ECHOES OF THE PAST, ENERGY OF THE FUTURE

Building on Zeeland’s Legacy to Create a Sustainable and Knowledge-Driven Region for the Next Generation

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Echoes of The Past,
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Abstract

Zeeland is a delta region with a rich cultural heritage that plays a key role in the Netherland's energy transition and is known as the 'energy plug' of the Netherlands. Despite its potential, Zeeland is becoming a left behind region in the Netherlands due to student migration, aging population, lack of engagement and limited opportunities. This is visible on the national innovation index of the Netherlands where Zeeland scores the lowest.

This proposal aims to reimagine Zeeland as an innovation region by focusing on spatial planning strategies that integrate education, industry, renewable energy and cultural landscapes within a decentralized governance. The project centers on the students of Zeeland, both theoretical and vocational. The vision is based on these community wishes, while involving all relevant stakeholders in the strategy process. A mixed-methods approach is used, incorporating both qualitative and quantitative research to understand the regional challenges and opportunities.

The design advocates for the decentralization of provincial governance and the establishment of independent knowledge clusters within Zeeland. These clusters, shaped by the province's spatial characteristics, will be more aligned with the development needs of students and the opportunities in both renewable energy and industry.

The strategic framework of the design centers around three key principles: preserving and enhancing the cultural landscape, developing a delta innovation region and increasing access to innovation through inclusive processes. By enhancing the cooperation between industries, knowledge institutions, renewable energy sectors and local communities, the project aims to create a more participatory governance model, where students and other stakeholders have an equal say in decision-making.

If the project is successful, this approach could position Zeeland as an innovation region in not only the national, but also European scale. Redirecting investments from nuclear energy projects towards renewable energy solutions will support industries, lower energy prices and also preserve the region's cultural landscape. Ultimately, in the future, Zeeland will become a region that attracts and maintain talent, supports innovation and contributes to the broader energy transition.

Keywords: Innovation, Decentralised, Cultural Landscape, Zeeland, Students, Energy transition

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CHAPTER 01

Understanding the Urgencies

Urgencies | History | Identities | Current Governance System

Urgencies

Climate Change and Energy Transitions

Figure 1. 02
Global Warming Location
Source: Banksy Map (2023, July 10)

Climate change has become one of the most defining global challenges of the 21st century. The consequences of this change are no longer distant projections but tangible realities. Global warming, rising sea levels, and extreme weather events are already affecting vulnerable areas, with major impacts on both nature and human society.

In 2015, the Paris Agreement was signed by 196 UN Parties, with its main goal to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" (United Nations, 2015). Following this, the Dutch government introduced the National Climate Agreement (Klimaatakkoord, Rijksoverheid, 2019), aiming to reduce CO_2 emissions by 55% by 2030 (compared to 1990 levels) and achieve full climate neutrality by 2050.

To make this happen, a transformation is needed: from fossil fuels to renewable energy sources. This energy transition requires major changes in the current energy production systems. More investments and spatial planning are needed to accommodate renewable energy sources. There is a significant spatial challenge, as renewable energy sources such as wind, solar, hydropower, and biomass require much more land to generate the same amount of energy as fossil fuels (Sijmons et al., 2014).

Besides changing how we produce energy, adapting how we use energy is also essential in this transition. According to Sijmons et al. (2017), energy conservation remains the most effective method to greatly reduce emissions. This adds up to the numbers, considering that only 12–20% of generated energy is converted into useful work due to losses across the fossil fuel chain. End-users must change their habits to reduce consumption. The largest fossil fuel users are heavy industries, and these sectors still rely heavily on fossil fuels. These new consumption patterns, across all sectors, also come with spatial adaptations. It includes necessary changes in housing, mobility, agriculture, and industry, as well as repurposing or rehabilitating outdated fossil-fuel-based infrastructures (PBL, 2024).

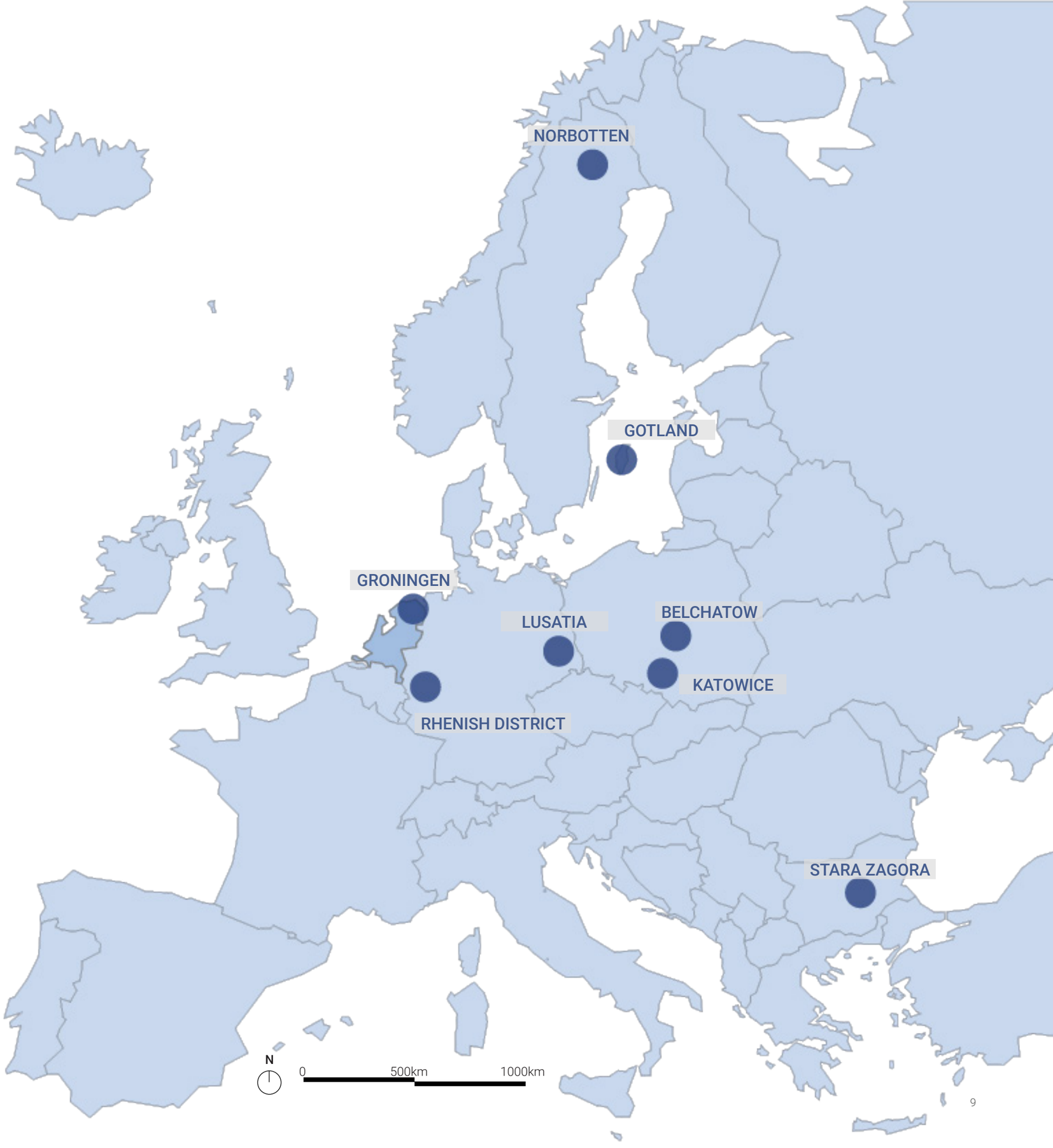
Dust Project

The effects of climate change force humanity to transition towards a sustainable future. However, these transitions also bring about their own challenges. The DUST project is an EU-funded collaboration involving thirteen partners from various European countries, including academic institutions, societal organizations, and industry experts.

DUST (Democratising jUst Sustainability Transitions) aims to develop and implement innovative participatory tools to enhance citizen engagement in sustainability transitions. The project particularly focuses on communities that are often underrepresented in political processes. It seeks to amplify the voices of those most affected by transitions, especially in regions heavily reliant on energy-intensive industries such as coal and lignite mining.

The main goal is to rebuild trust in democratic governance and to ensure that the benefits and burdens of these transitions are fairly distributed. To achieve this, the project combines design and participatory platforms to actively engage communities with political systems.

Eight regions across Europe have been selected for labs that aim to integrate local perspectives into regional and national policy-making. Within this context, the project location serves as the ninth test site, where explorative design is used to identify methods for involving neglected communities in a cooperative sustainability transition. (Balz et al., 2023)



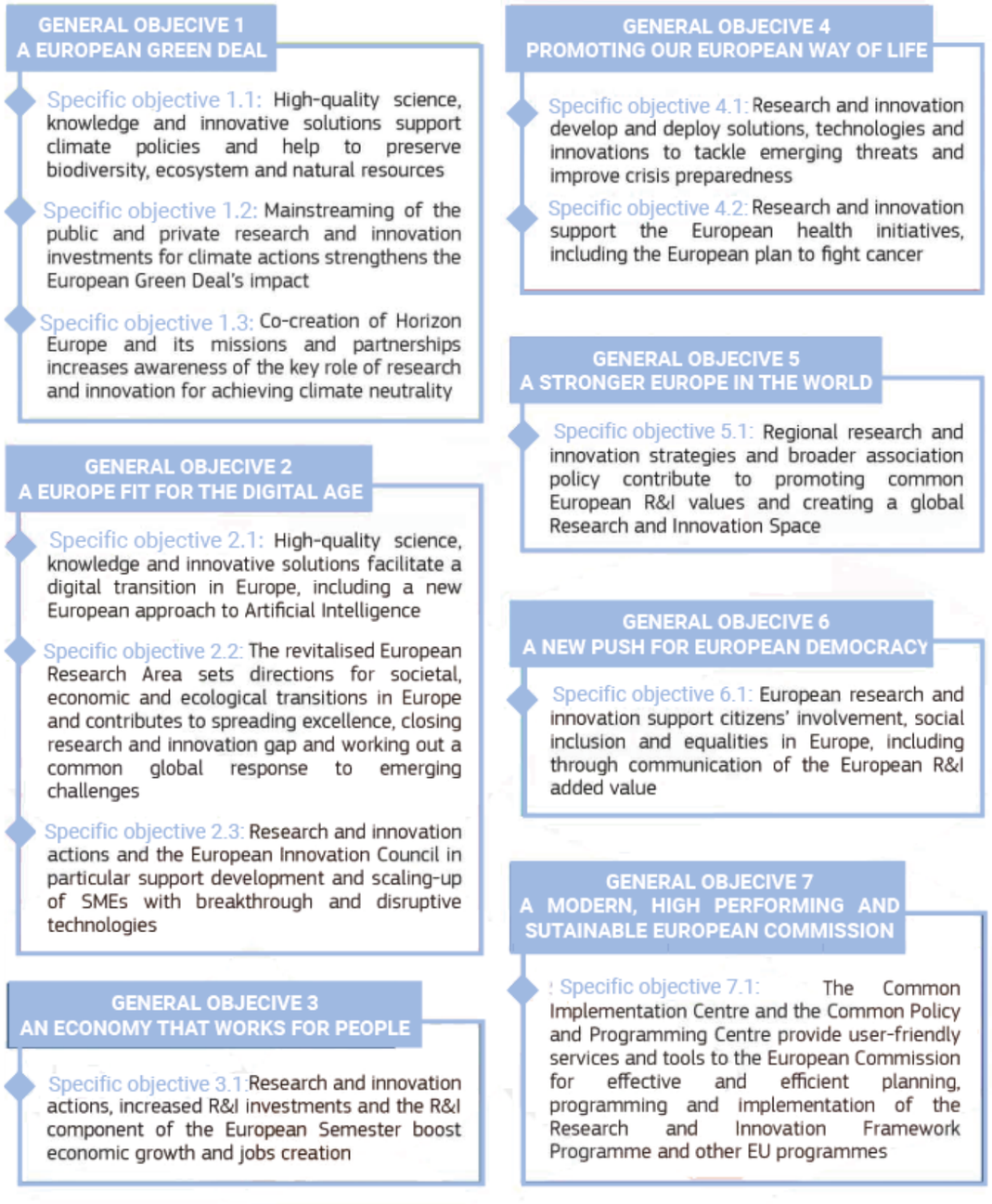


Figure 1. 03
The R&I Policy for Accelerating Transitions in Europe: DG R&I Spesific Objectives to the Commission's
Source: European Commission (2020)

Innovation in Relation to Climate Change and Energy Transition

The urgency of climate change and the need for the energy transition have stimulated the European Union (EU) to redefine its innovation strategy as a foundation of sustainable development. Innovation can not only be seen as the driver of economic competitiveness, but can be used as an essential tool to tackle these global societal challenges that climate change and the energy transition bring, like decarbonization, energy resilience and biodiversity loss (European Commission, 2020)

THE ROLE OF INNOVATION IN CLIMATE AND ENERGY TRANSITION

Innovation in the EU is defined as "The development and application of new or significantly improved products, services, processes, or business models that add value economically and socially" (European Commission, 2020). This definition underscores the climate and innovation strategies of the EU, especially in the context of the European Green Deal. The DG Research and Innovation (DG R&I) directly contributes to the main goals of the European Union and consists of 7 main objectives (see figure 1.03):

- The European Green Deal
- A Europe fit for the digital age
- An economy that works for people
- Promoting our European way of life
- A stronger Europe in the world
- A new push for European Democracy
- A modern, high performance and sustainable European commission

These objectives shape the innovation policy that frames EU-funded programs, like Horizon Europe and the European Innovation Council (EIC) (Publications Office of the European Union, 2024).

KEY PRIORITY SECTORS FOR INNOVATION IN THE EU

The innovation policy of the European Union is sector-specific and has an emphasis on specific sectors that can drive this transition. According to the EIC Work Programme (2025) and the EU Innovation Policy Framework, key sectors include:

- Clean and renewable energy systems
- Digital and industrial modernization
- Mobility and transport
- Agriculture, food and bioeconomy
- Construction and the Built Environment
- Industry and advanced manufacturing

THE EUROPEAN INNOVATION SCOREBOARD

To actually measure ‘innovation’ the European Innovation Scoreboard (EIS) has been established to measure and compare innovation performances across the EU countries and regions. The EIS 2024 classifies the innovation performance into four dimensions:

- Framework conditions (human capital, research systems)
- Investments (Public and business R&D)
- Innovation activities (firm innovation, intellectual property)
- Impacts (Employment and exports in knowledge-intensive sectors)

Each of these is based on 32 indicators that can be found in the appendix [1]. The EIS can be seen as a policy instrument that is aligned with the European Union’s innovation ambitions (European Innovation Council, 2025). According to the European Innovation Scoreboard 2024 (EIS), the Netherlands is one of the Innovation Leaders among countries as Sweden, Denmark and Finland (European Commission, 2024). (see figure 1. 04)

ALIGNING INNOVATION FRAMEWORKS TO REGIONAL DEVELOPMENT

The European Innovation Scoreboard (EIS), The European Commission (EIC) and the DG R&I framework collectively support the EU’s strategic goals of becoming a global innovation leader. The European Commission suggests in underperforming areas to create enabling conditions for: Bottom-up innovation, Cross-border collaboration and academic exchange, Tailored funding for R&I programs and infrastructure and digital access improvements (European Commission, 2020).

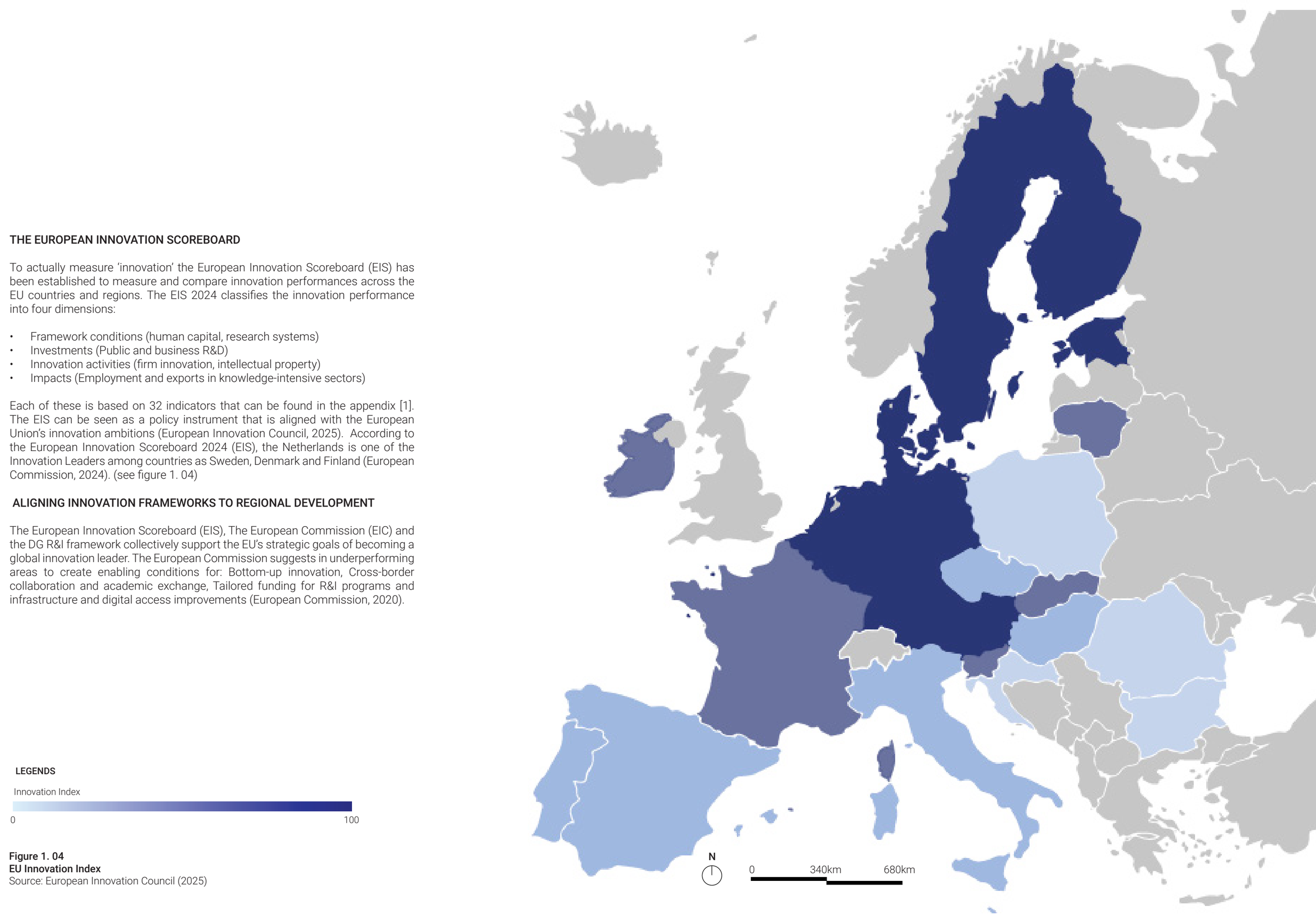
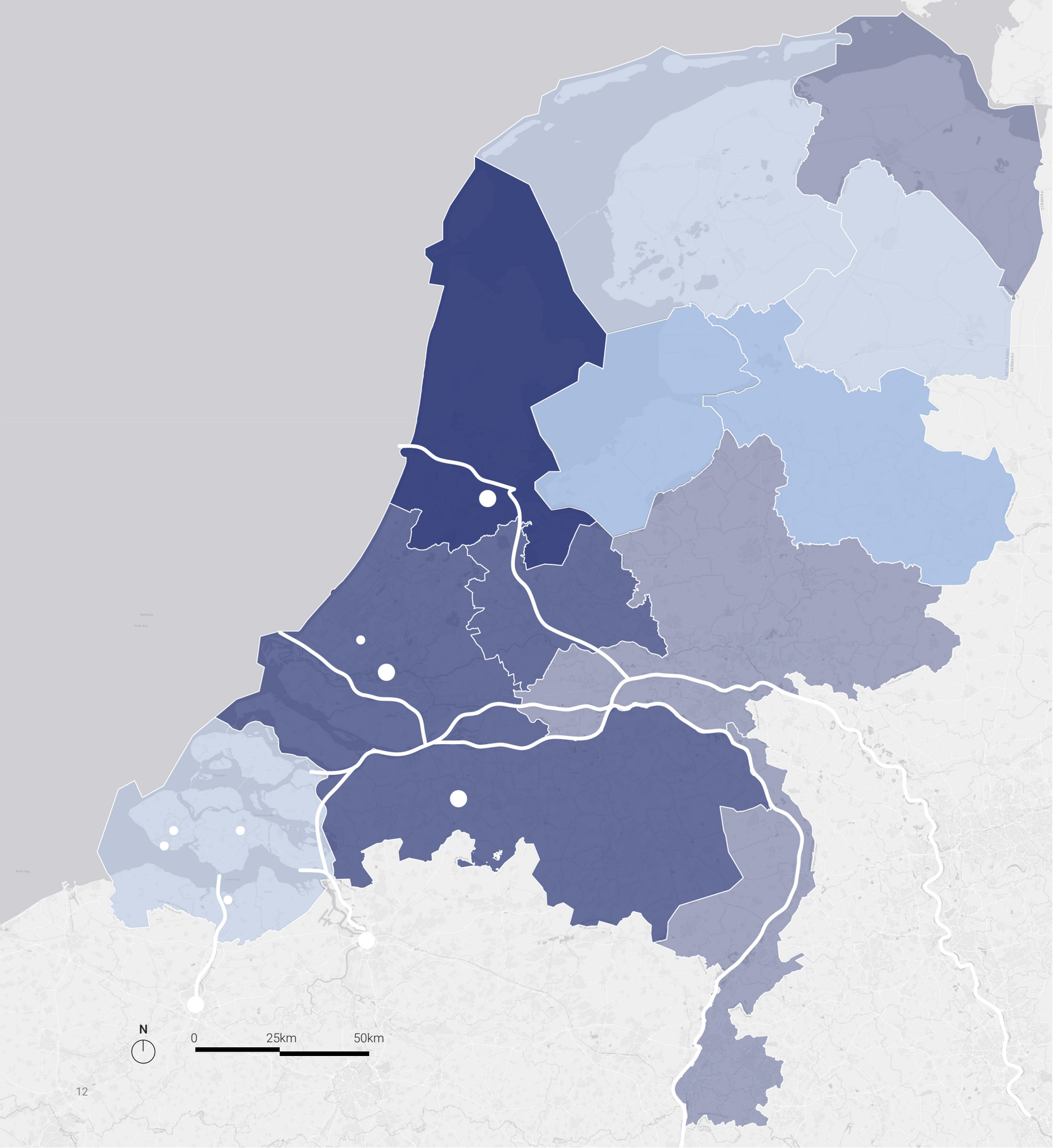


Figure 1. 04
EU Innovation Index
Source: European Innovation Council (2025)

The Netherlands Context

The Netherlands is shaped by water. Most of the country is lying below sea level and is intersected by major rivers like the Rijn and Maas and its unique geography has historically shaped its national development (Deltares, 2023). It consists of 12 provinces and has a population of 17.88 million inhabitants (2023). Coastal cities such as Den Helder and Vlissingen are part of a delta system that consists of waterways, which are used as economic connectivity between inland Europe and the North Sea. This water-centric identity of the Netherlands has been possible by innovative strategies in sectors such as water management, delta technology, agriculture and even renewable energy.

According to the European Innovation Scoreboard 2024 (EIS), the Netherlands is one of the Innovation Leaders among countries as Sweden, Denmark and Finland (European Commission, 2024). This classification is based on the scores of the 32 indicators that can be found in the appendix [1] which scores the Netherlands the highest in public-private collaboration, employment in knowledge-intensive sectors and scientific publication output. However, the national ranking also shows imbalances between the provinces. North-Holland scores the highest in the Netherlands, while provinces like Zeeland underperform in innovation capacity, ranking at the bottom in indicators like R&D expenditure, tertiary education attainment and SME innovation activity (European Commission, 2024). This gab reflects the broader challenges of the European Union to ensure a balanced development within the innovation policy.



