industrie zal een grote rol spelen, hiermee zal waarschijnlijk waterstof toenemen als hernieuwbare energiedrager.

ZORGEN EN VERWACHTINGEN OVER DE ENERGIETRANSITIE

Heb je het idee dat de energietransitie invloed gaat hebben op je werk? Op welke manier?
Ja, voornamelijk in het onderhouden van een fabriek en andere beheersing van processen met verschillende procesparameters.

Wat zijn je grootste zorgen als je baan zou verdwijnen door de overstap van fossiele naar duurzame energie?
Genoeg werkbinnen andere sectoren zoals voedingsmiddelen, medicijnen. Als er wordt overgegaan naar duurzame energie moeten ook deze installaties onderhouden worden en hebben deze dus ook mensen nodig.

Is er genoeg steun vanuit de overheid of bedrijven die werknemers zoals jij helpt omschakelen naar ander werk?
Nee, tot nu toe is er nog steeds een vraag naar werknemers in de techniek dit zal de komende jaren niet veranderen. Dus vanuit de kant van het bedrijfsleven is er tot nu toe nog geen noodzaak om mensen om te scholen omdat er nog steeds veel tekorten zijn.

Denk je dat er kansen zijn om een community op te bouwen met mensen die dezelfde zorgen hebben? Zouden hier veel anderen in geïnteresseerd zijn?
Ja dat is een mogelijkheid zoals social-media LinkedIn, hier kan je makkelijk connecties leggen met gelijkgestemde. Interesse hangt af per persoon moeilijk om hier iets over te zeggen, zou je kunnen onderbouwen met een enquête zoals deze.

Wat als er een deel van de banen verloren gaan door deze transitie, wat zou je daarvan vinden? Zou jij bij het deel zitten dat mag blijven werken?
Kans is groot dat ik bij het deel zit wat mag blijven werken, aandeel technici in de fabriek is ongeveer 40% (noodzakelijk om een fabriek operationeel te houden). Ook als een fabriek gerenoveerd wordt zijn deze mensen alsnog nodig.

TOEKOMST EN OMSCHOLING

Zou je openstaan voor omscholing naar een baan in duurzame energie? Waarom wel of niet?
Nee, tot nu toe is er te weinig vraag voor. Daarnaast liggen de lonen lager.

Welke vaardigheden of banen in de duurzame sector spreken je aan?
Waterstoftechnologie

Welke ondersteuning zou je nodig hebben om een overstap naar een nieuwe sector te maken? (bijv. opleiding, financiële hulp, begeleiding, etc.)
Niet van toepassing

Zou een toekomst met meer duurzame energie in Zeeland, waarin zeeland een energie hub wordt voor de rest van het land je aanspreken?
Nee, de mensen zijn er niet om dat allemaal te realiseren. Daarnaast is de infrastructuur er nog niet om alles op elektrisch te laten draaien.

Hoe zou jij dit voor je zien, vooral op zee of ook op het land? Zou je denken dat er veel zou veranderen voor jou en de rest van Zeeland?
Zie het niet gebeuren dat alles op hernieuwbare energie gaat draaien, omdat het stroomnet niet goed genoeg daar is op voorbereid. Als voorbeeld zou je heel de Noordzee vol moeten bouwen met windmolen om Tata steel op waterstof te laten draaien.

Denk je dat er veel frictie zou komen van deze veranderingen?
Nee denk het niet, want de transitie is al vastgelegd met plannen.

PERSPECTIEF OP DE ENERGIETRANSITIE

Denk je dat de energietransitie kansen kan bieden voor werknemers zoals jij? Welke kansen zie je?
Ja, er zullen nieuwe banen komen met een grotere groeiperspectief als bedrijven die er nu zitten. Daarnaast is de concurrentie wel groot als je het tegen grootte bedrijven opneemt.

Wat zou het bedrijf volgens jou moeten doen om werknemers zoals jij goed voor te bereiden op deze veranderingen?
Goede training geven over de verandering in het proces en hoe deze aangestuurd dienen te worden op de verschillende parameters.

In hoeverre denk je dat deze toekomst voor Zeeland mogelijk is?
Niet mogelijk, omdat er een werknemers tekort is. Daarnaast kan niet alles op hernieuwbare energie draaien.