LEGENDS

Innovation Index

0 — 100

Figure 1. 05
EU Innovation Index
Source: European Innovation Council (2025)

Delta Context

The province of Zeeland is situated at the mouth of the Schelde Delta. The landscape tells a dynamic story of 50 million years with changes in height and sea levels, a story of tidal waters and the rivers that shape the landscape. During the last ice age, Zeeland was largely a sandy polar desert which, due to rising temperatures and sea levels, turned into a peat bog. The advancing sea then also drowned this marsh and turned Zeeland into a tidal area around 6,300 years ago (Zeeland | Geopark Schelde Delta, z.d.).

During the Roman Age, people started reclaiming and draining the peat. As a result, the sea got hold of the area again and the mosaic of islands developed, forming the basis for present-day Zeeland.

The Delta is formed by the rivers de Rijn, de Maas, and de Schelde, which all have different origins in the hinterlands and emerge together in the North Sea. The result is a number of islands and peninsulas, disconnected by sea and river estuaries, which have changed shape throughout the years. Smaller peninsulas merged together into the bigger islands seen nowadays. Some regions which were inhabited some time ago are now submerged, such as the Verdronken Land van Saeftinghe.

It is a true estuary area with large estuaries of rivers where tidal action is strong. This tidal area is characterized by salt marshes, mud flats, plates and gullies. Gullies shift and can re-sand previously formed slabs, mudflats and even salt marshes. This way, the outer dike areas are ever-changing, shifting forms. With the North Sea tides pushing and pulling at the river's course, fresh and salt water intermingles, creating a unique environment with a specific set of plants and animals.

About 1,000 years ago, people started to dike the higher salt marshes and the continuous struggle and life against and with the water began. This interaction between geological force and human action is typical for the Schelde Delta; it shows the alternating role of natural processes and human influences. Whether there was friction, usage or symbiosis between people and nature, human actions have many intended and unintended consequences for the landscape and its sediments.

LEGENDS

Dike
Main channel with strong current

Figure 1. 06
Delta Context

History

Industries Shaped by Water

Throughout Zeelands's history, water has been a defining element next to industry. Over time, industries changed, but they all kept a strong connection to water. This started with early settlements along the river banks, with a focus on trade, fishing, agriculture and industries that depended directly on water access and management. During the 17th century, Zeelands ports played a key role in international trade. As the common wealth grew, so dit the ports and cities. (Zeeland en de Gouden Eeuw - Zeeuwse Ankers, 2022) This wealth had a decline at the end of the 18th century, after the industrial refolution found its way to the netherlands, small industries arose. In this period the canal between Gent and Terneuzen was digged (Industrie in de Kanaalzone - Zeeuwse Ankers, 2022).

Zeelands economy was not the same as during the Gouden Eeuw, but due to its waterfront location, industries found it an appealing place to settle. With the arrival of heavy industry: a phosphate plant (Sas van Gent) and a coking plant and fertiliser factory (Sluiskil), Zeeland put itself on the map again (Nieuw Zeeland Archieven - Zeeuwse Ankers, z.d.).

After the second world war and the defestating Watersnoodramp in 1953, Zeeland got a new industry, namely tourism. The province got new infrastructure and the Deltawerken, improving accesibility. With this came a new focus on preserving nature and recreation.

Today Zeeland is still mostly known for its unique beaches and big industry. Though, the new industry is shown in the skyline and landscape, renewable energy. The future industries will keep evolving and innovating, but the connection to the water will stay.

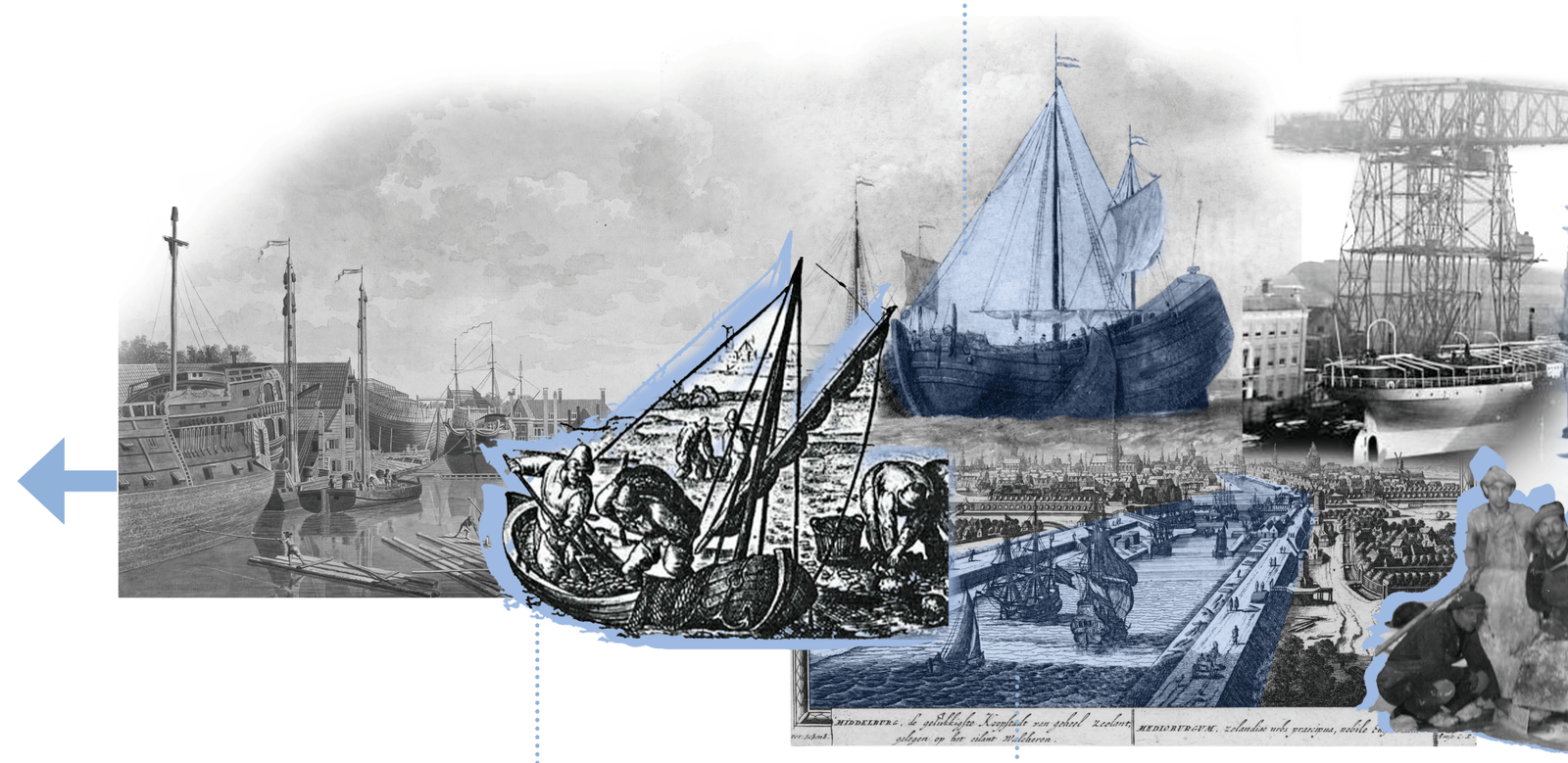


Figure 1. 07
Timeline of Trend Changing
Collage Image Source: public domain

1900 - CHEMICAL AND FOSSIL
Big chemical and fossil fuel industries start to arise. Leading companies were the glass, sugar and coke factory.

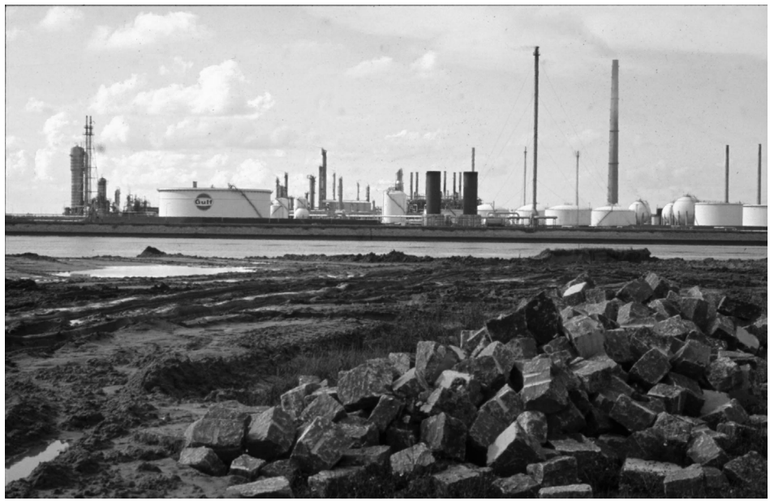
1980
After the Watersnoodramp, the Delta Commision was created to work on a solid defense plan for the Netherlands against the sea. This led to the construction of the Delta Works from the late 1950s to the 1980s.

NOW
The energy transition is already making significant strides in Zeeland. Wind turbines are rising from the sea, and fields are dotted with solar panels. The landscape of Zeeland is beginning to take on new shapes which will keep on going in the future.

1953
In the night of 31 of January 1953, a severe northwest storm, together with high tides, created a spring tide. The dikes did not last, and a defestating flood followed, destroying houses and causing many deaths among residents and animals of Zeeland.

EARLY 2000
In recent years, the province has been focusing on the tourism sector, putting Zeeland on the map with its unique landscape and heritage.

Identities



The identity of the Zeeuwse population can be seen as a unique community within the Netherlands. It is shaped by historical events, its peripheral location, and distinctive spatial qualities.

As a delta region, Zeeland constantly grapples with the dynamics of water versus land. The relationship with the sea is a major element of the region's **cultural identity**. Battles against storms and floods, as well as the presence of shipping and fishing industries, play a significant role in the narrative of Zeeland. In addition, the influence of the Christian church remains prominently visible.

This water-shaped landscape also attracts considerable tourism, which has become a key aspect of the region's **economic identity**, alongside agriculture and major port industries. This combination of economic functions is characteristic of peripheral regions.

Although Zeeland lies in close proximity to major cities such as The Hague and Rotterdam, the political and social distance is much greater. Many inhabitants of Zeeland feel a sense of disconnection between their lives and the political leadership in The Hague.

From top to bottom right:
Figure 1. 08, 1.09, 1.10
Agriculture, Tourism, and Industry
Source: Zeeuws Archief, n.d.

The previously mentioned identity of Zeeland is also reflected and recognizable in its physical landscape. The region's complex relationship with water is clearly illustrated by the presence of large harbors such as the North Sea Port, as well as by the flood protection infrastructure of the Deltawerken. Dikes, dams, and locks are essential elements of this **physical identity**, as they shape both the land and the waters.

Although the dynamic interaction with nature is ever-present, agriculture has overtaken much of the natural environment. The near-total cultivation of the region has created a sharp divide between human activity and the natural world. On top of this horizontal layer of farmland now lies a vertical layer of energy transport and production. Large-scale energy projects have left another human imprint on the landscape. Energy plants, wind turbines, and power lines have made Zeeland one of the largest energy producers in the country.

These three layers have resulted in a form of human settlement that no longer exists in harmony with nature, but rather on top of it. Machines have put a stop to the natural rhythms of the delta.

From top to bottom right:
Figure 1. 11, 1.12, 1.13
Deltaworks, Energy and Landscape
Source: Zeeuws Archief, n.d., Stichting het Zeeuwse landschap, n.d

Current Governance System

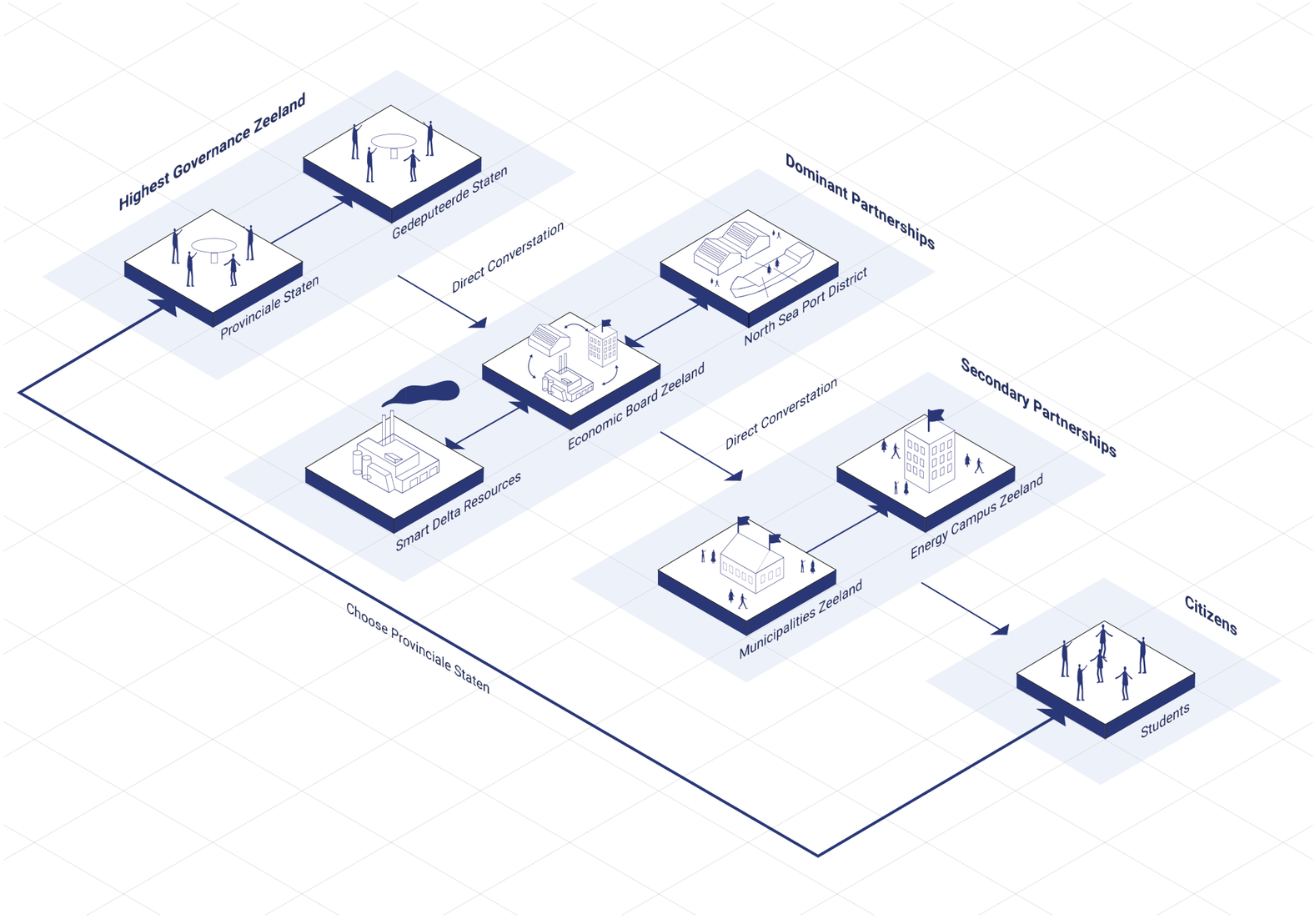


Figure 1. 14
Current Governance Scheme

Zeeland, as one of the twelve provinces of the Netherlands, is part of a governance system that balances democratic representation with executive administration. In Zeeland the highest governance comprises of the Provinciale Staten and the Gedeputeerde Staten (Provincial Executive) that each play a different role in the provincial governance. Additionally, private partnerships also influence policy making and implementation (Provincie Zeeland, 2024a).

The Provinciale Staten serves as the legislative body of Zeeland. Members are elected by the citizens every four years, with the number of seats determined by the size of the province's population. The primary responsibilities include:

- Legislation (Enacting provincial laws and regulations
- Oversight (Monitoring the execution of policies by the Gedeputeerde Staten)
- Budget approval (Overseeing financial expenditures)
- The Provinciale Staten operates through four commissions: governance, economy, public space and strategic tasks (Provincie Zeeland, 2024a).

The Gedeputeerde Staten functions as the executive arm of the Provinciale Staten and is responsible for the implementation of policies and managing the administrative affairs. Members are appointed by the Provinciale Staten and represent the political composition of the elected body. In Zeeland de Gedeputeerde Staten consists of six deputies: 2 seats from BBB. 1 seat from SGP, 1 seat from CDA, 1 seat from VVD and the last seat is reserved for the King's Commissioner (Commissaris van de Koning) who is appointed by the crown for a term of six years (Provincie Zeeland, 2024a).

Zeeland also has private partnerships that influence the governance structure. Private partnerships are collaborative arrangements between the public sector and private entities and are focused at achieving common goals, mostly in areas like economic development, infrastructure and innovation. There are partnerships that are in direct conversation with the Provinciale Staten and Gedeputeerde Staten (active participation) and in indirect conversation (providing expertise or funding). The partnerships with significant influence in Zeeland include: Smart Delta Resources (SDR), Economic Board Zeeland (EBZ) and North Sea Port District (BGTS). These partnerships typically operate independently from citizens control or engagement (Planbureau Zeeland, 2022).

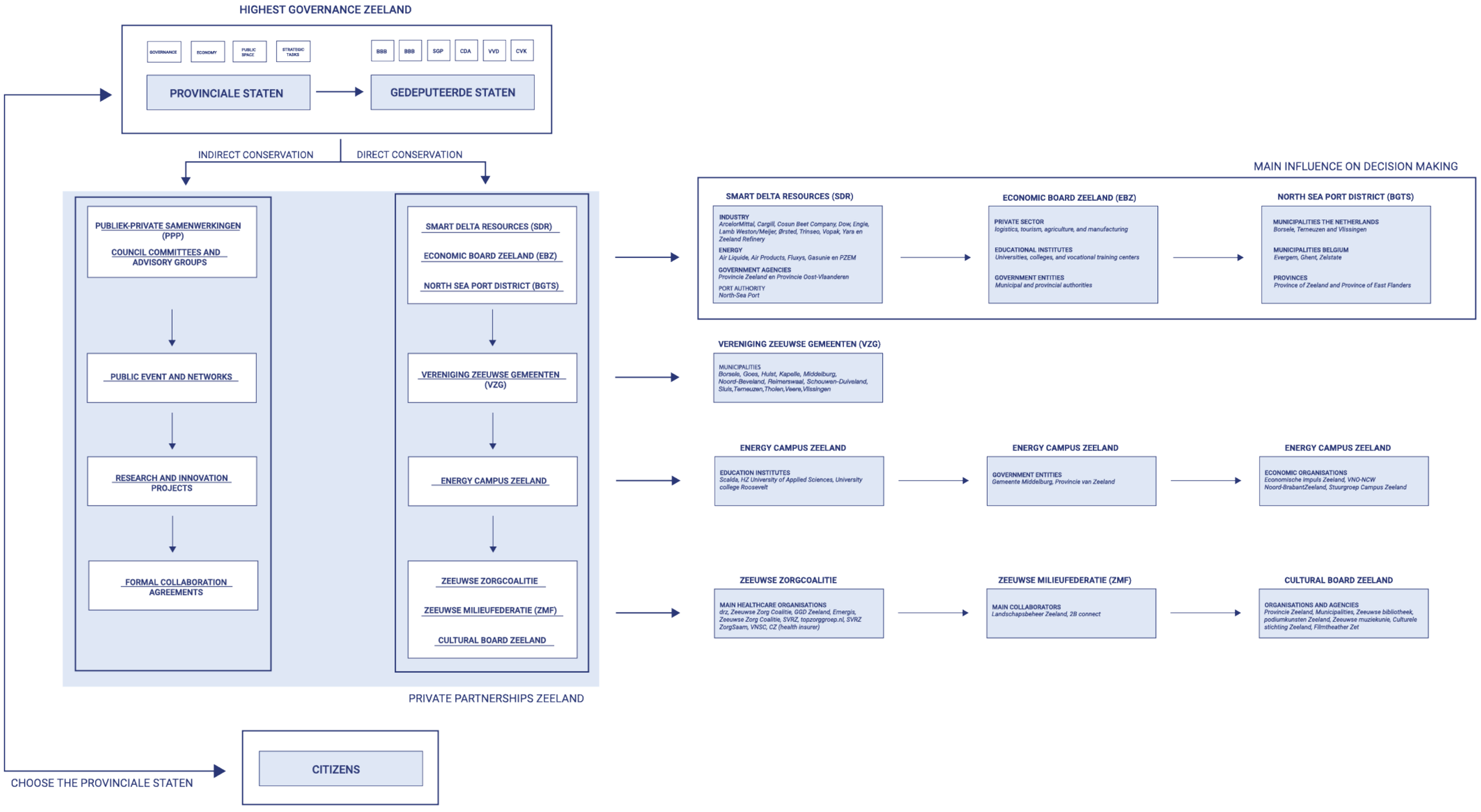


Figure 1. 15
Current Governance System

Figure 2. 01.Zeeland's Satelite View. Source: Google Earth ©2025

CHAPTER 02

Who Shapes the Future?

Introduction to students | Media Analysis | Why Students | Differences Between Students | Students' Wishes and Concerns

Introduction to Students

Current students

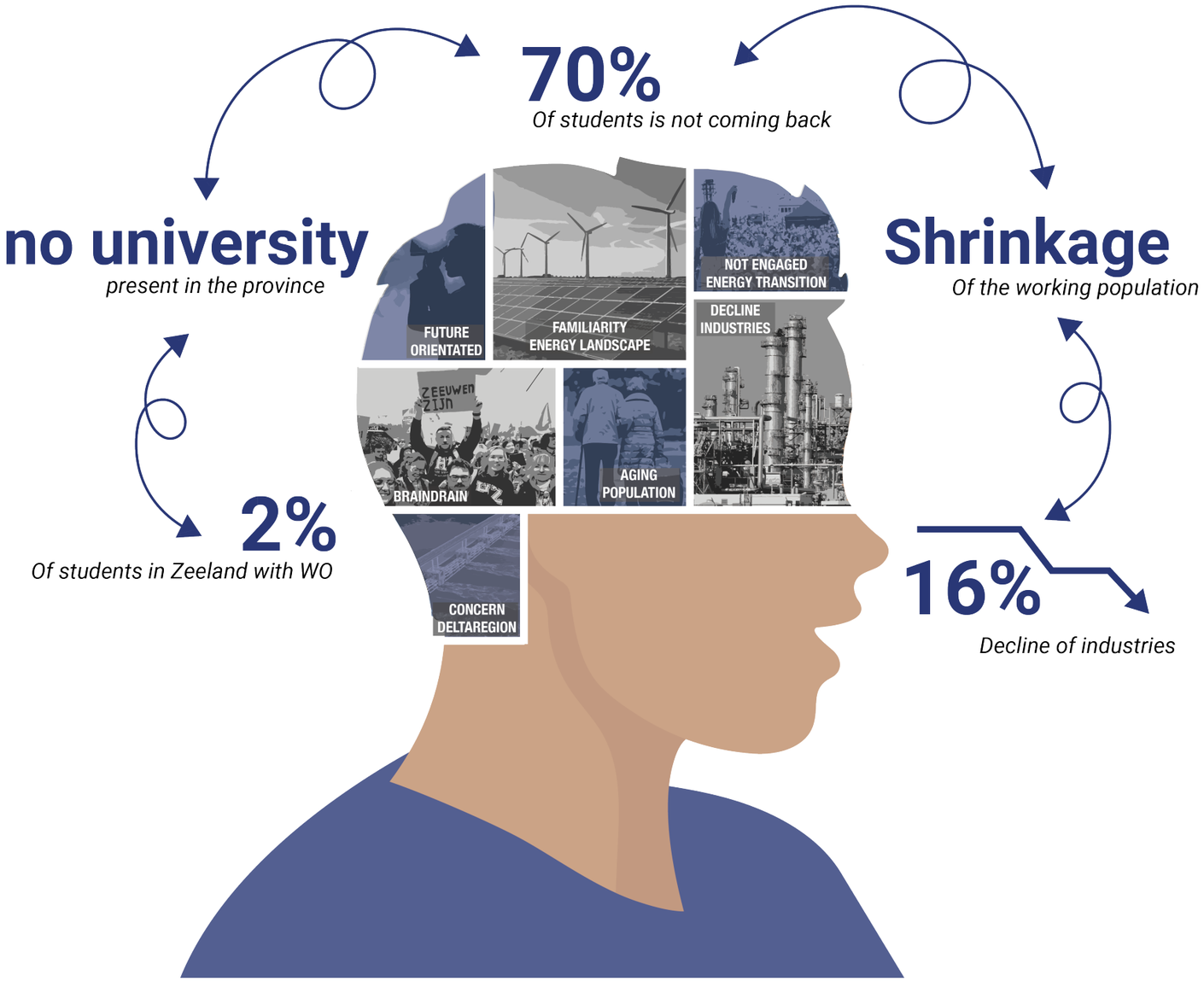


Figure 2. 02
Current Students
Collage Image Source: see Bibliography

In addressing the challenges confronting the province of Zeeland, we have identified the student population, vocational (MBO) and theoretical (HBO and WO) students as our chosen community to create a vision. This group not only represents the future workforce of Zeeland, but also holds the potential to counteract socio-economic trends.

Zeeland is dealing with an aging population and the outmigration of students in pursuit of educational opportunities elsewhere (Meerstra, 2022). By focusing on retaining students, Zeeland can mitigate these trends. They also serve as an important connection between educational institutes and the industries. Next to this, students embody future-orientated perspectives and bring new ideas for innovation. Their engagement is crucial for sustainable industries and energy where technologies and practices are rapidly evolving. However, current observation indicate a lack of student involvement in Zeeland's energy transition, missing opportunities for both students and the region.

Student Energy Usage

Students in Zeeland represent a significant, yet under-recognized group in the region. Despite the urgency of the energy transition, student engagement remains low, while their energy consumption is relatively high across different domains (Derksen, 2025). The widespread use of laptops and smartphones contributes to the growing energy demand among students. They also frequently rely on public transport for commuting, often choosing convenience over sustainability. Globally, tourism and travel account for around 5% of direct energy use and emissions and students are a big part of this (Gössling & Hall, 2022). Food- and product delivery services have become a habit, especially among students. This trend adds to energy-intensive logistics chains and contributes to the growing carbon footprint. Heating during the winter and colling during the summer are typically managed by conventional systems, which leads to higher energy use. Lastly, inefficient lighting and long showers also are very common among students which also contributes to high energy usage. Students in Zeeland are currently more consumers than contributors in the energy transition. Their daily behaviors, collectively represent a high energy demand.

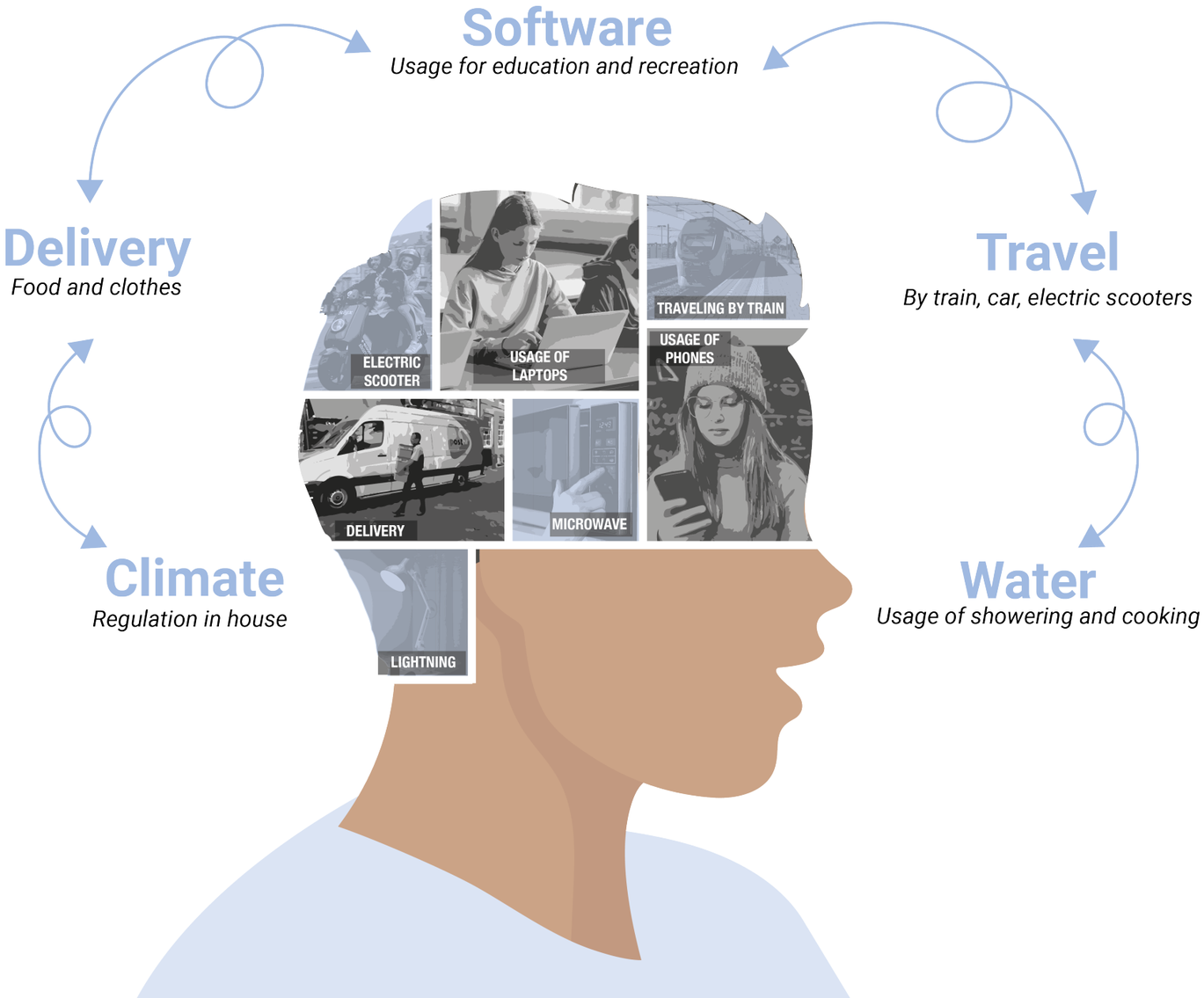


Figure 2. 03
Student Energy usage
Collage Image Source: public domain

Media Analysis

What students think

To understand the students of Zeeland better and why they leave the region, a media analysis and interview (see appendix 2) have been conducted to understand the most important spatial elements affecting both theoretical and vocational students in Zeeland, this is also shown in figure 2.06

- Educational infrastructure and institutional nodes
  Availability, quality, collaboration and opportunities of educational and research institutes.
- Connectivity and mobility infrastructure
  Public transportation options, road infrastructure, bike lanes and walkability for daily commuting.
- Landuse and Zoning
  Presence of diverse facilities, like recreational-, work-, leisure-, and study areas and availability of student housing.
- Economic and industrial spatial distribution
  Locations of industries, the relationship between education providers and industry and the extent of economic diversity beyond the industries in Zeeland.
- Energy transition and sustainable urban development
  Integration of new energy technologies into local education and industry and the implementation of renewable energy projects and sustainable urban planning, transport and buildings.
- Cultural and social infrastructure
  The availability of recreational areas, nightlife, student associations, cultural activities and social inclusion initiatives for all students.

Every spatial element plays an important role in the students life and influence their decision to stay in Zeeland or leave for other regions, like the Randstad or Belgium. For each of these spatial elements, a media analyse has been conducted to determine if these spatial elements effect the students positively or negatively. When one of the spatial elements influences the students, it does so in ways that it will influence the following: their academic experience, quality of life, career prospects, decision to stay or leave Zeeland.

Figure 2. 04
Media Collage

A positive impact will increase student retention, well-being and engagement with the region. A negative impact will cause student dissatisfaction, departure and disengagement with the region.

The Sankey diagram in figure 2.05 shows the relationship between the spatial elements and whether they have a positive or negative impact on the chosen community. A detailed breakdown of each element and how it impacts the students is as followed:

- Educational infrastructure and institutional nodes
  Zeeland has a strong presense of vocational schools in Zeeland, but the options for higher education are limited and lack specialization. This is creating an academic gap between the vocational students and the theoretical students in Zeeland.

- Connectivity and mobility infrastructure
  Zeeland is isolated compared to urban areas in the Randstad. Students who live in the rural areas of Zeeland faces long travel times and infrequent transit connections, which contributes to most of the educational institutes and worksectors.

- Landuse and zoning
  Lack of urban vibrancy, function segregation and lack of recreational areas hinder social inclusion and the emotional well-being of the students.

- Economic and industrial spatial distribution
  Zeeland's economic development is dominated by large industries (DOW, North Sea Port, etc.) and these industries operate often without a close collaboration with the current educational institutes. Little bottom-up participation means that the students are rarely involved in shaping the local economic strategies of Zeeland.

- Energy transition and sustainable urban development
  The landscape of Zeeland allows for unique educational specialisation sectors, like water management, agriculture, renewable energy.

- Cultural and social infrastructure
  Zeeland currently offers limited cultural and social infrastructure. This region feels socially isolated for students without the cultural diversity and informality of public spaces

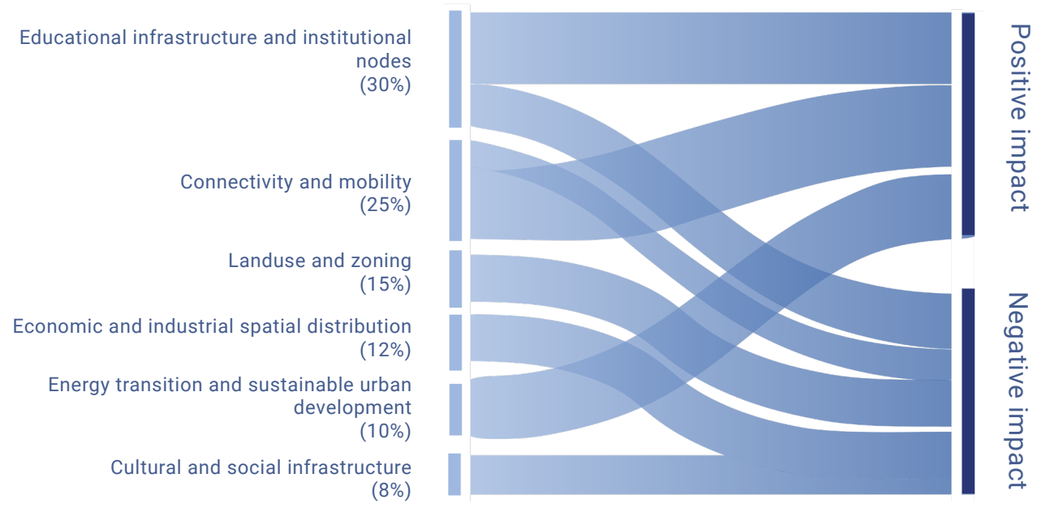


Figure 2. 05
Media Analysis: Sankey Diagram
Source: Various sources *(see Literature)*

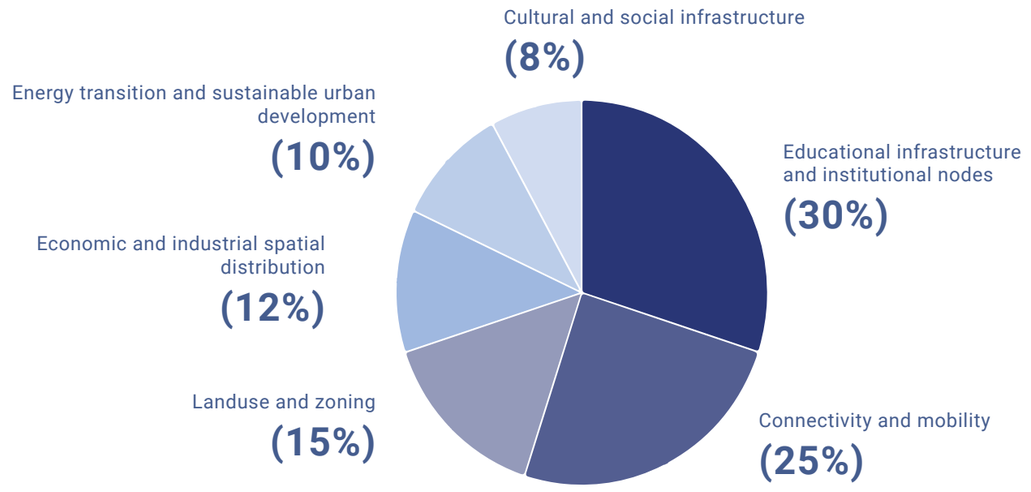
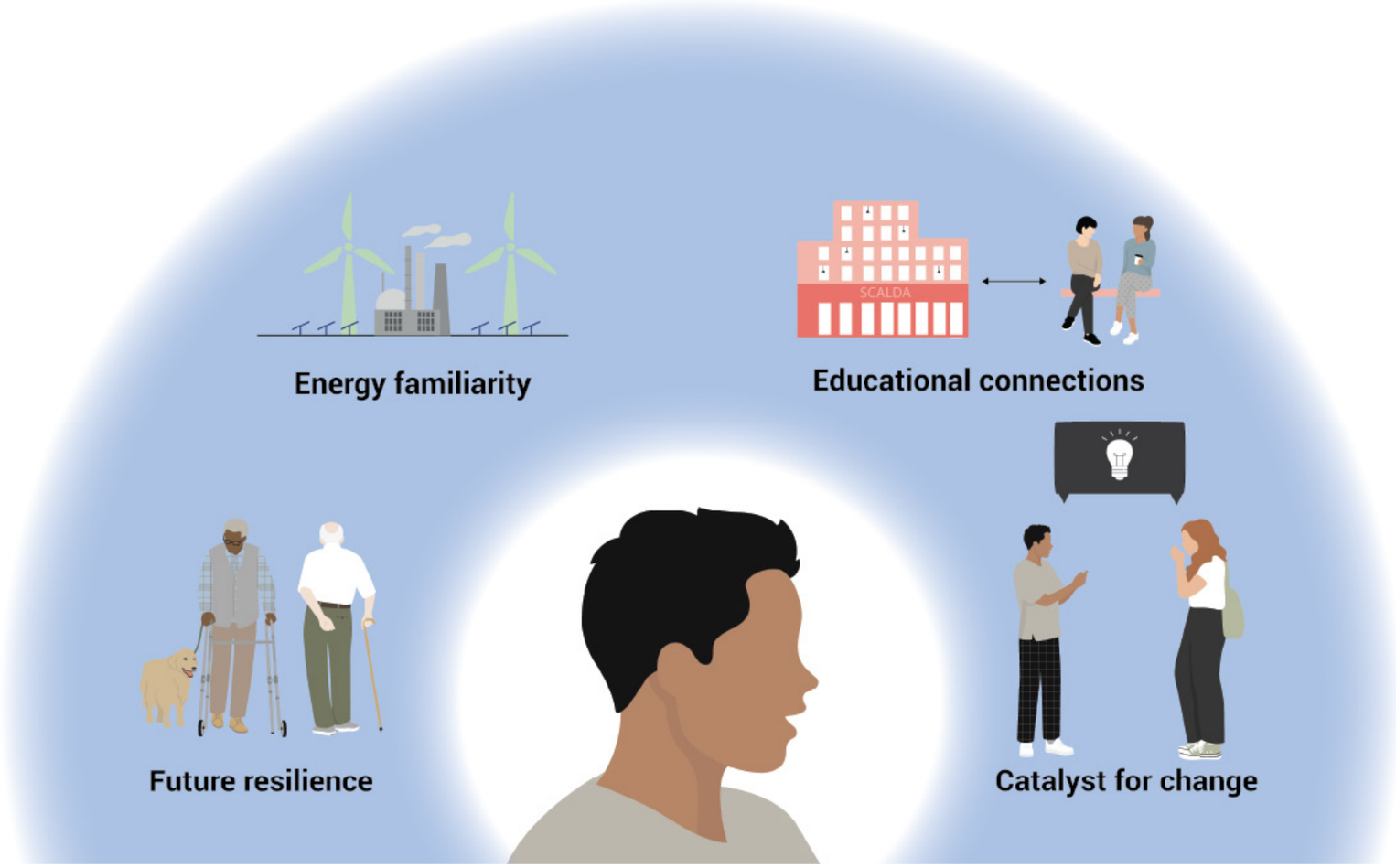


Figure 2. 06
Media Analysis: Pie Chart
Source: Nexus sources *(see Bibliography)*

Why Students



The student community is a vital group to consider in regional planning and design—especially in a region like Zeeland. Young, educated individuals are among the most powerful drivers of future resilience and progress. They tend to be open to change, highly adaptive, and often at the forefront of innovation.

In a society increasingly shaped by aging populations, students play a key role in maintaining the social and economic balance. Their presence helps to counter demographic shifts, bringing energy, fresh perspectives, and long-term thinking into the system. With a forward-looking mindset, they are often more inclined to support bold, future-oriented decisions that prioritize sustainability, inclusivity, and innovation.

In Zeeland, today's students already have a strong connection to the region's evolving energy landscape. Having grown up alongside wind turbines, solar farms, and other sustainable infrastructure, these elements are embedded in their sense of place and identity. As a result, they are more accepting—and even supportive—of new sustainability projects, viewing them not as disruptions, but as natural extensions of their environment.

Moreover, students' direct connection to education means they are consistently engaged with contemporary ideas and societal challenges. They are more likely to be aware of and concerned about pressing global issues such as climate change, biodiversity loss, and social inequality. This awareness positions them as important allies in shaping a resilient and future-proof Zeeland.

Figure 2. 07
Why Students

Differences Between Students

The educational system in Zeeland reveals distinctions between the vocational students, typically enrolled in MBO (middelbaar beroepsonderwijs), and theoretical students, enrolled in HBO (hoger beroepsonderwijs) and WO (wetenschappelijk onderwijs) programs. These differences have consequences for the region's economic development, work force composition and capacity to engage with the energy transition. The main differences between the different students are highlighted in table 1. 01.

Vocational students are primarily trained to work in the local industries or the construction sector. Their education emphasizes, practical, hands-on skills suited for immediate entry to the job market. In contrast, theoretical students are educated to conduct research and design new technologies, often pursuing careers that involve the implementation of new technqiques and applications (Derksen, 2025). The connection to industry also highlights the differences in students. Vocational student's education program closely aligns with the current industry demands and trends. Theoretical students, however, can proactively shape the format of industries through innovation and research.

Decision-making power also is different among students. Vocational students tend to be more guided by industry expectations, while theoretical students may influence how tranistions are implemented (Derksen, 2025). Vocational students are more likely to stay in Zeeland due to localized job opportunities, whereas theoretical students often leave the region in pursuit of broader educational or career prospects.

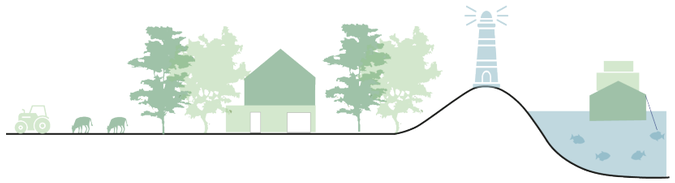
ASPECT	VOCATIONAL STUDENTS (MBO)	THEORETICAL STUDENTS (HBO + WO)
EDUCATION FOCUS	Trained to work in local industries or construction	Educated to innovate, research, and design new technologies
CAREER PATH	Enter practical, hands-on jobs, including construction and maintenance	Study implementations of new techniques and their applications
INDUSTRY CONNECTION	Dependent on existing industry trends and needs	Can drive innovation and reshape industries
JOB MARKET IMPACT	Large workforce needed to build and maintain renewable energy infrastructure	Have potential to transform industries towards sustainability
PERSPECTIVE TRANSITION	More abstract and distant; not directly involved in shaping the transition	More proactive and engaged with the energy transition
DECISION MAKING	Industry dictates what they learn and do	Can influence how the transition is implemented
MIGRATION TREND	More likely to stay in Zeeland	More likely to leave for educational opportunities in other regions
ECONOMIC POSITION	More affected by rising housing prices and gentrification	Generally have more mobility and resources

Table 1. 01
Differences Between Students
Source: Interview

Students' Wishes and Concerns

Understanding the concerns and wishes of the students in Zeeland is important for designing a vision for them. Based on the media-analysis, interview and youth engagement studies, student perspectives can be organized into five domains: cultural landscape, spatial qualities, mobility, knowledge economy and the energy landscape. These themes reflect the experiences and aspirations of Zeeland's youth and students.

"How can we make sure that modernization does not disturb the cultural landscape?"



CULTURAL LANDSCAPE

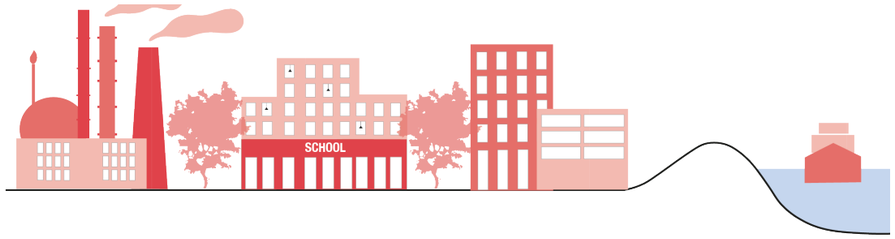
Concern

The students in Zeeland are concerned about the impact of modernization on the provinces cultural and natural heritage. As new developments are emerging, the risk of losing these landscape qualities increases.

Wish

The students emphasize the importance of conserving and promoting natural areas in Zeeland, combined with ecological preservation and youth engagement in local heritage (Provincie Zeeland, 2024b). They advocate for policies that balance innovation with the conservation of the landscape's cultural value.

"Is there a way to integrate different landuses?"



SPATIAL QUALITIES

Concern

The current zoning and functional layout of urban and rural areas fail to meet the multifunctional needs of the students. These monofunctional areas limit interaction and vibrancy in both villages and cities.

Wish

Students envision attractive and dynamic city centers that consists of a blend between living, working and recreational functions. They want revitalization of public spaces, integration of green areas and multifunctional infrastructure that will support community life (Provincie Zeeland, 2024b).

“How can amenities be easier to access?”

MOBILITY

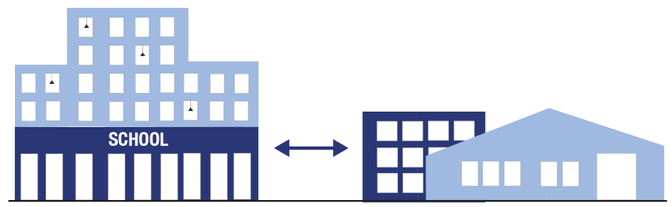
Concern

Accessibility is a major challenge for students. Young people struggle to reach schools, jobs and amenities, especially in the evening and weekends.

Wish

Improving public transport is one of the top wishes. Students request more frequent and better-connected services, especially in the rural areas. They want a better transport corridor from North to South Zeeland and cross-border links with Belgium and advocate for a Ghent-Rotterdam trainline through Zeeland (Provincie Zeeland, 2024b).

“How do the education possibilities connect to the work environment in the future?”



KNOWLEDGE ECONOMY

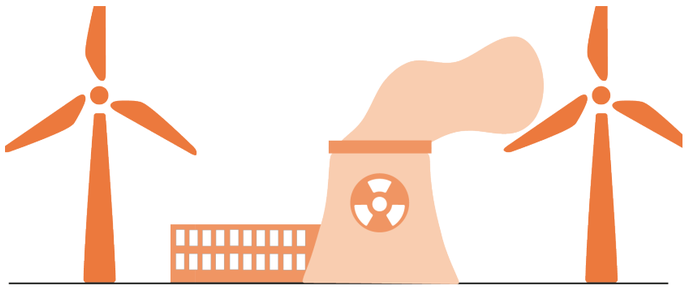
Concern

The disconnection between local educational opportunities and the job market. Students often feel obligated to leave Zeeland to pursue higher education or career opportunities.

Wish

Zeeland needs to offer more diverse educational institutes that introduce master programmes in the province. They want more collaborations between universities, companies, research centers and other schools. Stronger ties between education and the regional job market are essential to retain students in the province (Provincie Zeeland, 2024b).

“How can we keep on using the same amount of energy?”



ENERGY

Concern

The students are questioning on how the energy transition will affect their daily lives, economic opportunities and energy usage. They are unsure if the region can maintain their current energy consumption while transitioning into renewable sources.

Wish

Students support investments in renewable energy sources, particularly wind and solar, but they don’t mind nuclear energy if its necessary to maintain their energy usage. They do stress the need for a better connection of education with the energy industry so they can be more aware and engaged with the ongoing transition (Provincie Zeeland, 2024b).