CARLO - DOW (ORIGINAL DUTCH)

PERSONAL INVOLVEMENT AND COMMUNITY

How would you describe your connection with your colleagues and the community around the company?
Friendly atmosphere, with a great eye for safety. In addition, you will be properly trained to become a professional and every starter will have a supervising mentor.

What does this job mean to you?
You can make an impact from within. In addition, connections in the industry are made quickly and there is an open culture.

Are there a lot of people near you that work in the same sector?
Not applicable.

Do you think there will be developments at your work in the near future in terms of new ways of working with energy?
Yes, especially decarbonisation of industry will play a big role, with this, hydrogen is likely to increase as a renewable energy carrier.

WORRIES / EXPECTATIONS ABOUT THE ENERGY TRANSITION

Do you feel that the energy transition is going to affect your work? In what ways?
Yes, mainly in plant maintenance and other control of processes with different process parameters.

What are your biggest concerns if your job were to disappear due to the switch from fossil to renewable energy?
Plenty of work within other sectors such as food, medicine. When switching to renewable energy, these plants also need to be maintained and therefore need people.

Do you think there is enough support from the government or companies to help workers like you transition to other work?
Nee, tot nu toe is er nog steeds een vraag naar werknemers in de techniek dit zal de komende jaren niet veranderen. Dus vanuit de kant van het bedrijfsleven is er tot nu toe nog geen noodzaak om mensen om te scholen omdat er nog steeds veel tekorten zijn.

Do you think there are opportunities to build a community with people who have the same concerns? Would many others be interested in this?
No, so far there is still a demand for workers in engineering this will not change in the coming years. So from the business side, so far there is no need to retrain people because there are still many shortages.

What if some of the jobs are lost because of this transition, how would you feel about that?
Chances are I am in the part that gets to keep working, share of technicians in the factory is about 40% this is necessary to keep a factory operational. Even if a factory is renovated, these people are still needed.

FUTURE AND RETRAINING

Would you be open to retraining for a job in renewable energy? Why?
No, so far there is too little demand for it. Besides, wages are lower.

What skills or jobs in the sustainable sector appeal to you?
Hydrogen technology

What support would you need to make a transition to a new sector? (e.g. training, financial help, mentoring, etc.)
Not applicable

Would a future with more renewable energy in Zeeland, in which Zeeland becomes an energy hub for the rest of the country, appeal to you?
No, the people are not there to make all that happen. Besides, the infrastructure is not there yet to run everything on electric.

How would you envisage this, mainly at sea or also on land? Would you think much would change for you and the rest of Zeeland?
Don't see it happening that everything will run on renewable energy because the power grid is not prepared well enough for that. As an example, you would have to build the entire North Sea full of wind turbine to run Tata steel on hydrogen.

Do you think there would be much upheaval stemming from these changes?
No don't think so, because the transition is already fixed with plans.

PERSPECTIVE ON THE ENERGY TRANSITION

Do you think the energy transition can provide opportunities for workers like you? What opportunities do you see?
Yes, there will be new jobs with greater growth prospects as companies sitting there now. Besides, competition does get tough when you are up against size companies.

What do you think the company should do to properly prepare employees like you for these changes?
Provide good training on the change in the process and how they should be controlled on the various parameters.

To what extent do you think this future is possible for Zeeland?
Not possible because there is a worker shortage. Besides, not everything can run on renewable energy.

APPENDIX 1.4: INTERVIEW 4 (DUTCH/ENGLISH)

DANIEL - DOW (ORIGINAL DUTCH)

PERSONLIJKE BETROKKENHEID EN GEMEENSCHAP

Hoe zou je de band omschrijven met je collega's en de gemeenschap rondom het bedrijf?

De band met mijn collega's is goed. Met het bedrijf lokaal is het ook goed, al is er wel afstand tussen de mensen die in de ploegen werken en het kantoor personeel in dagdienst.

Wat betekent deze baan voor jou?

Dit is een van de weinige banen in de huidige maatschappij is waarin je als alleenstaande een huis kan kopen. Het betekent voor mij dus een mogelijkheid voor vrijheid.

Zijn er in je omgeving veel mensen die in dezelfde sector werken? Hoe praten jullie over de toekomst van de industrie? Behalve mijn collega's is er niemand in mijn omgeving. Met mijn collega's hebben we het er niet veel over omdat de voedselindustrie belangrijk is en blijft.

Denk je dat er in de nabije toekomst ontwikkelingen gaan plaatsvinden op jouw werk wat betreft nieuwe manieren van met energie werken?