Figure 2. 08
What Do They Actually Want and Need

Figure 3. 01.Zeeland's Satelite View. Source: Google Earth ©2025

CHAPTER 03

Research Methodology

Problem Statement | Research Question | Methodology Framework
Terminology | Theoretical Framework | Conceptual Framework

Problem Statement

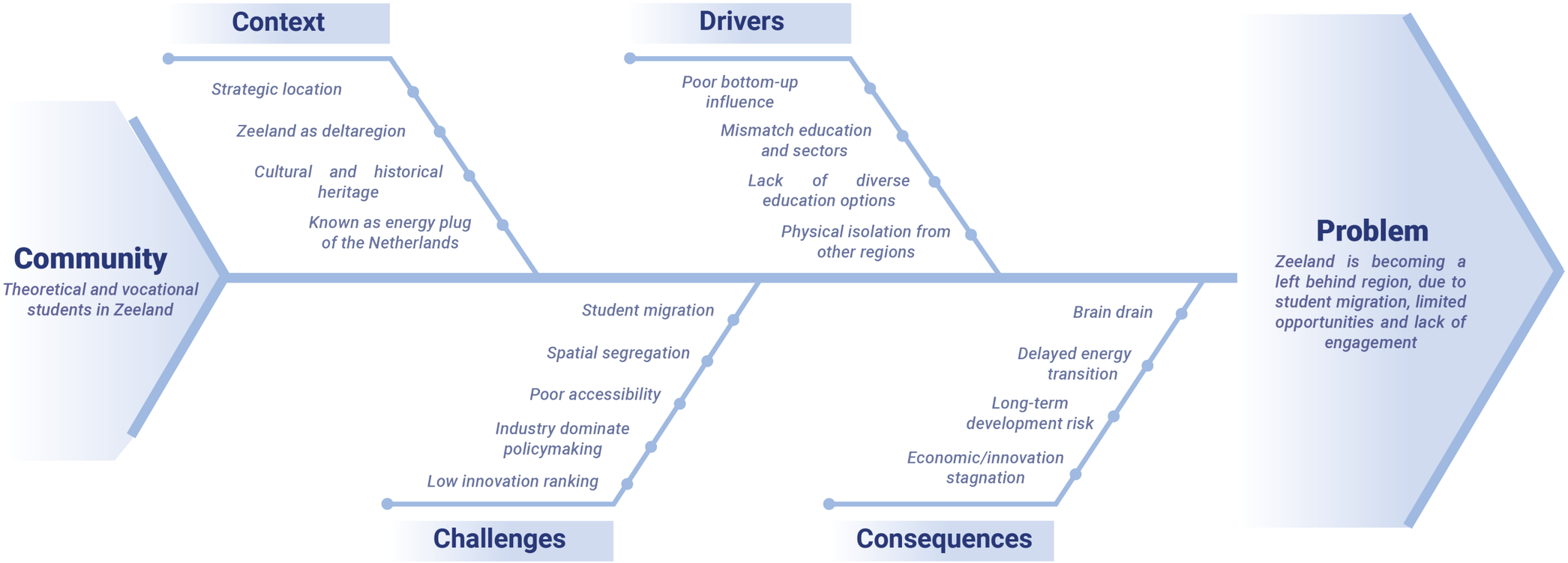


Figure 3. 02
Problem Statement

The Netherlands is a global leader in innovation, with regions contributing uniquely to its economic and technological progress. Zeeland, in particular, can be characterized as a delta region with a **rich cultural and historical heritage**, a strategic location near major Dutch and Belgian economic hubs, and a thriving **tourism sector**. Known as the **energy plug of the Netherlands**, the province has already taken steps towards renewable energy integration, contributing to the global energy transition. The region's proximity to cities like Antwerp, Ghent, and Rotterdam also presents opportunities for cross-border economic and academic collaboration.

However, the needs and aspirations of students do not align with the opportunities Zeeland provides, leading many to leave for the Randstad in search of **better education, job prospects, and a more vibrant social life**. As a result, Zeeland as a province, struggles to keep pace with national innovation trends and ranks the **lowest on the country's innovation index**. Additionally, spatial segregation, poor accessibility, and the dominance of large industries in decision-making processes further restrict progress. The lack of bottom-up engagement threatens the long-term growth of Zeeland in terms of the energy transition and its overall economic and social development.

Research Question

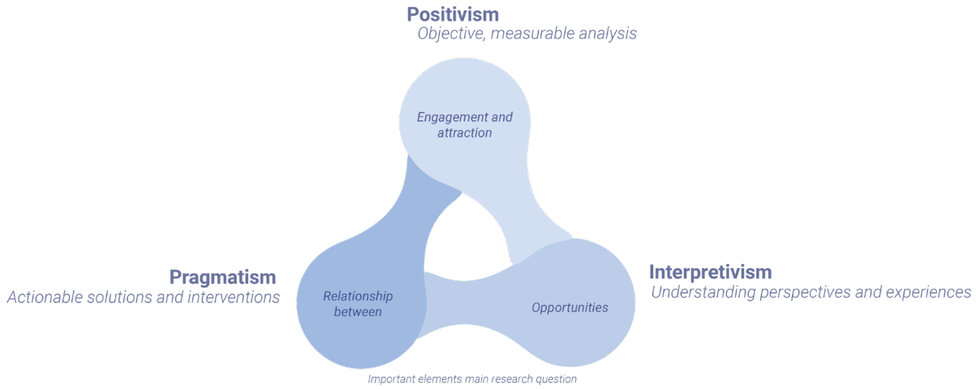


Figure 3. 03
Three Philosophical Paradigms

To address this problem statement, the study asks: How can spatial planning strategies in Zeeland steer the relationship between renewable energy, industries and education to create opportunities that engage both vocational and theoretical students, attracting them to stay in the region?

To answer our main research question, sub research questions have been formed that draws on three philosophical paradigms: Positivism, interpretivism and pragmatism (Goncalves, 2024), see figure 3.04

Positivism assumes that reality can be measured objectively. It guides the study's use of quantitative data, such as the innovation index scores.

Interpretivism focuses on subjective experience and meaning-making. It supports the use of inverviews and even policy analysis to understand the local perceptions of governance and innovation

Pragmatism/ design combines both and emphasizes the use of mixed-methods for problem-solving. This fits well in this project's aim to both analyse and act (design) upon regional challenges through participatory and design-based research.

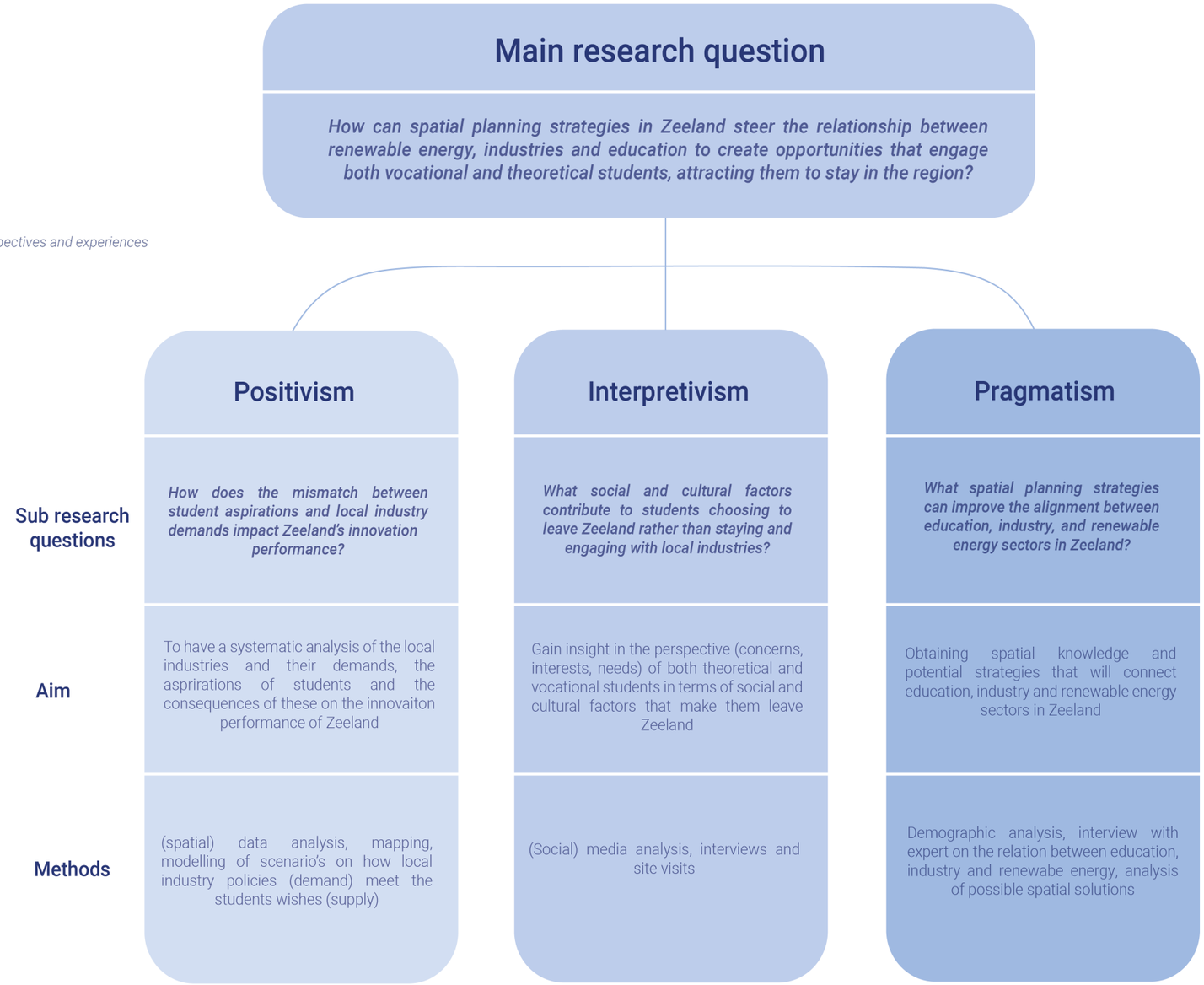
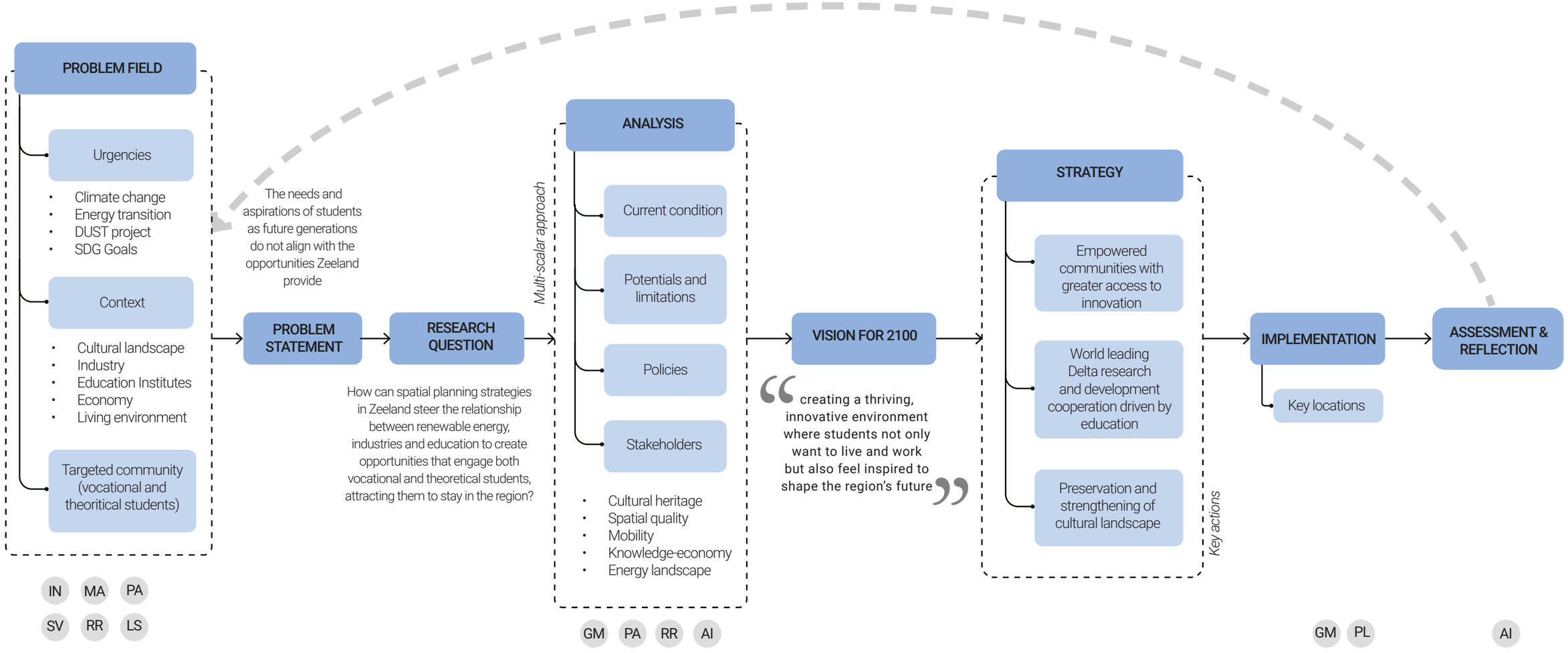


Figure 3. 04
Research Question

Methodology Framework



METHOD EXPLANATION

IN Interview
Conducted to gather firsthand information and perspectives from current users and stakeholders

MA Media Analysis
Utilize Atlas.ti to sort information related our issues and undestand our targeted community's perception

SV Site Visit
Visited key areas to verify findings from our background research and gain insights of what actually happens in our study area

PA Policy Analysis
Reviewed and integrated multi-scalar policies and regulations (EU, regional, national, province) in relation with climate change and energy transition

RR Report Reading
As references for narrative building and presentations

LS Literature study
Studied theories and projects from academics and professionals as foundations of our approach

GM GIS Mapping
Translated our analysis and visions into spatial layers

PL Pattern Languange
Organized key actions and identified relations between each action using cards to structure our strategy

AI Artificial Intelegence
Utilise chatgpt and Atlas.ti for grammar, spelling checks and making summaries throughout the process

Figure 3. 05
Methodology Framework

Terminology

'Angular Choice'
Shows how likely a space is to be used as a route between others, based on angular shortest paths—indicating through-movement or flow (Hausleitner, 2024; Hillier & Iida, 2005).

'Angular Integration'
Measures how easily a space can be reached from all others, based on the least angular change—indicating accessibility or to-movement potential (Hausleitner, 2024; Hillier & Iida, 2005).

'Bottom-up'
Emphasizes participation from local communities, residents, and grassroots organizations (Healey, 1997).

'College innovation campus'
Located in the heart of Zeeland Goes, the College Innovation Campus is a collaboration space between local universities and industries.

'Contour wings'
Wrap dangerous, noisy industrial areas with transition zones towards settlements or other landuses (DZH, 2022).

'Delta Eco innovation campus'
The Delta Eco Campus promotes environmental sustainability through cutting-edge research in renewable energy and eco-friendly technologies

'Delta'
A delta is a low-lying, sediment-rich landform at the mouth of a river where it flows into a sea or ocean, often characterized by branching waterways and fertile soil (National Geographic, n.d.).

'Deltawerken'
The Deltawerken is a renowned system of dams, sluices, locks, dikes, and storm surge barriers in the Netherlands, designed to protect the country from flooding after the catastrophic North Sea Flood of 1953 (Rijkswaterstaat, n.d.).

'Energy innovation campus'
The Energy Innovation Campus serves as a hub for sustainable energy research, development, and implementation.

'HBO'
Tertiary higher theoretical education (Rijksoverheid, n,d).

'Hydrogen innovation campus'
The Hydrogen Innovation Campus focuses on advancing hydrogen technology for clean energy solutions.

'Knowledge cluster'
Research and governance hub that represent different kinds of sectors and communities equally and is formed and specialized based on their unique spatial qualities

'MBO'
Secondary vocational education (Rijksoverheid, n,d).

'Natura 2000'
A European network of protected natural areas (European Commission, n.d.).

'Space Syntax'
A method for analyzing how spatial configurations influence movement and social behavior, showing how the layout of streets and spaces shapes human activity (Hausleitner, 2024; Hillier & Hanson, 1984).

'Systemic design'
A interdisciplinairy approach that principles of systemic thinking combines with the creative design process. It involves having the necessary context needed to make decisions and then switching between a holistic understanding of the system and considering the specific needs of stakeholders and users (Wandl, 2021).

'Theoretical'
Theoretical education is associated with HBO and WO institutions (Nuffic, 2020).

'Tidal energy innovation campus'
The Tidal Energy Campus focuses on harnessing the power of tidal movements to generate clean, renewable energy.

'Top-down'
Refers to a centralized approach where decisions are made by government authorities, planners, or experts, often at the national or municipal level (Friedmann, 1987).

'Vocational'
Vocational education typically refers to MBO-level programs (Nuffic, 2020).

'WO'
Scientific/academic higher theoretical education (Rijksoverheid, n,d).

'Zeeuws'
Zeeuws is a regional dialect spoken in the Dutch province of Zeeland, reflecting the area's unique cultural identity and historical ties to both Dutch and Flemish linguistic traditions (Nederlandse Taalunie, 2021).

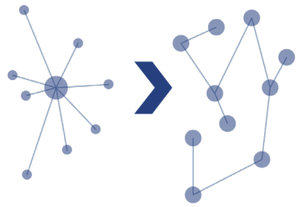
Water battery island
A water battery island functions as a large-scale energy storage system, using pumped hydro technology to balance renewable energy supply and demand.

Theoretical Framework

CIRCULAR INDUSTRY

Circular industry challenges the linear model of the current economy by emphasizing the reuse and repurposing of materials and resources. The “cradle to cradle” theory is a foundational concept that encourages closing material loops to reduce environmental impact (Visser, 2017). In industrial systems, this leads to decreased resource dependency and greater resilience in supply chains. While the concept is considered essential for sustainable development, it is not always connected to systemic change (Kirchherr, 2017).

The circular economy can be promoted through a top-down approach, but it is also recognized as a tool for designing bottom-up management strategies. Currently, the implementation of circularity appears to still be in an early stage, focused mainly on recycling. To successfully transition into a circular industry, it is important that all stakeholders are involved in both the process and the distribution of profits (Ghisellini, 2015).

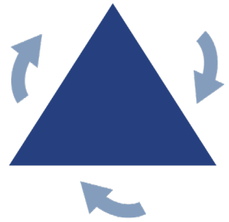


DECENTRALISATION

Decentralisation refers to the transfer of power, responsibility, and resources from a central government to local representatives at the subnational level. This process enhances democratic decision-making and serves as a tool to empower and engage communities (OECD, 2019).

While the term typically applies to political systems, it is also a widely used concept in economics and public administration. Decentralisation is believed to make governments more accountable and responsive. This can be attributed to increased political competition, reduced instability, and greater local responsibility (Faguet, 2014).

Decentralised governance can also enable the delivery of public goods at the lowest level of government, leading to improved efficiency (Oates, 1972). However, challenges such as fiscal sustainability, corruption, and coordination issues may arise and threaten the effectiveness of decentralisation.



SPATIAL JUSTICE

Spatial justice refers to the fair distribution of resources, opportunities, and access to physical spaces, ensuring that all individuals can benefit from their environment (Soja, 2010). It highlights spatial inequalities in areas such as housing, transportation, and public services.

Spatial justice is closely connected to broader concerns of social justice in urban settings, particularly affecting marginalized groups (Harvey, 1973). Today, increasing inequality and social polarization impact the distribution and accessibility of public goods within cities (Rocco, 2022).

It is considered one of the greatest challenges of the contemporary world and remains a neglected aspect of the sustainability transition.

CULTURAL LANDSCAPE

A cultural landscape is a topographic area shaped by human activity, reflecting the combined work of nature and culture. The physical environment becomes a distinctive landscape that embodies the values, technologies, and social structures of the people who inhabit it (Hepach, 2023). It is not merely a backdrop, but a cultural product created by the population.

Each cultural landscape is unique and possesses its own characteristics. It is viewed as a shared and collective force that operates on a broader scale than individuals, influencing how society functions. The importance of the cultural landscape lies in the socio-cultural connection between the environment and its people. A sense of place and belonging emerges from an emotional connection to the landscape (Mohindru, 2002).

The identity and culture of landscapes are also recognized and protected by organizations such as UNESCO. History and heritage play a vital role in cultural landscapes, as these layers contribute to a community’s sense of belonging and continuity.

INNOVATION

Innovation refers to the creation of a new product or service, or the improvement of an existing one (Taylor, 2017). Embracing change and driving progress are considered its main pillars. Innovation plays a central role in technological advancement, organizational development, and economic evolution (Tushman, 1996).

It can take the form of both incremental and disruptive changes, but the introduction of new methods, products, or services will inevitably impact those that came before. Therefore, it is essential that the forces driving innovation are balanced with practical considerations and societal needs.

Conceptual Framework

A conceptual framework is a structured network of interrelated concepts that helps to explain the development of the research (Dabrowski & Rocco, 2024). It articulates the key variables and constructs of the research project and shows how they are connected. This project has aimed to develop such a conceptual framework, figure 3.06 to explore how Zeeland can become an innovation region by integrating education, industry, renewable energy and the cultural landscape through collaborative governance, policies and projects (spatial interventions).

At the center of this conceptual framework is the aim of transforming Zeeland into an innovation region (change its current identity). This framework also visualizes how students can play a dual role in both influencing and being affected by policies, projects (spatial interventions and governance structures across four key domains education, industry, renewable energy and cultural landscape.

Students
Students are placed at the entry point of the framework. They will be active participants in the regional innovation of Zeeland. Their experiences, concerns and wishes will shape the policy landscape and project development. The double arrow from left to right represents the bidirectional interaction that shows that they will pose influence, but also stay affected.

Innovation Region Zeeland
At the center is the envisioned identity of the region: Innovation Region Zeeland. This is a collaborative ambition, where different sectors will work together.

Four thematic sectors support innovation hub Zeeland:

- **Education**
  Knowledge institutions will have an improved accessibility and wuality of learning to match the other sectors
- **Industry**
  Industry will have a stronger and equal partnership with educational institutes, cultural landscape and renewable energy sources.
- **Renewable energy**
  The renewable energy sector will be aligned with the energy transition goals and will collaborate and influence the industry, education and cultural landscape.
- **Cultural landscape**
  The work that humanity and nature do to shape the environment around us (Hepach, 2023).

Each domain interacts with the other domains in a dynamic, equal way, promoting collaboration and decentralization.

Decentralized governance
Where the power, responsibility and resources are transferred to local communities (equally) from central government (OECD, 2019).

Policies and projects
Policies will be used to set the formal boundaries of change, while projects (spatial interventions) will implement these in physical space.

Spatial justice and sense of belonging
The outer layer of the framework shows that all interactions between students and the different domains are framed by spatial justice and sense of belonging. Spatial justice is concerned with equal access to resources and opportunities, while a sense of belonging addresses the emotional and cultural connection to place. These two serve as indicators for the success of the innovation region transformation.

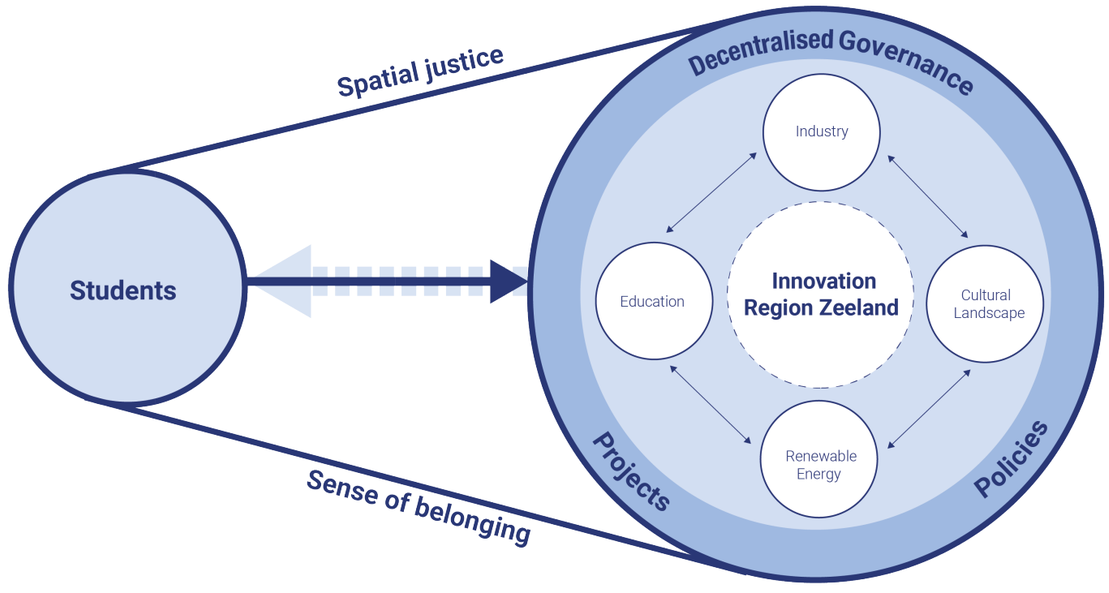


Figure 3. 06
Conceptual Framework

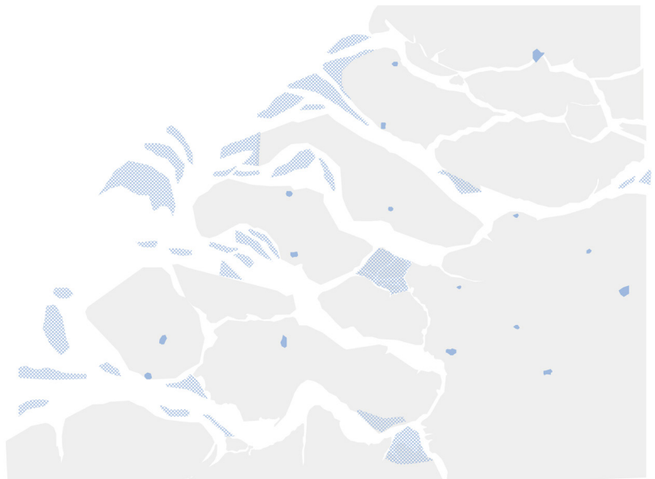
Figure 4. 01.Zeeland's Satelite View. Source: Google Earth ©2025

CHAPTER 04

Spatial Analysis

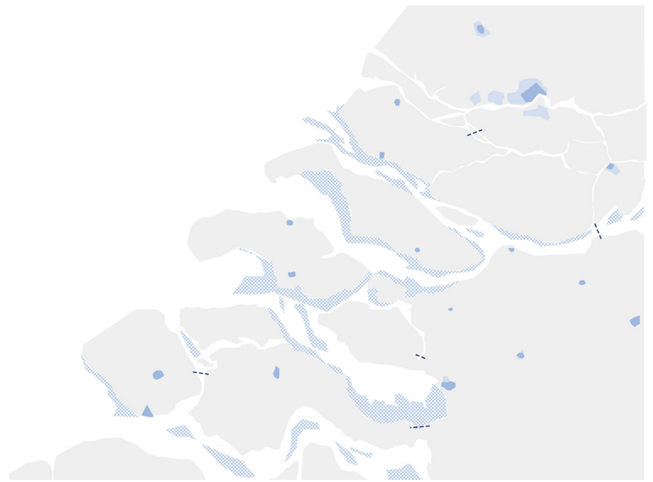
Spatial History | Thematic Analysis and Trends | Current Systemic Section | Analysis Conclusion

Spatial History

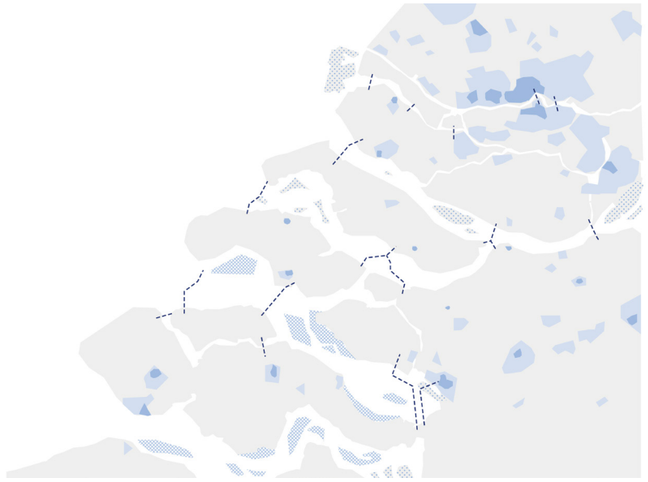


1850
The multiple islands are separated from each other, still without man made connections. Small settlements are located near the water.

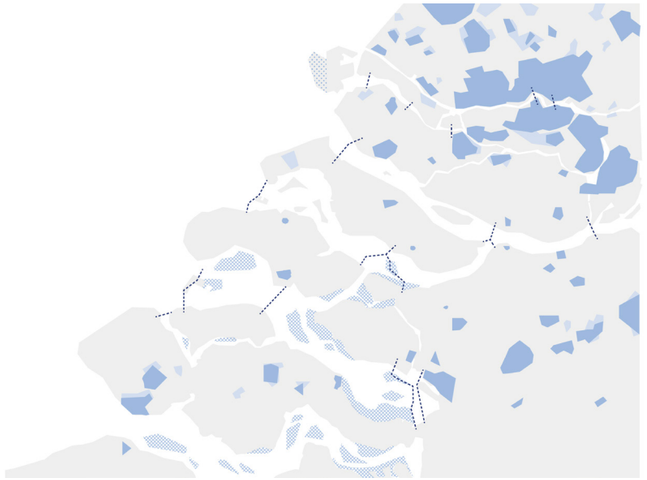
1900
Zuid-Beveland and Walcheren get connected to te mainland through dikes. The Ooster and Westeschelde take on different forms, some land is submerged in the water. The Islands in South Holland get denser, having less space for the rivers. There is growth visable in the settlements.



1950
The growth of Rotterdam continues towards sea. The mudflats and salt marshes have changed shape with some consequences in the land formation.



2000
The settlements have been intensively extended. Also the new Delta Werken are visable, forming connections between the islands. Near the Rotterdam harbour, land has been reclaimed for the Maasvlakte.



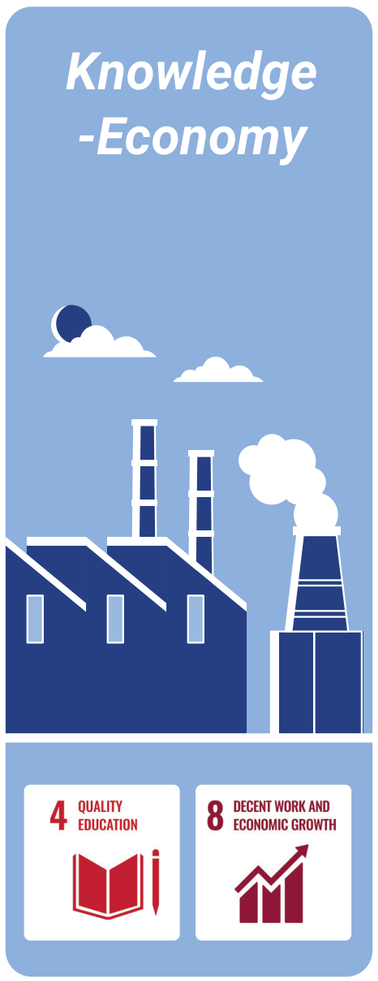
2024
Small bits of settlements are added to the existing cities. Near the Rotterdam Harbour, the Tweede Maasvlakte was added.

Themes

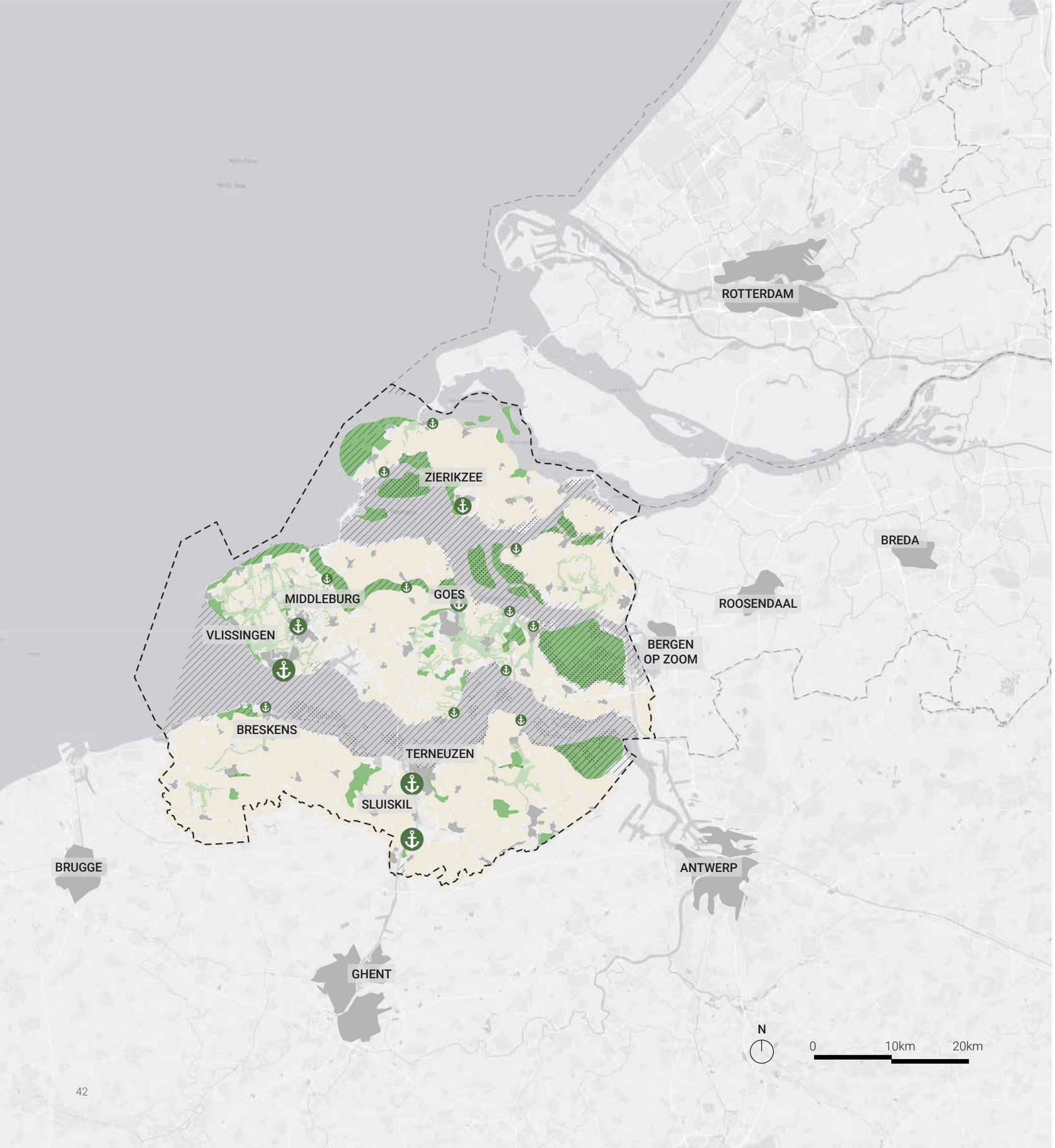

Cultural Heritage
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND


Spatial Qualities
11 SUSTAINABLE CITIES AND COMMUNITIES


Mobility
11 SUSTAINABLE CITIES AND COMMUNITIES
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE


Knowledge -Economy
4 QUALITY EDUCATION
8 DECENT WORK AND ECONOMIC GROWTH


Energy
7 AFFORDABLE AND CLEAN ENERGY
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Analysis

Cultural Heritage

As outlined in the theoretical framework, the cultural landscape reflects the combined influence of nature and human activity in shaping a region's unique identity. In Zeeland, the natural landscape is largely defined by the force of the sea. Estuaries and tidal swamps serve as key examples of this influence. Within these water systems, intertidal flats can be found, illustrating the ongoing interaction between land and water.

The sea has also shaped the land's morphology—sand dunes and creek ridges, formed by marine sand deposits, became the first stable grounds for human settlement and infrastructure. These features are therefore essential to the cultural landscape, marking the meeting point between natural forces and human intervention.

Today, the majority of the surface area has been cultivated for agriculture. Open fields and pastures dominate the region and are prominent elements of its cultural landscape. Human influence extends further—harbours and ports have become defining features, expanding alongside maritime industries and major logistics hubs. These places are deeply rooted in the region's heritage and cultural identity.

More recently, energy landscapes have begun to emerge as part of this evolving cultural setting. With Zeeland playing a major role in energy production, wind turbines and solar farms now shape the physical environment. However, these new additions have not yet fully integrated into the region's collectively recognized identity.

LEGENDS

- Harbours/ ports
- Creek ridges
- Main greenery
- Intertidal flats
- Agricultural lands
- Nature reserve

Figure 4. 02
Cultural Heritage Analysis Map

The natural and ecological layers of the cultural landscape have seen threatening trends over the last years. New dangers for the flora and fauna have appeared with links to human activity. The Deltawerken infrastructure has had a large impact on the water flow in the estuaries. The tidal movement supplies sand for the sand ridges in the protected nature reserves. However, because of the limited flow of water there is less new sand deposited on the ridges. This disrupts the balance of supply and erosion, resulting in a destruction of the ridges.

These sand ridges are essential habitats for birds and seals. Their population numbers have been declining and are trending to disastrous numbers. The province of Zeeland is currently raising sand levels on two of the biggest ridges but others in the region are not taken care of.

Sand erosion of sand ridges in Zeeland

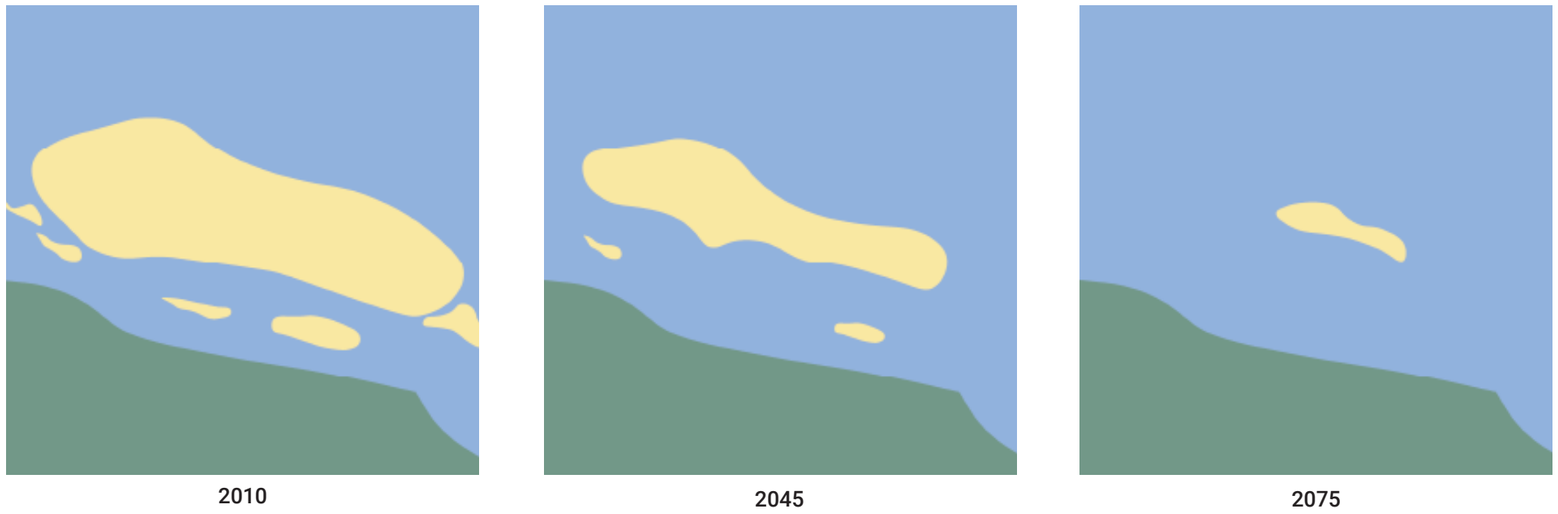


Figure 4. 03
Sand erosion of sand ridges in Zeeland
Source: Natuurmonumenten, n.d

Native species population decline

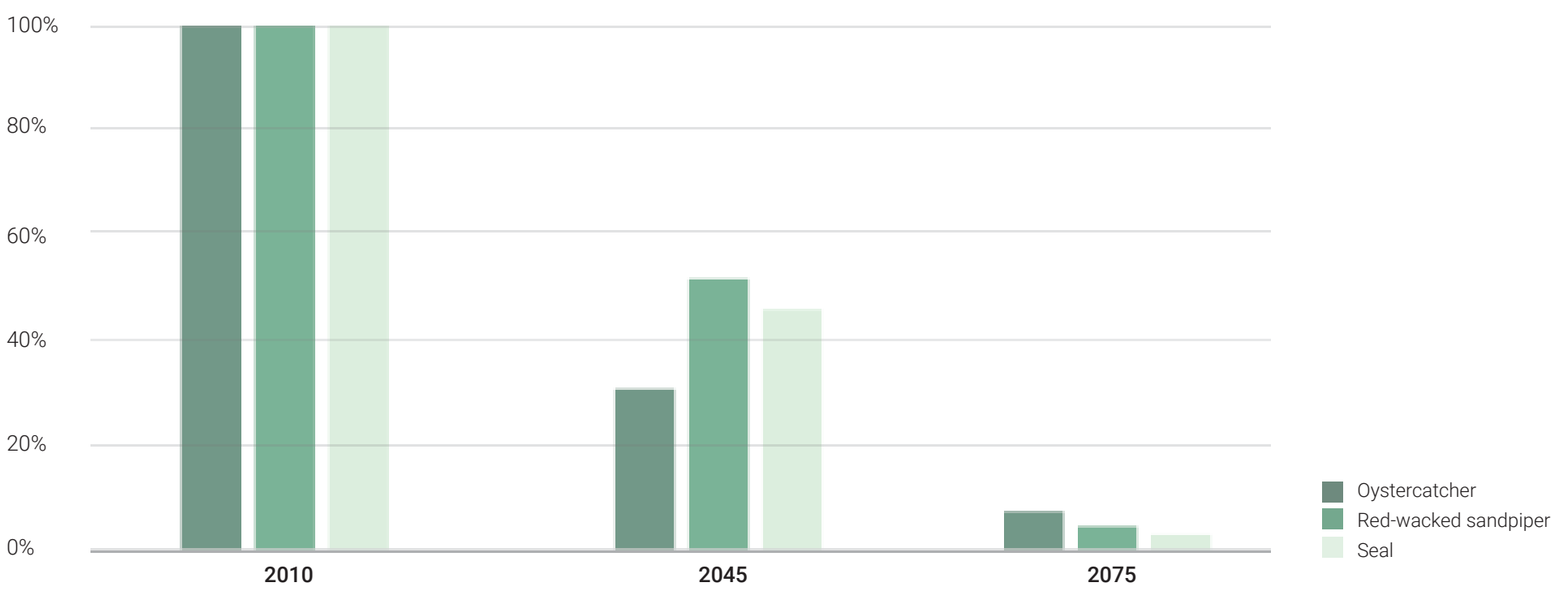
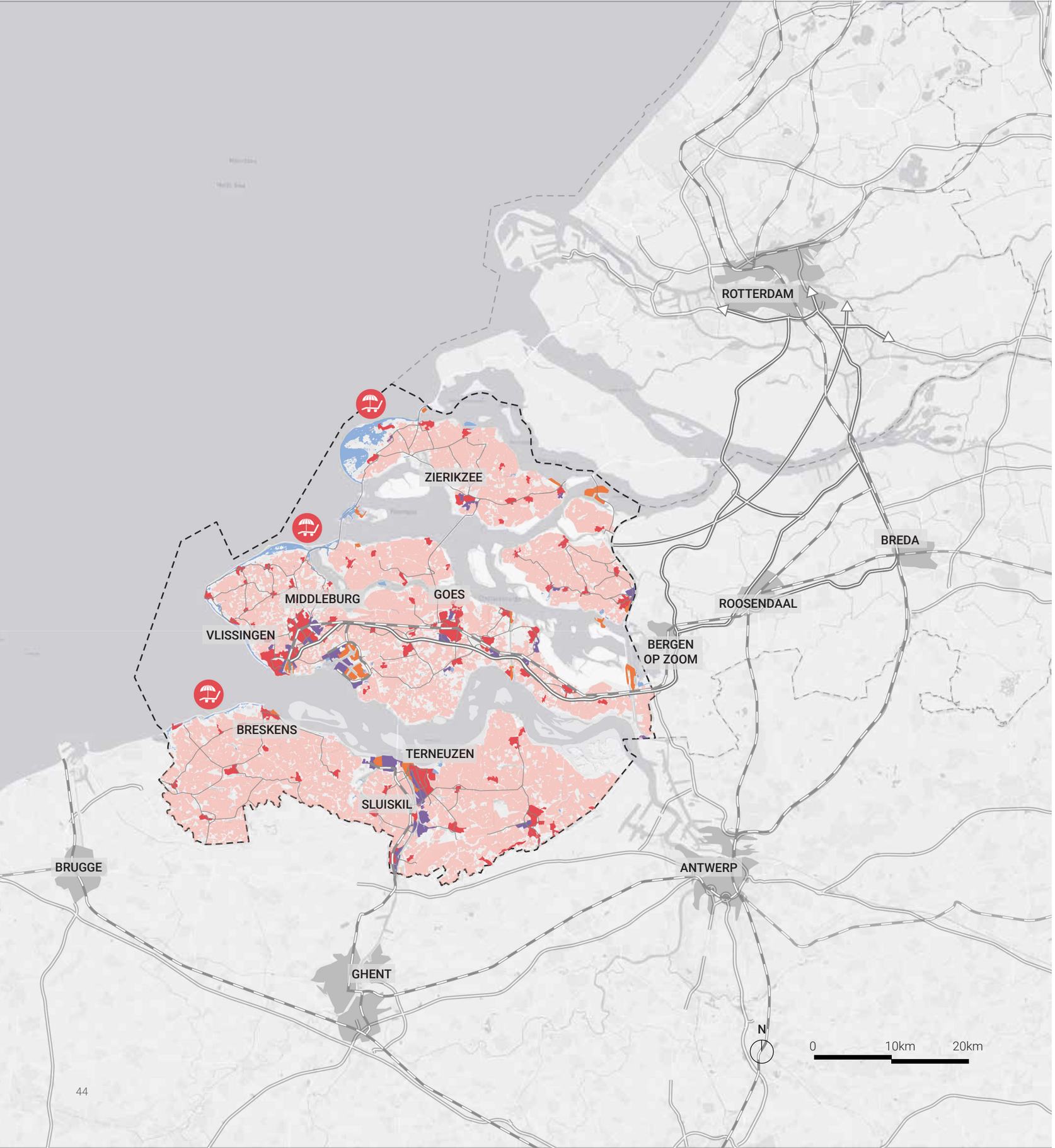


Figure 4. 04
Native Species Population Decline
Source: Natuurmonumenten, n.d

Spatial qualities

Zeeland is known for its rich natural landscapes, agricultural activity and growing tourism sector. The spatial qualities of the region are shaped by its geographic location, historical development and economic priorities. One notable feature of Zeeland's land use is the functional separation of areas, where agriculture, industry, and tourism are often spatially distinct. This spatial arrangement has led to an emphasis on Middelburg and Vlissingen as the primary urban centers, where commercial and industrial activities are concentrated, while rural areas are predominantly dedicated to agricultural use. Looking at the distribution of land use in Zeeland it reveals that agriculture remains the dominant sector in terms of land coverage, yet industry, though occupying a smaller portion of land, wields significant economic influence. Additionally, the tourism sector plays a critical role in the regional economy.



LEGENDS

- Settlements
- Industry
- Harbour/ ports
- Coastlines
- Agricultural Lands
- Tourism
- Railway
- Train stop
- Highway

Figure 4. 05
Spatial Quality Analysis Map

Agriculture is the most significant land use in Zeeland, occupying approximately 46-50% of the province's total land area (Impuls Zeeland, 2020). The province's climate and soil conditions are well-suited for onions and potatoes, which makes Zeeland a crucial contributor to the agri-food sector in the Netherlands (Zeeland.nl, 2021). The agricultural land-use also shapes the region's cultural identity, given its historical connection to farming and rural life.

While agriculture is the largest in land user, industry plays a critical role in Zeeland's economic landscape, particularly in the energy and manufacturing sector. Approximately, 5-7% of Zeeland's land area is dedicated to industrial activities, including large-scale energy production, chemical industries and port facilities (Zeeland.nl, 2021).