Op mijn werk zijn er constant veranderingen en ontwikkelingen om zo duurzaam mogelijk te kunnen werken.

ZORGEN EN VERWACHTINGEN OVER DE ENERGIETRANSITIE

Heb je het idee dat de energietransitie invloed gaat hebben op je werk? Op welke manier?

We gebruiken op mijn werk veel waterstof H₂, momenteel breken we daarvoor methaan CH₄ op in ovens. Er zijn al projecten bezig om dit waterstof te verkrijgen door middel van elektrolyse wat gevoed kan worden door zonnepanelen en windmolens. Dus in dat opzicht gaat de energietransitie zeker invloed hebben.

Wat zijn je grootste zorgen als je baan zou verdwijnen door de overstap van fossiele naar duurzame energie?

In de komende 20 jaar is het geen probleem. In de proces-industrie zoeken ze altijd mensen en zullen er dus ook altijd banen blijven. Maar als het later dan dat is, dan ben ik zelf ook al ouder. Er zijn veel bedrijven die geen interesse hebben in het aannemen en dus het aanleren van de fabriek aan nieuwe medewerkers die al dicht op hun pensioenleeftijd zitten.

Is er genoeg steun vanuit de overheid of bedrijven die werknemers zoals jij helpt omschakelen naar ander werk?
Nee

Denk je dat er kansen zijn om een community op te bouwen met mensen die dezelfde zorgen hebben? Zouden hier veel anderen in geïnteresseerd zijn?

Ik denk dat er wel kansen zijn, maar niet in de nabije toekomst. Daarvoor moeten de zaken eerst verergeren.

Wat als er een deel van de banen verloren gaan door deze transitie, wat zou je daarvan vinden? Zou jij bij het deel zitten dat mag blijven werken?

Ik denk dat vooral kantoorbanen gaan verloren bij de verduurzaming. Omdat deze vaak meer geld kosten dan opleveren. Ik behoor tot de groep wat mag blijven werken omdat er overal een tekort is aan productiepersoneel.

TOEKOMST EN OMSCHOLING

Zou je openstaan voor omscholing naar een baan in duurzame energie? Waarom wel of niet?

Ik zou open staan als het volledig word betaald. En als ik daarna hetzelfde of een beter salaris krijg.

Welke vaardigheden of banen in de duurzame sector spreken je aan?

Zo lang ik niet te veel binnen te zit vind ik veel banen prima.

Welke ondersteuning zou je nodig hebben om een overstap naar een nieuwe sector te maken? (bijv. opleiding, financiële hulp, begeleiding, etc.)

Vaak betalen banen in een andere sector minder, financiële hulp zou nodig zijn. Ook zijn er nu maar weinig/geen duurzame fabrieken, opleiding naar een ander beroep is nodig.

Zou een toekomst met meer duurzame energie in Zeeland, waarin zeeland een energie hub wordt voor de rest van het land je aanspreken?

Als ze met duurzame energie meer kerncentrales in Borsele bedoelen dan wel ja. Dit is beter voor het milieu zolang er goed om word gegaan met het bijkomende afval. Als dit allemaal windmolens zou betekenen zou ik er op tegen zijn. Dit geeft veel horizonvervuiling. Zowel op het land als op de Noordzee. Dit kan je nu aan de kust al zien.

Hoe zou jij dit voor je zien, vooral op zee of ook op het land? Zou je denken dat er veel zou veranderen voor jou en de rest van Zeeland?

Waarschijnlijk zal dit veel op zee zijn omdat veel mensen denken dat windmolens goed zijn. De veranderingen die daardoor zullen komen is veel horizonvervuiling en veel dode vissen omdat hun natuurlijke habitat hierdoor verstoord word.

Denk je dat er veel frictie zou komen van deze veranderingen? Er komt dan veel frictie tussen voor en tegenstanders van de nieuwe centrales van Borsele 2 en 3.

PERSPECTIEF OP DE ENERGIETRANSITIE

Denk je dat de energietransitie kansen kan bieden voor werknemers zoals jij? Welke kansen zie je?

Meer centrales en/of windmolens betekent ook meer banen. Deze installaties moeten ook onderhouden en bestuurd worden.

Wat zou het bedrijf volgens jou moeten doen om werknemers zoals jij goed voor te bereiden op deze veranderingen?