Tourism is another essential economic driver for Zeeland, contributing to both regional employment and the service sector. It accounts for approximately 5-10% of land-use, which includes infrastructure for accommodation, recreation and leisure activities (Impuls Zeeland, 2020). The province's coastal regions, nature reserves, and historical sites attract a growing number of visitors annually, with over 12.6 million overnight stays recorded in 2022 (Impuls Zeeland, 2020). One notable characteristic of tourism in Zeeland is its strong seasonal nature. In the summer months, a significant growth of visitors can be seen which leads to temporary imbalances in infrastructure and resource usage. During this peak season local accommodation, transport networks and public services are under considerable strain.

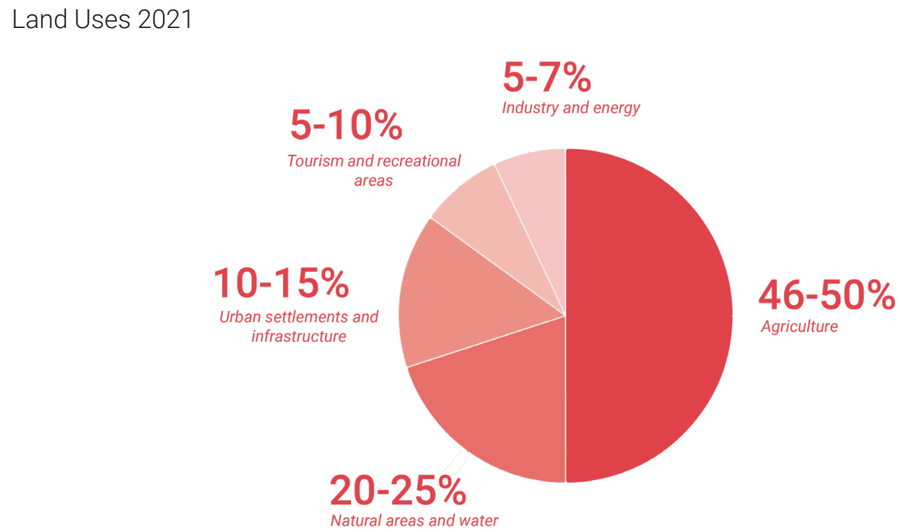


Figure 4. 06
Land uses
Source: Uitvoeringsprogramma Landelijk gebied Zeeland (2021)

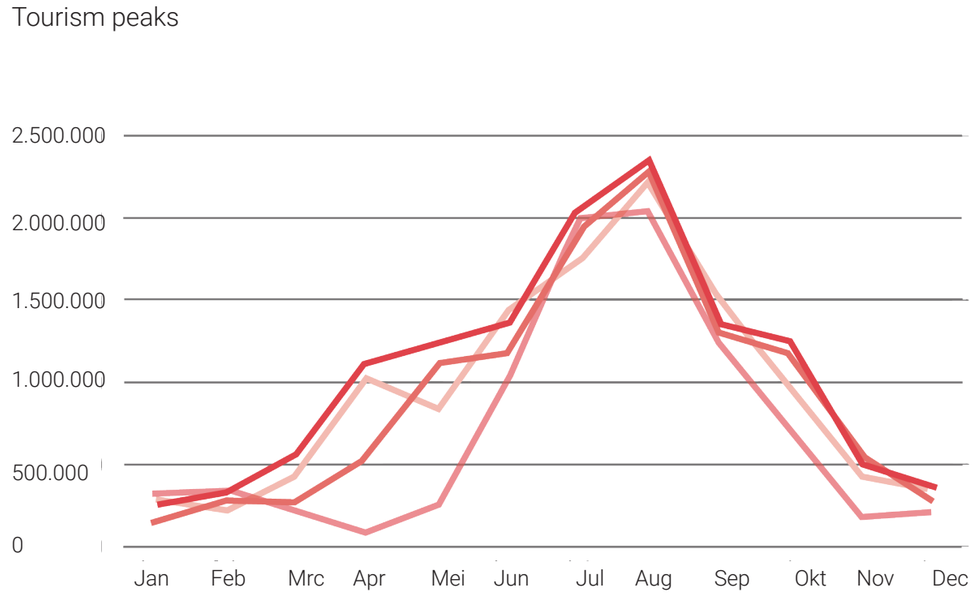


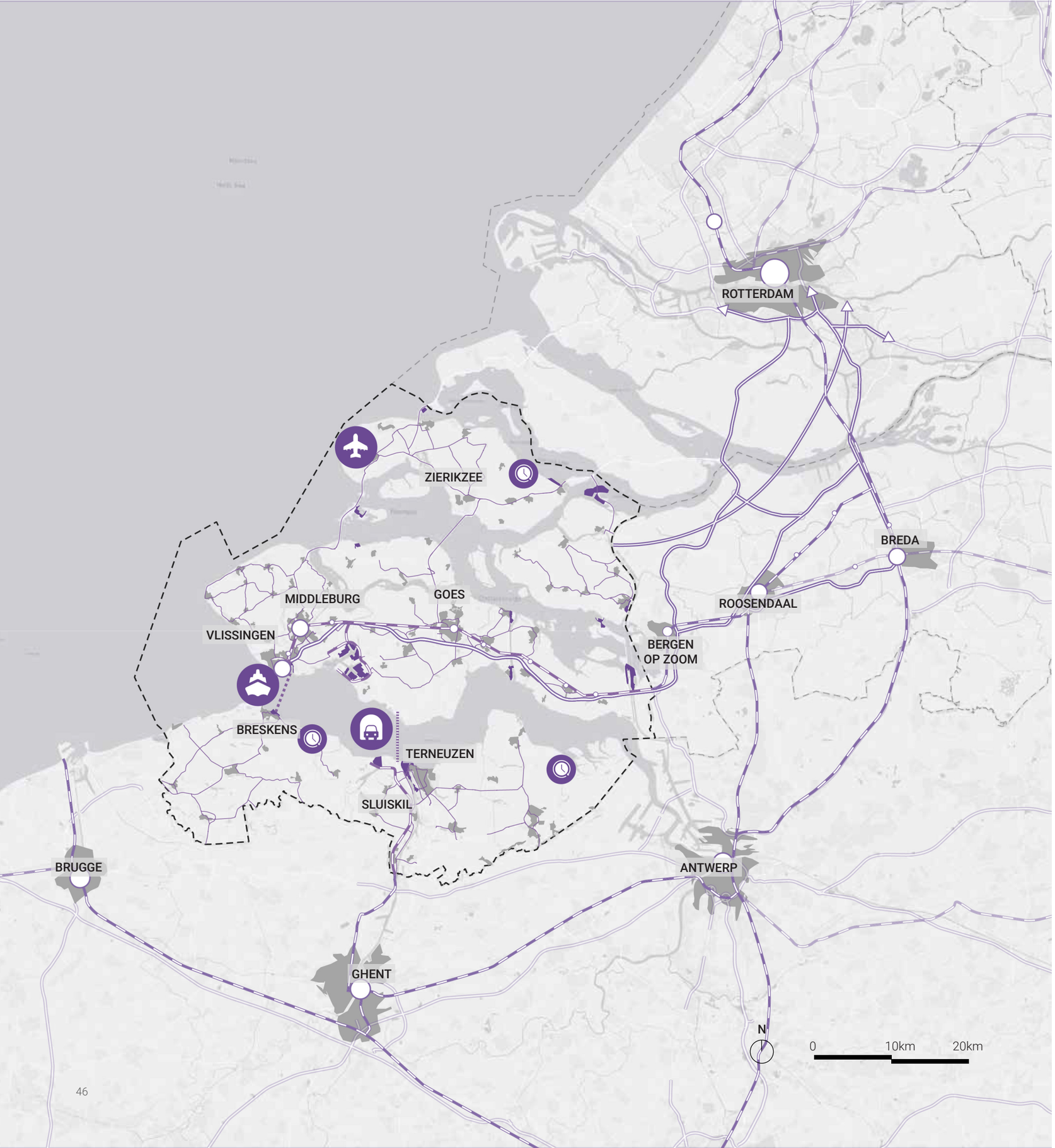
Figure 4. 07
Tourism Peaks
Source: HZ Kenniscentrum Kusttoerisme (2023)

Mobility

Accessibility in Zeeland poses a challenge, largely due to its fragmented geography of islands and peninsulas. The A58 highway connects Vlissingen, Middelburg, and Goes to Noord-Brabant and the Randstad, but the rest of the province depends on provincial roads that are more prone to congestion and less efficient. North-south connections are scarce, with only a few key bridges and tunnels linking different parts of the province. These limited routes create bottlenecks and reduce network flexibility.

Public transport follows a similar pattern. The only rail line runs from Vlissingen through Middelburg and Goes, with connections to Breda and Rotterdam. Bus and ferry services are available but run infrequently, making travel within Zeeland and to major hubs time-consuming and inconvenient.

This results in a car-dependent region with limited alternatives. For groups like students, the elderly, or those without cars, access can be a challenge. To improve mobility and sustainability, Zeeland needs more frequent, multimodal transport options and better internal and external connectivity.



LEGENDS

- Airport
- Ferry
- Tunnel
- Low Frequency Bus
- Railway
- Train stop
- Highway
- Roads
- Ferry Route
- Underwater tunnel

Figure 4. 08
Mobility Analysis Map

The mobility and public transport of Zeeland faces certain challenges. The accessibility of smaller towns is limited because of the public transport time schedules. Busses are often the only connection and they only drive during the day. In the weekend there are lines that do not ride after 18.00 o'clock. Next to that, studies show that the public transport in Zeeland often has issues with being on time. Busses that are late make it difficult to use the connections to arrive on time at work or school.

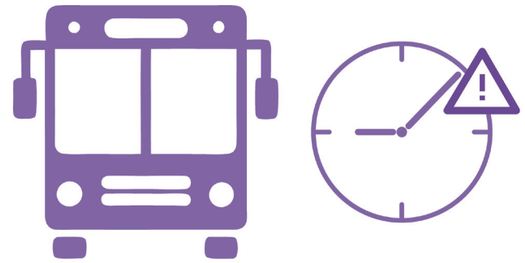
(Ministerie van Infrastructuur en Waterstaat, 2019)

Investment in shared mobility for students could be a solution for this problem. The region has created shared mobility hubs around educational institutions to increase the accessibility for the students without relying on scheduled transport networks.

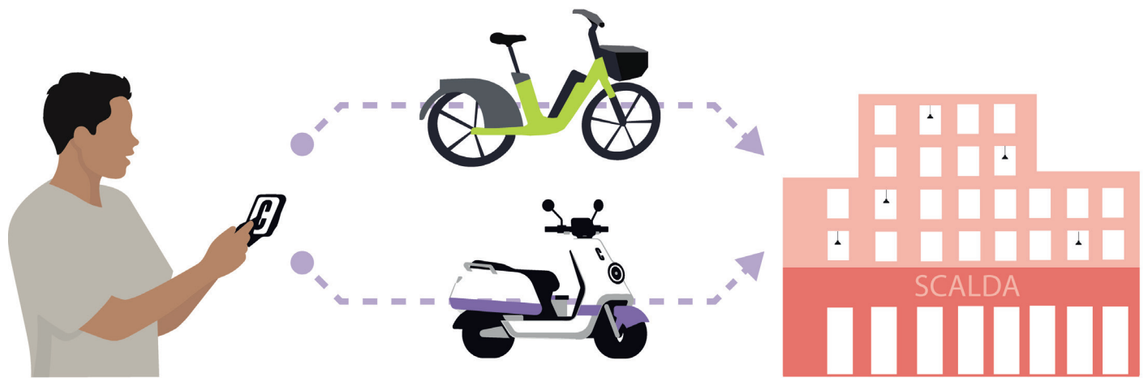
(AddVision, 2018)

Public transport time issues

Figure 4. 09
Randstad Train Announcement
Treinenenweb (2021)



Smart mobility education hubs



Would People Choose This Path?

ANGULAR CHOICE

Angular choice, in Space Syntax refers to the likelihood of a space being chosen as a path based on its relative connectivity to other spaces. Unlike integration, which measures overall accessibility, Angular choice measures the degree to which spaces are selected or passed through by individuals moving from one point to another. With this analysis, it can be understood how specific routes or nodes are preferred in the movement system of the region.

For this analysis, the angular choice has been conducted with a 15km range. Major transportation corridors, such as the A58 highway, show high angular choice due to their role as key link between Zeeland's cities, port areas and neighboring provinces like South Holland, Brabant and Belgium. Touristic routes leading to coastal areas also show higher angular choice. This will only grow during the peak season in the summer. Smaller towns and rural communities, where agriculture dominate have a lower angular choice value, while industrial hubs, like Terneuzen and Vlissingen show moderate to high angular choice, which reflects their importance in the regional economy.

LEGENDS

Low

High

Figure 4. 10
Angular Choice Analysis Map

How Connected Is This Space?

ANGULAR INTEGRATION

Angular integration is a measure used in Space Syntax to quantify the accessibility of spaces, based on angular distance rather than linear distance. It calculates how easily one space can be reached from others by taking into account the turning angles and the number of directional changes required.

For this analysis, the angular integration has been conducted with a 15km range. The urban center of Goes show a higher integration due to its central location and the concentration of infrastructural links. This city functions as a hub within the regional network of Zeeland, connecting smaller towns and rural areas. However, the rural locations and industrial zones of Zeeland display a lower integration score, suggesting limited accessibility and potential barriers to connectivity.

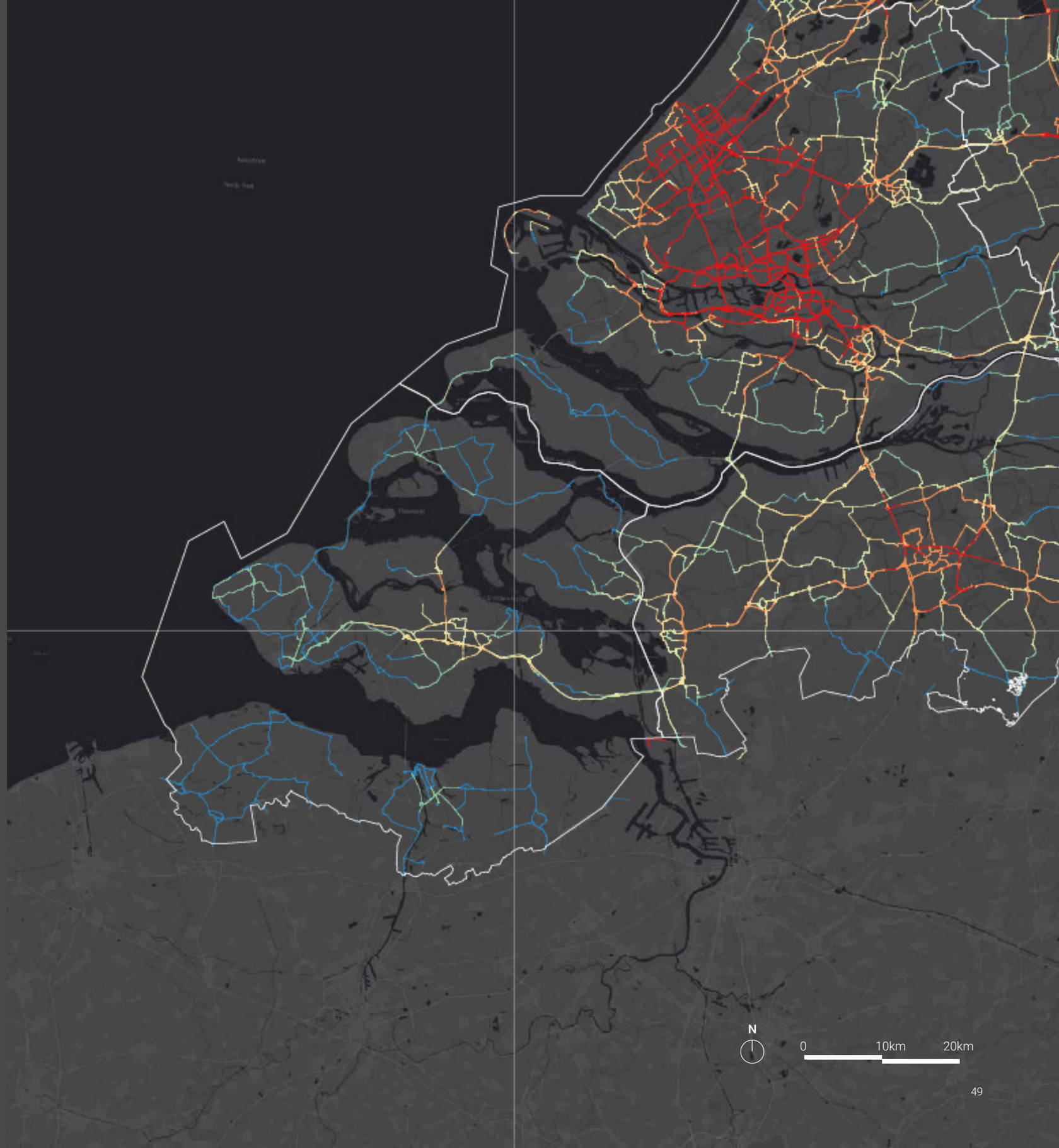


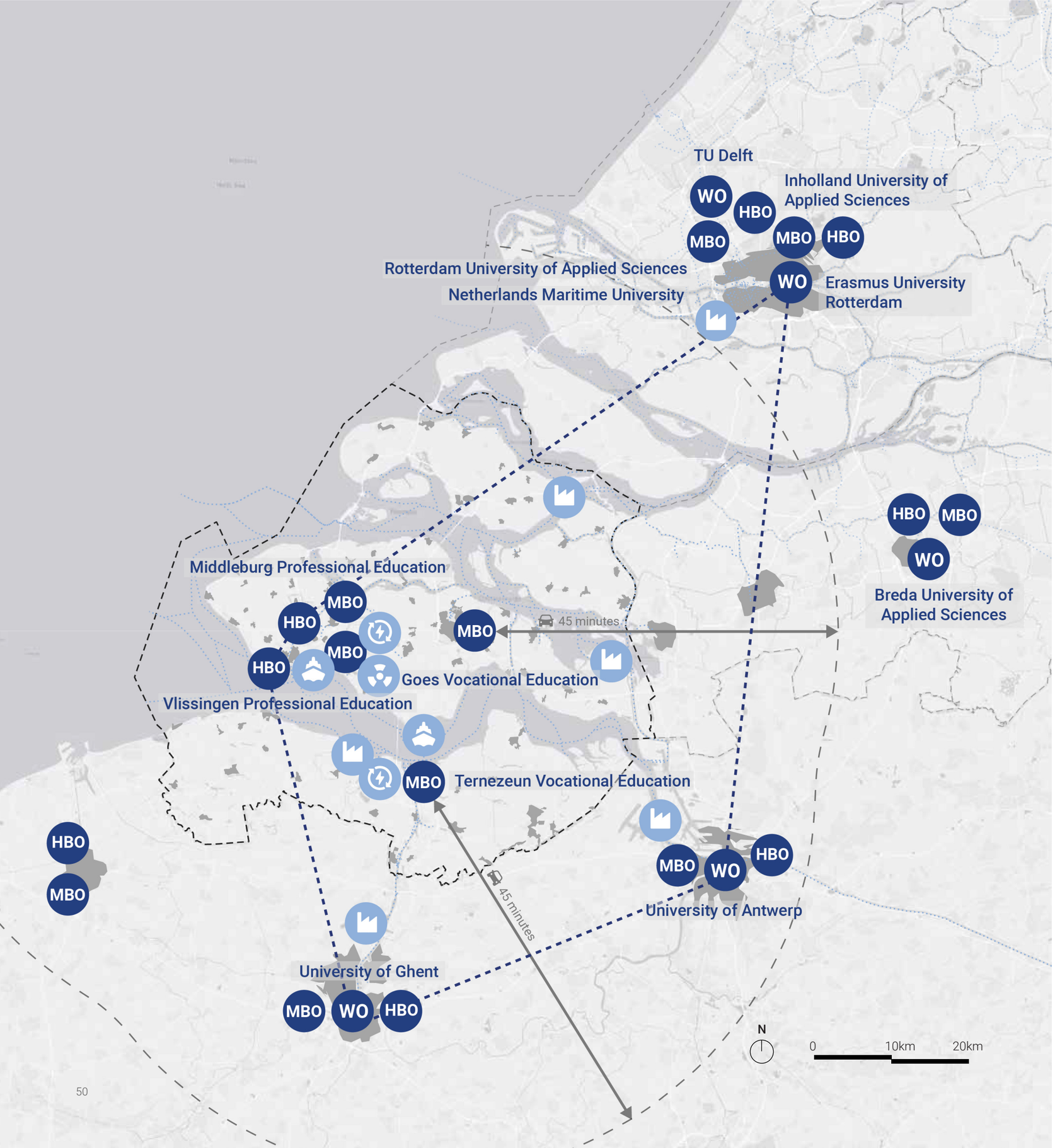
Figure 4. 11
Angular Integration Analysis Map

Knowledge-economy

Knowledge economy, driven by skilled labor, innovation and research plays a significant role in the growth and competitiveness of regions. In the case of Zeeland its educational landscape and connection to industries play a critical role in shaping its economic development.

Zeeland is home to only a limited number of higher education institutions: two 'Hoger Beroepsonderwijs (HBO) institutions and a few 'Middelbaar Beroepsonderwijs (MBO) schools. These institutions are predominantly located in the cities of Middelburg and Vlissingen, with the exception of MBO schools in Terneuzen and Goes. Middelburg and Vlissingen host the main HBO schools, which offer applied sciences and vocational programs that are aimed to prepare students for the job market, especially in sectors like energy, logistics and technology. These schools are situated in close proximity to industrial zones, such as the Port of Vlissingen and Borssele.

However, Zeeland's educational offerings are limited compared to other regions in the Netherlands. The absence of a major university within the province makes students rely on other institutions, such as Delft University of Technology, Rotterdam University of Applied Sciences, Antwerp University and Ghent University. These universities provide valuable connections to Zeeland in terms of research and innovation, the region's own educational institutes remain disconnected from these higher educated centers. This geographical and institutional gap limits Zeeland's ability to attract and sustain theoretical students.



LEGENDS

- Universities
- Vocational Education
- Professional Education
- Industry
- Renewable Energy
- Nuclear Power
- Harbour
- Shipping Route
- Settlements

Figure 4. 12
Knowledge- Economy Analysis Map

> *Retaining young people is just as big of a challenge. Make sure that they want to found a family, company and future in Zeeland.*
>
> *-PZC, 2025*

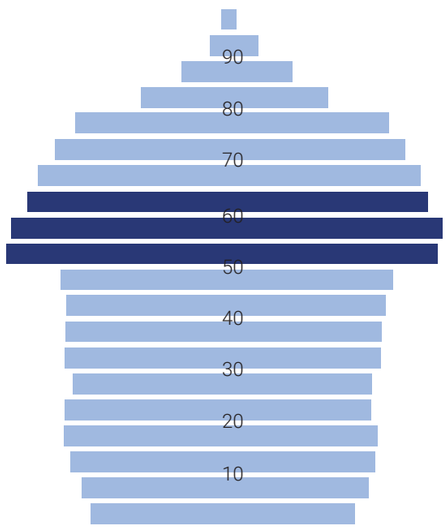


Diagram 4. 13
Aging population
Source: UWV (2023)

Currently, the region is dealing with an aging population and a brain drain where educated students migrate to larger cities such as Rotterdam, Amsterdam and Antwerp in search of better educational opportunities and career prospects.

One of the most pressing issues facing Zeeland today is its aging population, a trend that has implications for the future economic development of Zeeland. According to the Dutch Central Bureau of Statistics (CBS), Zeeland has one of the highest proportions of elderly residents in the Netherlands. In. 2021, approximately 23.4% of Zeeland's population was aged 65 or older and this is above the national average of 19.7% (CBS, 2021). This aging population is a result of several factors, including lower birth rates and the outflow of students in search of better career and educational opportunities.

Migration trends

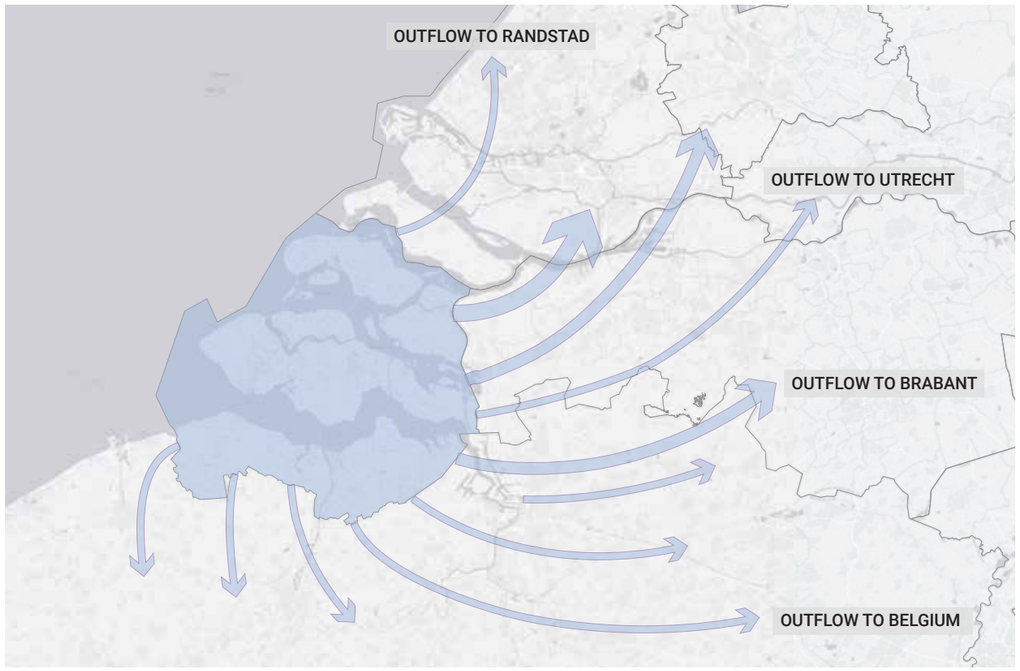


Diagram 4. 14
Migration trends
Source: Kenniscentrum-Zeeuwse samenleving (2025)

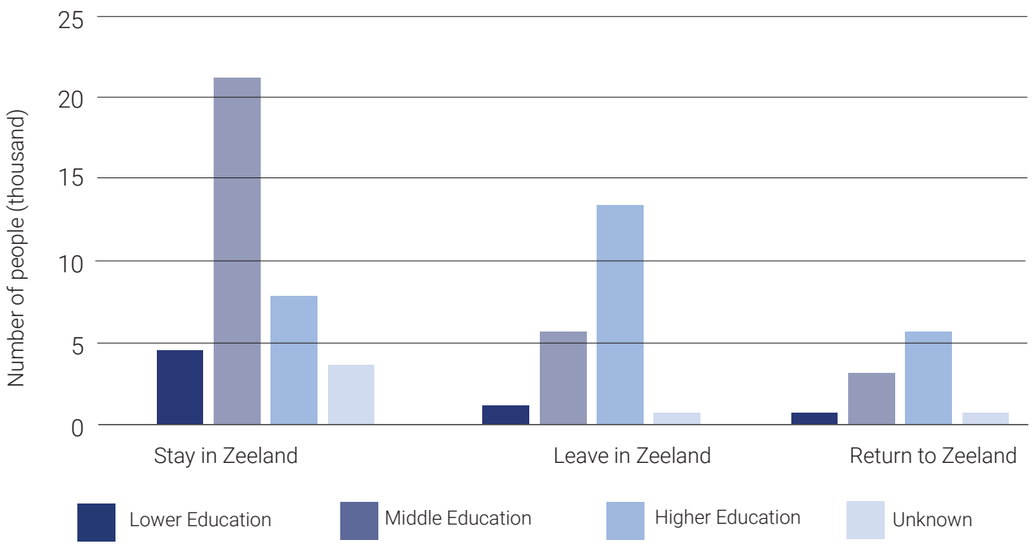


Diagram 4. 15
Migration trends
Source: Kenniscentrum-Zeeuwse samenleving (2025)

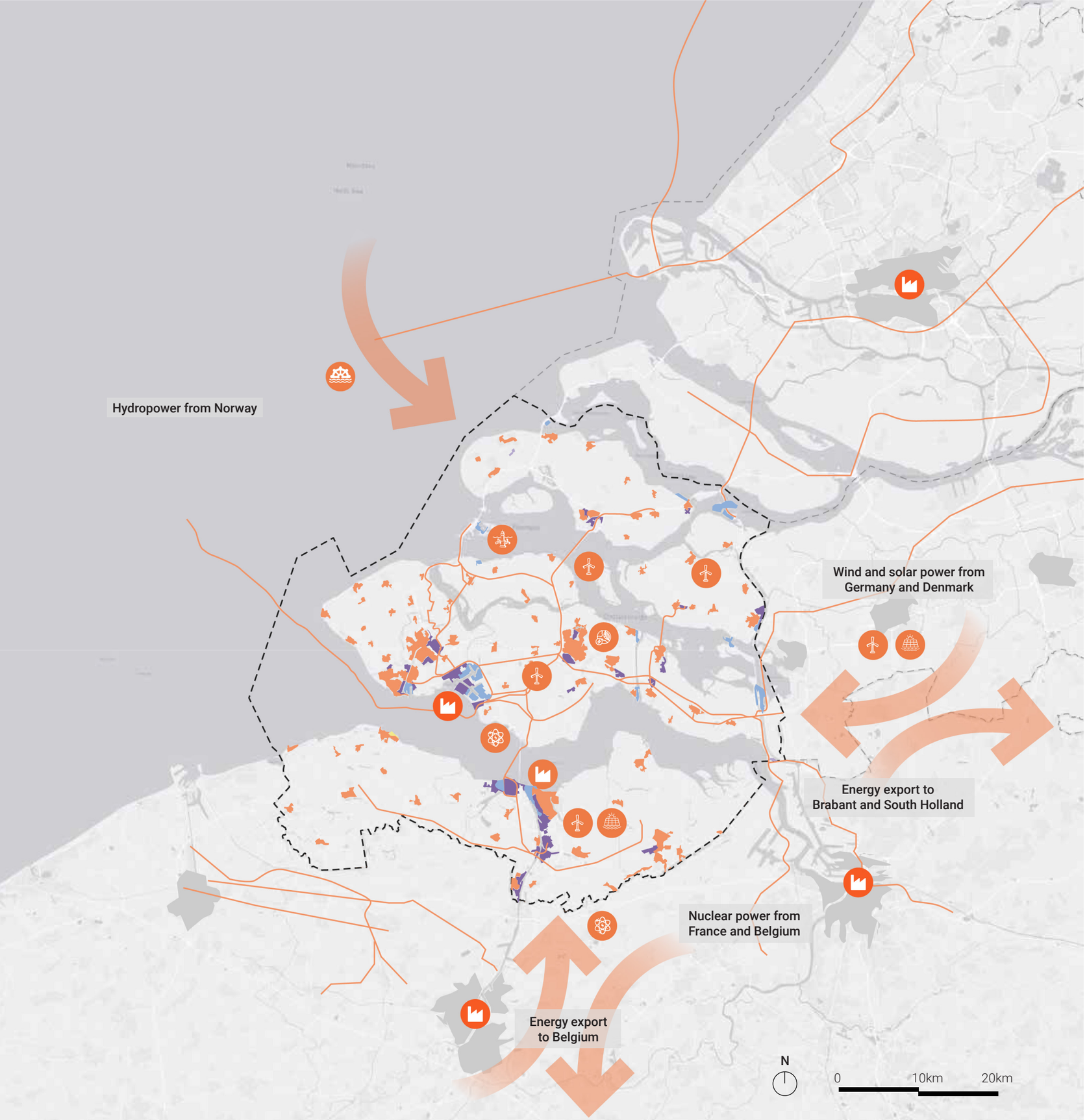
Energy

Industrial activity in Zeeland accounts for approximately 75% of the province's CO_2 emissions (Provincie Zeeland, 2020). The urgency to slow climate change emphasizes the need to shift from fossil-fuels to sustainable energy sources such as solar, wind, and tidal power. The growing demand of electricity outnumbering the energy production adds more pressure to expand the energy grid.

Currently, the province has taken significant moves toward renewable energy transition by implementing solar panels, offshore and onshore wind turbines, and tidal energy. The tidal power station is an experiment project in the Oosterscheldekering, which generates renewable energy.

In addition, Zeeland also operates the first nuclear power in the Netherlands, which located in Borssele. Currently, the government is exploring the possibility to build two additional nuclear power plants and keep the current one longer to support energy transition.

Beyond the national scale, Zeeland is also part of larger energy networking by connecting to Belgium's grid. As part of North Sea Port, the province aims to become the largest green energy cluster in Europe.



LEGENDS

- Existing Geothermal
- Existing Wind
- Existing Solar
- Existing Tidal
- Existing Nuclear
- Hydropower
- Industry
- Power Grid
- Settlements
- Industry
- Ports

Figure 4. 16
Energy Analysis Map

> *Zeeland is the power plug of the Netherlands*
>
> -PZC, 2024

Local protests against nuclear power development

Figure 4. 17
Local protest against nuclear power development

Figure 4.18 shows the increasing renewable energy consumption on a national scale from 2002, especially from electricity. In addition, according to the energy Agreement of 2013, the Netherlands has successfully achieved the target of sorurcing 16% of its energy from renewable sources 16% in 2023. Recently, The European goal for renewable energy for the Netherlands was sharply raised from 27% in 2030, to 39% in 2030 (PBL, 2021). Both increasing demand and EU target highlight the urgency to develop and expand renewable systems.

With the growing energy demand and climate goals, the national government is also promoting nuclear energy development as part of energy transition strategy. However, this development has sparked different opinions from the residents in Zeeland, where the development take place. There are local protests against this plan, reflecting concerns and oppositions to nuclear development.

Share of renewable energy in energy consumption

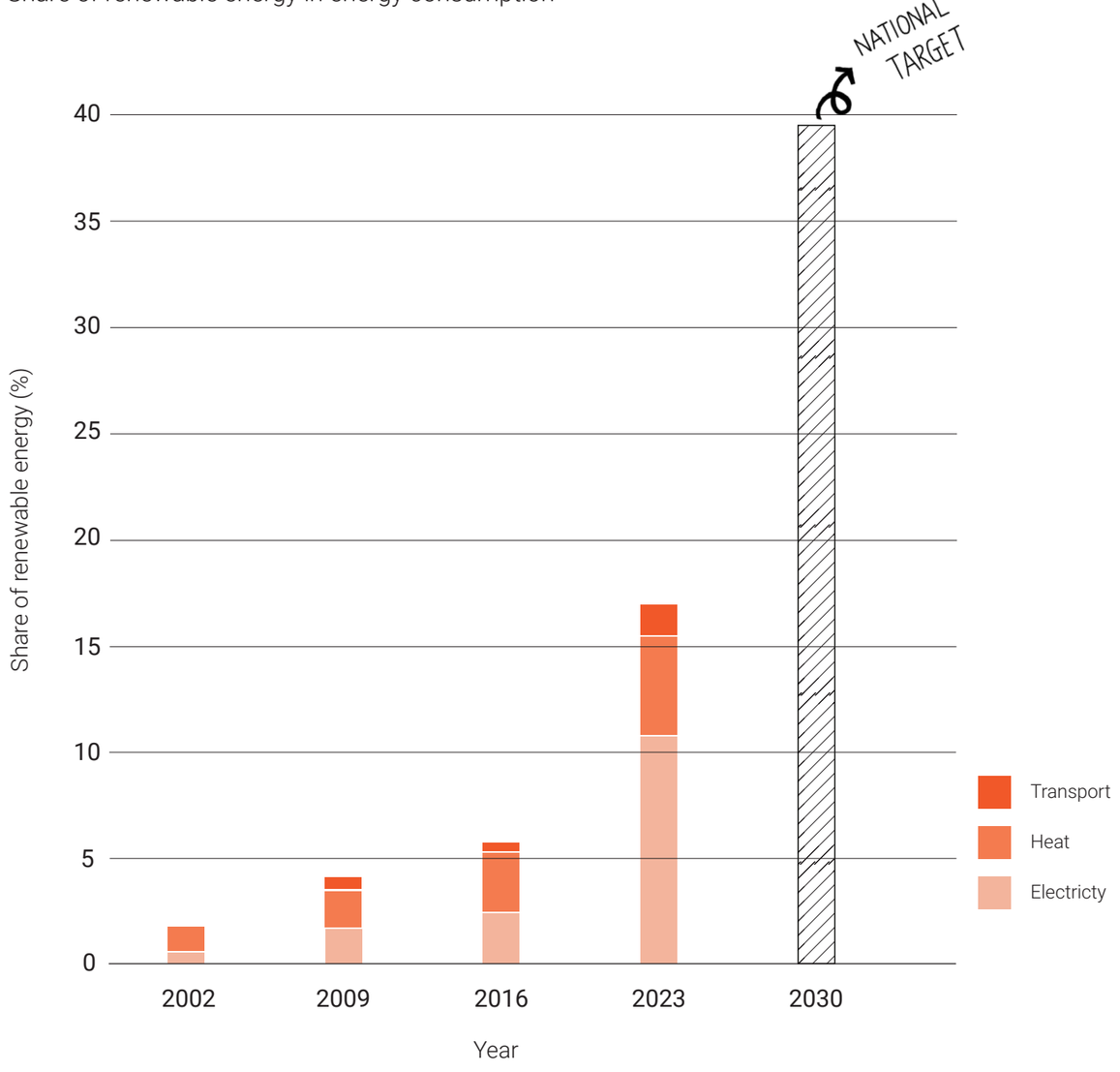


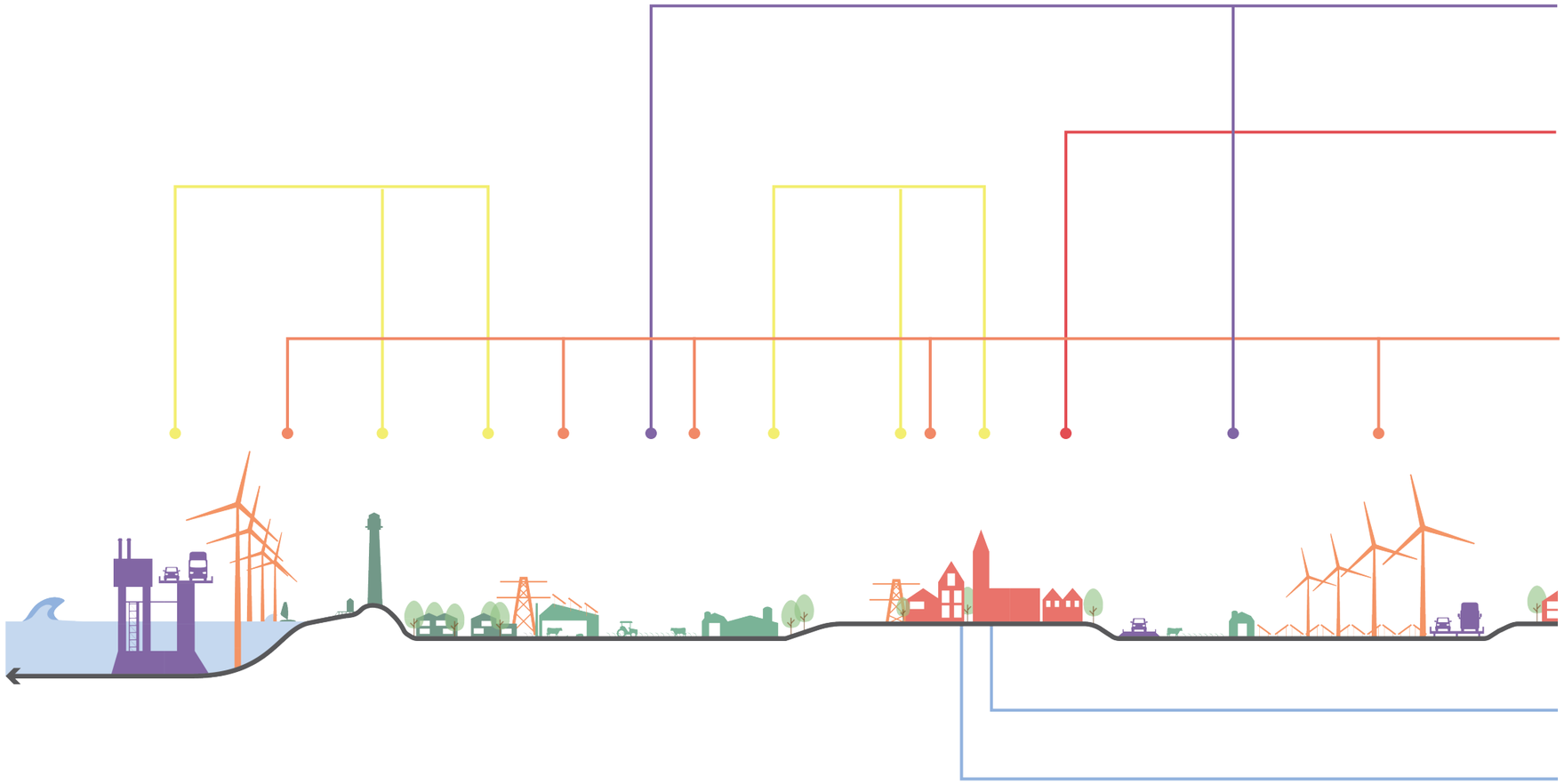
Diagram 4. 18
Share of Renewable Energy
Source: PBL/ CBS, 2022 and European Commission, 2023

Systemic Section

The systemic section illustrates the flows of energy and students within the Zeeland region. In the current situation, there remains a strong reliance on fossil fuels. These are primarily used to generate energy for the chemical industries, agriculture, and residential areas. Much of this energy originates from natural gas extracted outside of Zeeland. Additionally, nuclear material is imported for use in the Borssele power plant.

Alongside these, renewable energy flows, primarily from wind and solar farms, also contribute to the region's energy supply. These renewable sources are often integrated into large-scale mobility infrastructures or situated in open fields adjacent to agricultural and industrial zones.

The section also highlights the student flow, revealing a significant migration issue: many students leave Zeeland for the Randstad to pursue education or employment opportunities. The systemic causes of this trend are visible in the diagram, such as the uneven distribution of mobility networks and the concentration of educational institutions in a limited number of central towns.



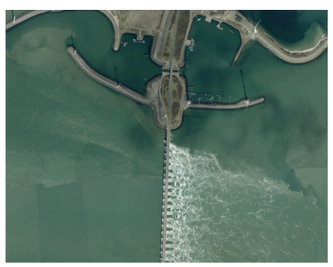
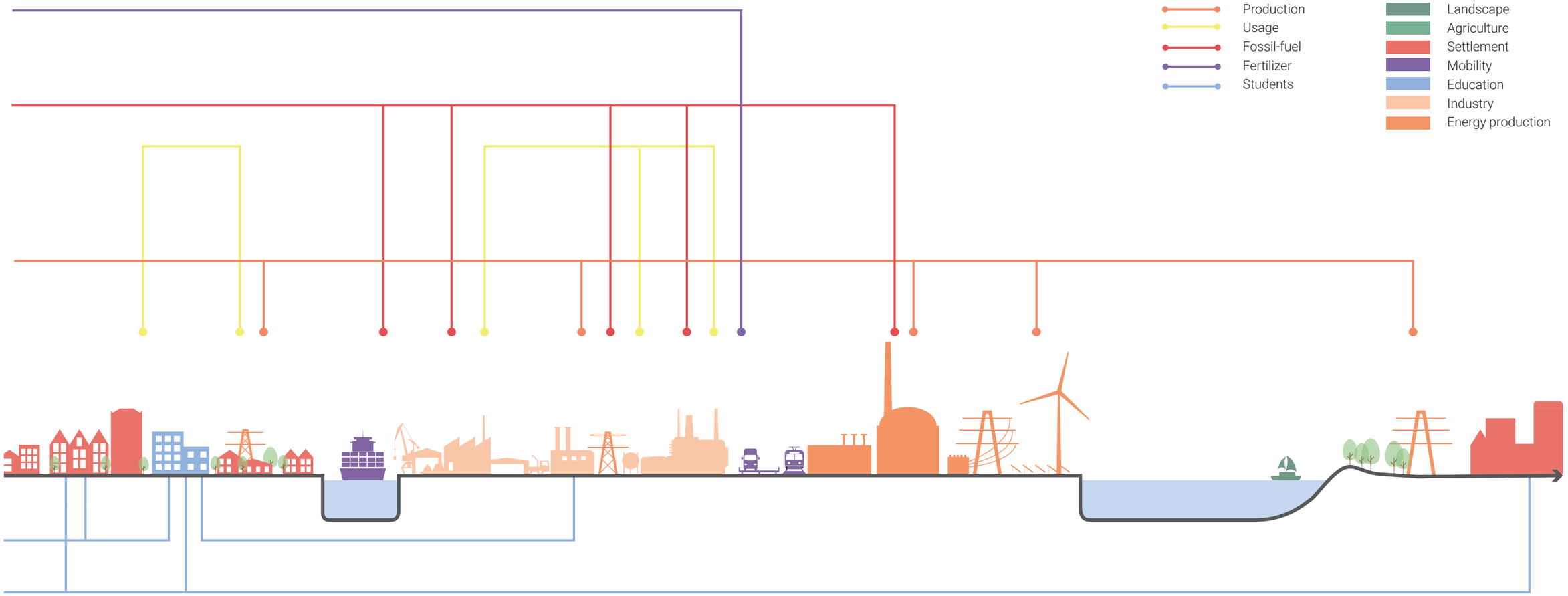
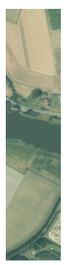
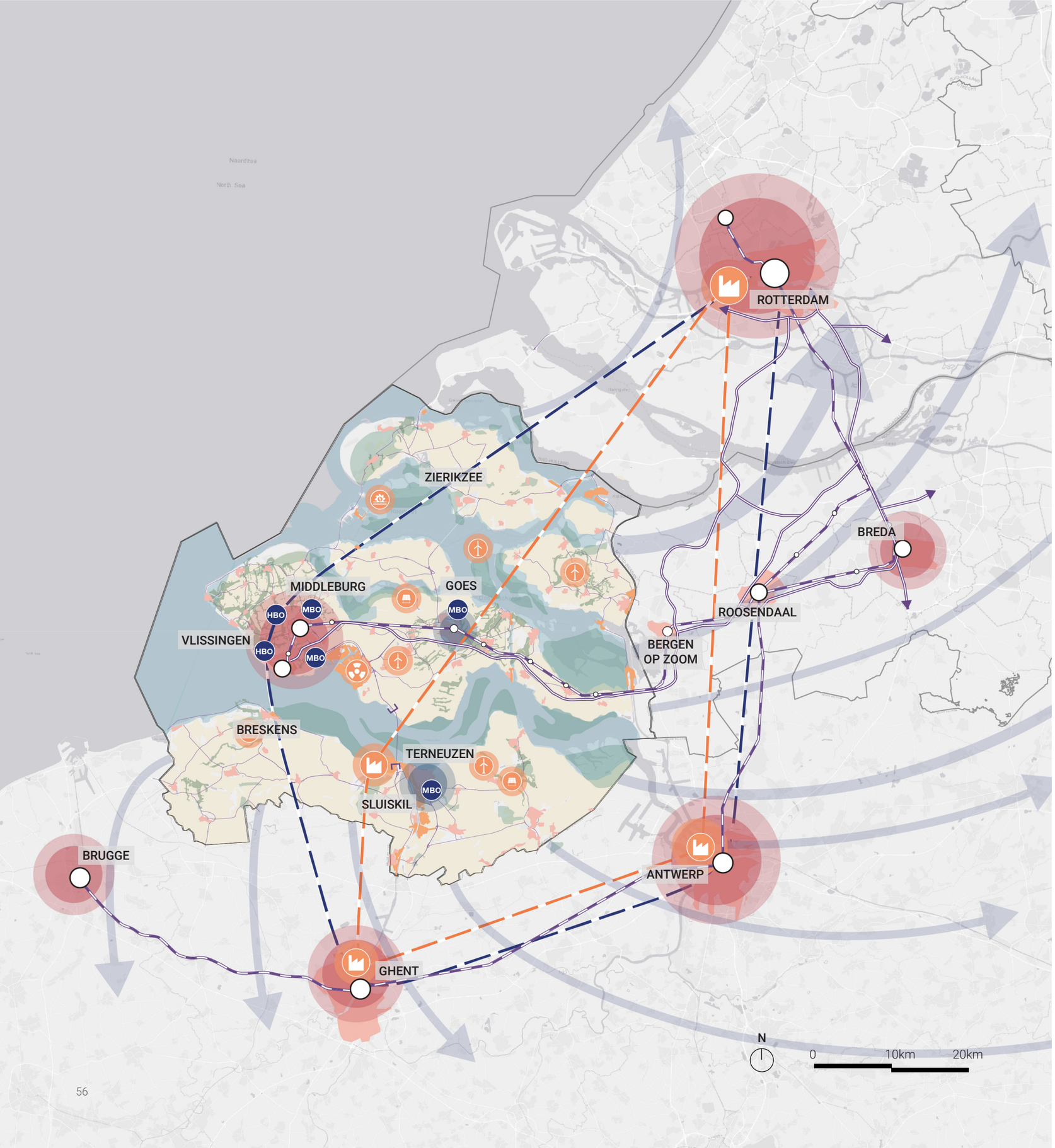


Figure 4. 19
Current Systemic Section


Production
Usage
Fossil-fuel
Fertilizer
Students
Landscape
Agriculture
Settlement
Mobility
Education
Industry
Energy production



Analysis Conclusion



LEGENDS

Spatial qualities
- Agriculture
- Settlements
- Industries
- Main greenery
- Main cities

Energy
- Main fossil fuel industry
- Nuclear plant
- Solarpower
- Windturbines
- Main industry connection

Mobility
- Train
- Local car roads
- Highways
- Stations

Knowledge Economy
- MBO Vocational school
- HBO Theoretical education
- WO Theoretical education (university)
- Main collaboration
- Outflow of students from Zeeland

Cultural landscape
- Greek ridges
- Water

Figure 4. 20
Analysis Conclusion Map

How do the current spatial conditions affect the students?