Tegen de tijd dat de deuren gesloten moeten worden zou het bedrijf de werknemers een kans moeten geven tot omscholing en hierbij fiscaal helpen. Zo komen ze niet eerst een paar jaar zonder werk te zitten omdat ze nog ongeschoold moeten worden.

In hoeverre denk je dat deze toekomst voor Zeeland mogelijk is?

Deze toekomst voor Zeeland is zeker mogelijk, de vraag is in hoeveel tijd. Alles moet eerst goed gepland worden waarin de bewoners het minst gestoord worden tijdens deze transitie.

DANIEL - DOW (ORIGINAL DUTCH)

PERSONAL INVOLVEMENT AND COMMUNITY

How would you describe your connection with your colleagues and the community around the company?

The relationship with my colleagues is good. With the company locally, it is also good, although there is distance between the people working in the shifts and the office staff in the day shift.

What does this job mean to you?

This is one of the few jobs in today's society is where you can buy a house as a single person. So for me, it means an opportunity for freedom.

Are there a lot of people near you that work in the same sector?

Apart from my colleagues, there is no one around me. With my colleagues, we don't talk about it much because the food industry is and remains important.

Do you think there will be developments at your work in the near future in terms of new ways of working with energy?

At my work, there are constant changes and developments in order to work as sustainably as possible.

WORRIES / EXPECTATIONS ABOUT THE ENERGY TRANSITION

Do you feel that the energy transition is going to affect your work? In what ways?

We use a lot of hydrogen H₂ at my work, currently we break down methane CH₄ for this purpose in furnaces. Projects are already under way to obtain this hydrogen through electrolysis which can be powered by solar panels and wind turbines. So in that respect, the energy transition is definitely going to have an impact.

What are your biggest concerns if your job were to disappear due to the switch from fossil to renewable energy?

In the next 20 years, it won't be a problem. In the process industry, they are always looking for people, so there will always be jobs. But if it is later than that, I will be older myself. There are many companies that have no interest in hiring and thus teaching the plant to new employees who are already close to retirement age.

Do you think there is enough support from the government or companies to help workers like you transition to other work?
No

Do you think there are opportunities to build a community with people who have the same concerns? Would many others be interested in this?

I think there are opportunities, but not in the near future. For that, things have to worsen first.

What if some of the jobs are lost because of this transition, how would you feel about that?

I think that office jobs in particular are lost in sustainability efforts. Because these often cost more money than they bring in. I belong to the group what may continue to work because there is a shortage of production staff everywhere.

TOEKOMST EN OMSCHOLING

Would you be open to retraining for a job in renewable energy? Why?

I would be open if it is paid in full. And if I get the same or better salary afterwards.

What skills or jobs in the sustainable sector appeal to you?

As long as I'm not sitting inside too much, I'm okay.

What support would you need to make a transition to a new sector? (e.g. training, financial help, mentoring, etc.)

Often jobs in another sector pay less, financial help would be needed. Also, there are few/no sustainable factories now, training to another profession is needed.

Would a future with more renewable energy in Zeeland, in which Zeeland becomes an energy hub for the rest of the country, appeal to you?

If by renewable energy they mean more nuclear plants in Borsele then yes. This is better for the environment as long as the additional waste is handled properly. If this all meant windmills, I would be against it. This gives a lot of horizon pollution. Both on land and in the North Sea. You can already see this on the coast now.

How would you envisage this, mainly at sea or also on land? Would you think much would change for you and the rest of Zeeland?

Probably this will be a lot at sea because many people think wind turbines are good. The changes that will come as a result is a lot of horizon pollution and a lot of dead fish because their natural habitat will be disturbed by this.

Do you think there would be much upheaval stemming from these changes?

There will be a lot of friction between people who are for against the new plants of Borssele 2 and 3.

PERSPECTIVE ON THE ENERGY TRANSITION

Do you think the energy transition can provide opportunities for workers like you? What opportunities do you see?

More power plants and/or wind turbines also means more jobs. These plants also need to be maintained and operated.

What do you think the company should do to properly prepare employees like you for these changes?

By the time the doors have to be closed, the company should give the workers a chance to retrain and provide fiscal assistance in doing so. That way, they won't be out of work for a few years first because they still need to be retrained.

To what extent do you think this future is possible for Zeeland? This future is definitely possible for Zeeland, the only question is in what timeframe. Everything has to be planned well first in a way that disrupts the inhabitants the least.