Zeeland is increasingly confronted with the structural problem of youth and student outmigration. Despite its strong industrial connections and strategic location between Rotterdam, Ghent, and Antwerp the region struggles to retain its younger population. Spatial analysis of the cultural landscape, mobility, education, knowledge economy and energy landscape reveal a region shaped by its unique landscape and defined by agricultural land use, open spaces, and small, aging villages. These rural areas offer limited social and professional opportunities for young people, further deepened by the lack of reliable and extensive public transportation.

Figure 4. 21
Current Situation Collage
Source: Public Domain

Figure 5. 01.Zeeland's Satelite View. Source: Google Earth ©2025

CHAPTER 05

Vision for Students

Potentials | Students' Concerns | Vision | Future Systemic Section

Potential and Urgencies

Cultural Heritage

The landscape of Zeeland has opportunities to enhance the strength of the regional identity. The first element lies in the historic harbours of Zeeland. These are spaces which could be densified or transformed to use this socio-cultural heritage for new functions. This would guarantee a more long term appreciation and preservation of these core elements of the cultural heritage. The creek ridges are also a potential to maintain the cultural landscape, as they are a foundational element of settlements in Zeeland. However, they are located in areas where urban development would more likely disrupt the landscape.

To preserve the natural environment certain possibilities lie within protecting and connecting ecological habitats. The habitats at risk are sand ridges in the estuaries and nature patches on land. These are already part of Natura 2000 protection but can be strengthened in biodiversity and ecology resilience if they are connected with Natura 2000 expansion. This can be a network of green and blue corridors which allows species to migrate and nest in protected areas. Higher biodiversity has a positive effect on both settlements and agriculture.

LEGENDS

- Settlements
- Industry
- Main greenery
- Creek ridges
- Protected nature area
- Water
- Improving ecology and biodiversity
- Deltaworks
- Agriculture
- Main ports
- Original harbour areas
- New ecological connections
- Maintaining ship connection

Figure 5. 02
Cultural Heritage Potential Map

Spatial qualities

The regions unique blend of landscape qualities and functions such as urban, coastal and rural landscapes provide a potential foundation to transform mono-functional areas. Tourism areas are currently characterized by the seasonal peaks and can be transformed into mixed-use areas. By introducing permanent amenities, cultural venues and housing, these areas can diversify their economic base and attract people throughout the year.

Urban centers such as Terneuzen, Goes, Middelburg and Vlissingen currently possess a lot of qualities to position them for densification. These cities can be repositioned as nodes where diverse functions, such as industry, education, housing and even innovation come together. Even in smaller cities such as Breskens and Zierikzee, there is a potential for growth in terms of the spatial qualities that they have, for instance the tourism and coast area in Breskens and the agriculture and ecology in Zierikzee. A potential can be aligned with the idea of the 'contourwings' in which we could facilitate transitional zones to create seamless connections between different urban sectors. Urban transformation is not confined, to these cities, but expanded into the unused and undefined in between spaces between different urban functions to optimize space.

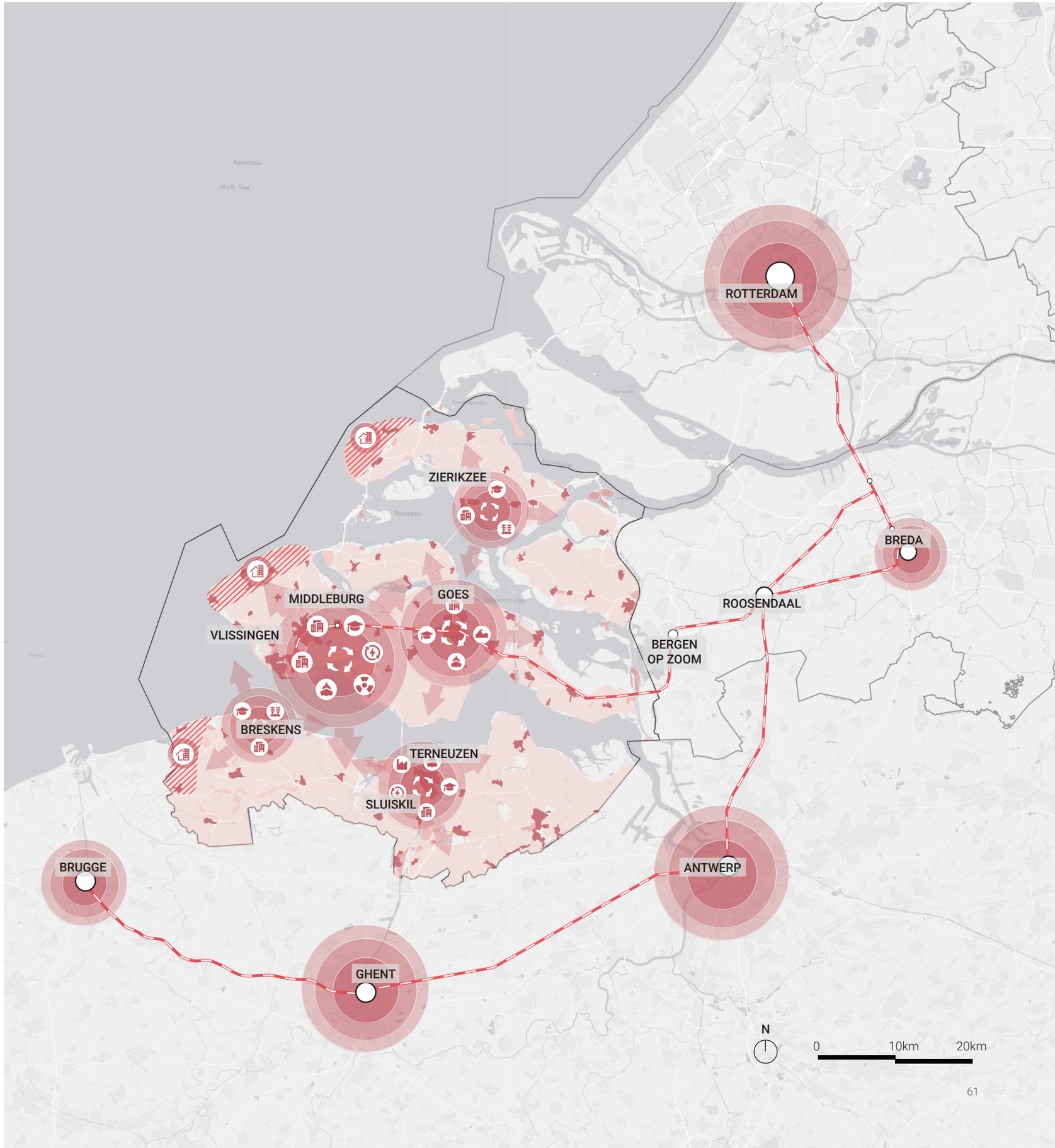


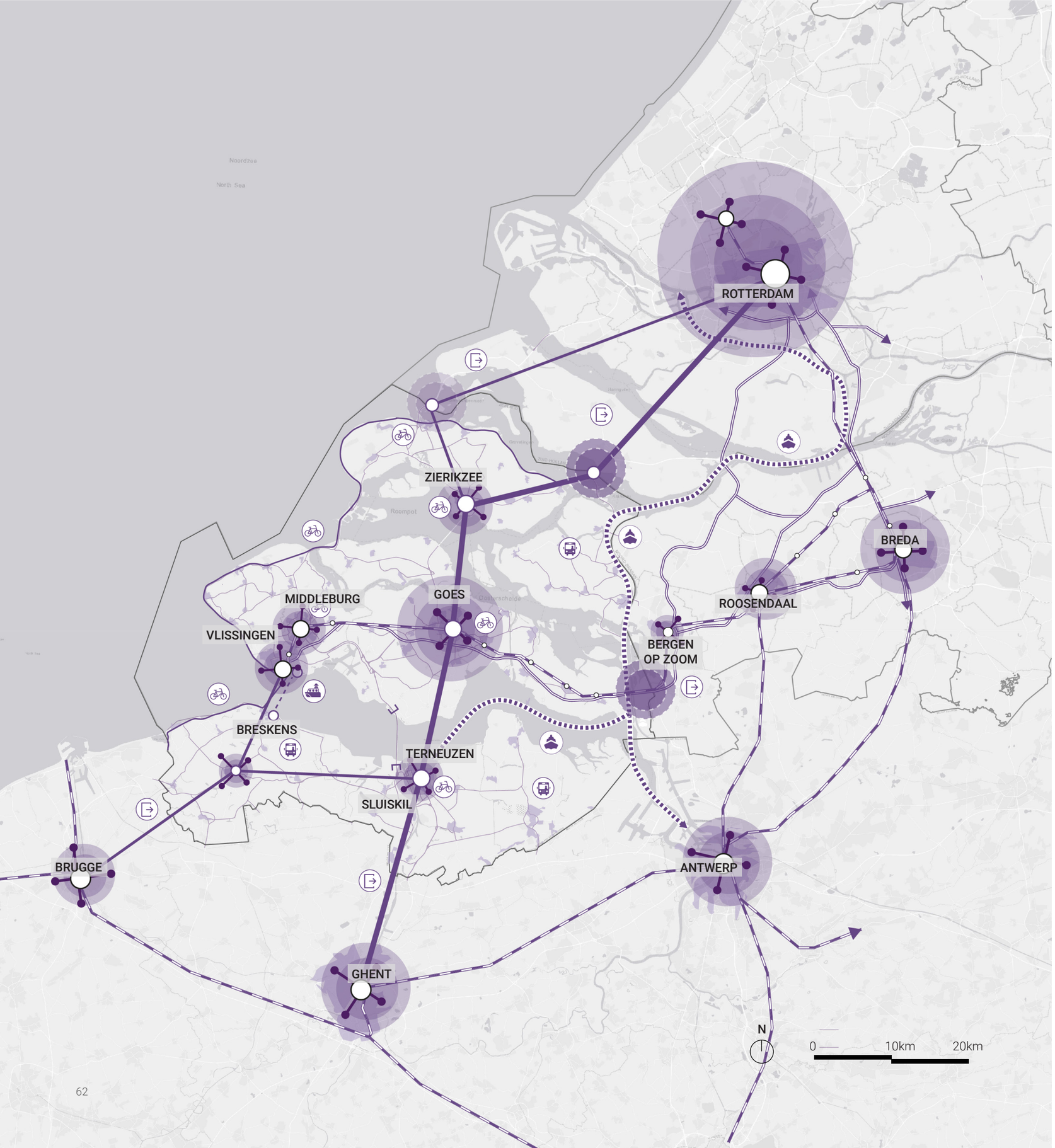
Figure 5. 03
Spatial Quality Potential Map

Mobility

Zeeland is strategically located between big cities such as Rotterdam, Antwerp and Ghent, but the current situation is not very well connected. There is most to gain from improving the north to south axis in the province. This can be done with new infrastructure which connect the islands across the water. As central location, Goes plays a major role in expanding the mobility. A new connection from Rotterdam towards Ghent, through Zeeland, would create a significant mobility hub in Goes.

Other potentials come with densifying the current networks. Higher frequency bus lines and more emphasis on smart mobility can drastically improve the accessibility of the region. The connections of small villages and bigger cities is essential to provide spatial justice in the field of accessibility.

Lastly, there is potential for focussing on soft mobility networks. Bike infrastructure already exists in the coastal areas, mostly for the tourism sector. But these paths could be expanded to connect towns and promote more sustainable transport methods. Creating more bicycle highways between cities would make cycling safer and more attractive.



LEGENDS

- Settlements
- Main cities
- Traffic jams
- Scenic bike route
- Mobility hubs
- Entrance points to Zeeland
- Industrial shipping route
- Public transport
- Bike
- Ferry stop
- Potential mobility artery from Ghent to Rotterdam
- Potential development entry points

Figure 5. 04
Mobility Potential Map

Knowledge-economy

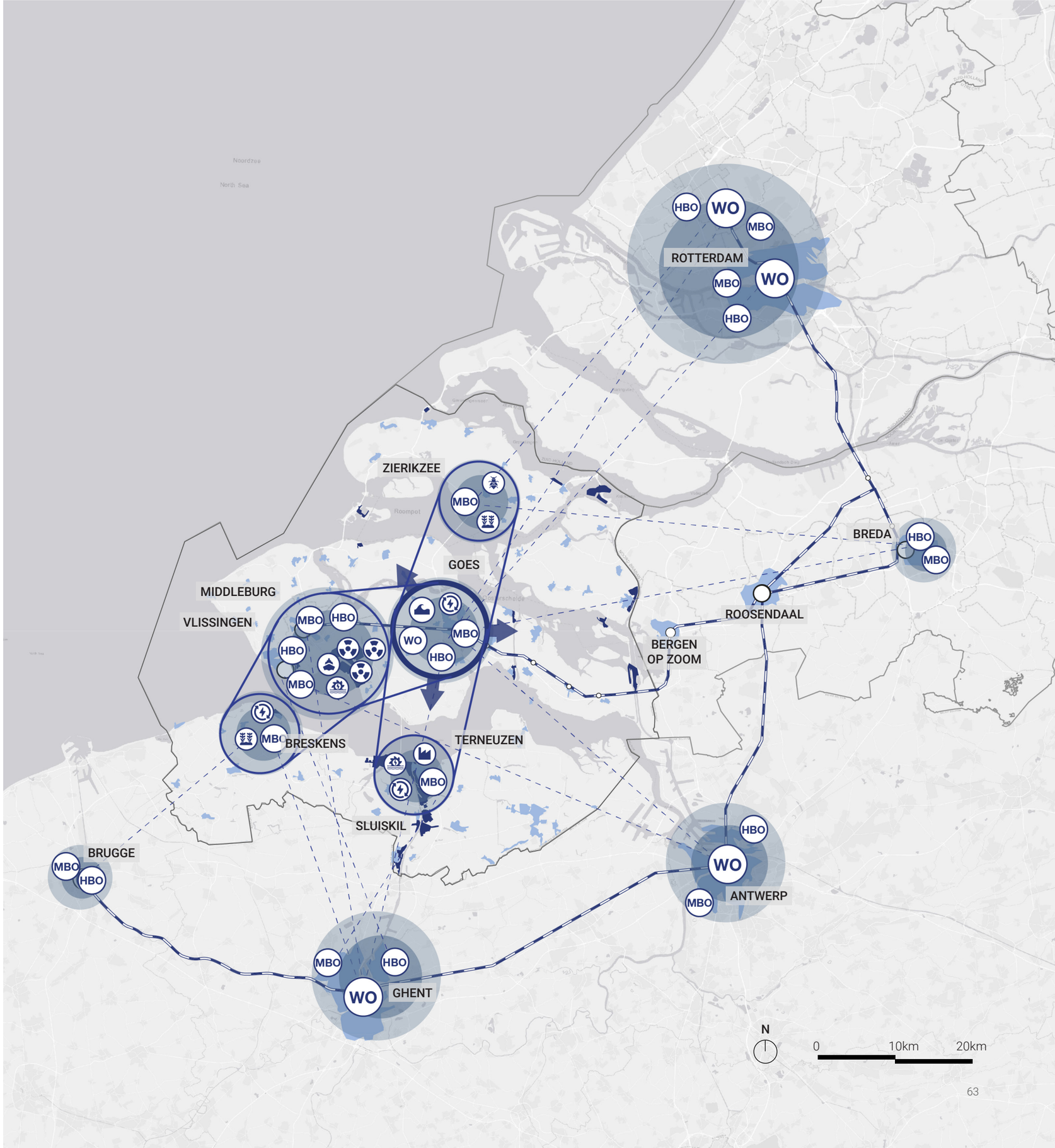
As economic development shifts toward innovation and sustainability, Zeeland's cities offer unique spatial qualities for creating specialized, interconnected knowledge hubs. Centrally located, Goes is well-positioned to serve as the educational connector for the region, coordinating institutions across Zeeland's urban network.

In the southwest, Middelburg, Vlissingen, and Borssele can form a renewable energy cluster, combining ports, research centers, and energy facilities to focus on wind, solar, and nuclear energy, supported by educational programs addressing technical, ecological, and societal challenges.

Terneuzen can specialize in linking industry and education, with potentials for an HBO school focused on green hydrogen production and storage, aligning with European decarbonization goals and leveraging the Ghent-Terneuzen industrial corridor.

Smaller cities like Breskens and Zierikzee also hold knowledge potential. Breskens in water-based energy, and Zierikzee in agriculture and ecology, each supported by an MBO school to connect local industries with research and education.

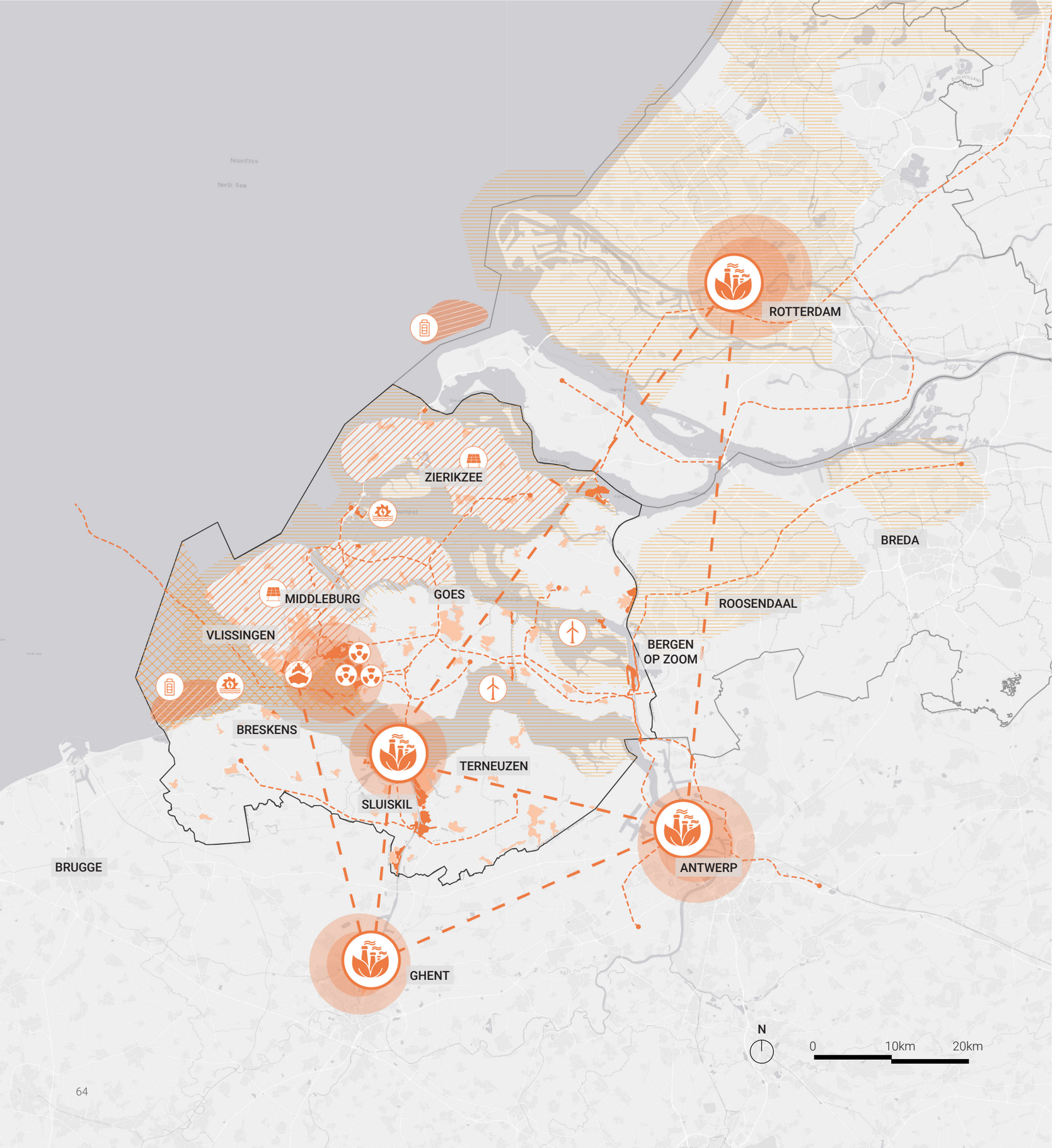
Together, these clusters support a polycentric knowledge economy grounded in Zeeland's spatial diversity and regional strengths.



LEGENDS

- Settlements
- Industries
- Main cities
- Vocational school
- Theoretical education
- Theoretical education (university)
- Train
- Internal education clusters Zeeland
- External educational connection
- Industry
- Renewable energy
- Nuclear plant
- Agriculture
- Maritime industry
- Tidal energy
- Ecology
- Water

Figure 5. 05
Knowledge- Economy Potential Map



Energy

Zeeland has high potentials for both land-based and water-based renewable energy. The province is investing in energy infrastructure to position itself as a sustainable and economically strong region.

For land-based energy, Zeeland offers opportunities in solar PV and, to a lesser extent, geothermal energy, although exploration of geothermal sources is ongoing in neighboring provinces. As previously mentioned, the national government is also exploring two additional nuclear plants in Borssele. While these developments can support energy security, maintaining environmental quality and land use efficiency must be taken into account when expanding land-based energy systems.

For water-based energy, the province has high wind potential and significant tidal changes, making it suitable for both offshore wind and tidal energy production. However, these developments must address the vulnerabilities of the delta landscape and ensure the protection of biodiversity.

As the province is equipped with diverse energy sources such as sun, wind, and water, it is well-positioned to support the production of green hydrogen. This potential also aligns with broader regional strategies, as the province is part of North Sea Port and in close proximity to the Port of Rotterdam, which is transitioning towards a hydrogen-based economy.

LEGENDS

- Settlements
- Industries
- Potential tidal energy
- Potential wind energy
- Potential solar energy
- Powerline
- Hydrogen corridor
- Industry (CO2 free)
- Windturbine
- Nuclear plant
- Solarpower
- Main port
- Tidal energy

Figure 5. 06
Mobility Potential Map

While the national government is currently exploring additional nuclear power development in Borssele, our approach focuses on renewable water-based energy systems that align with Zeeland's natural potential, while taking into account the nuclear expansion plan. We recognise the role of nuclear power in the current energy transition, however, our strategy highlights the potential of the province situated in the delta region to develop integrated energy systems.

Based on our assessment, each water-based system offers its own advantages and challenges. Floating solar panels rely on sunlight and offers high scalability with minimal land use. Floating wind turbines have the highest energy production but depend on wind conditions and require a lot of space. For tidal energy, it is the most consistent and predictable source, though current technology produces the least energy output compared to other systems.

Our approach is to integrate all of these energy systems to address these limitations and optimize energy production. This includes (1) enhancing space efficiency by placing solar panels between wind turbines and (2) using lagoon area for a mix of tidal and floating systems. This integration enhance energy production reliability and maximizes the use of the province's unique delta landscape.

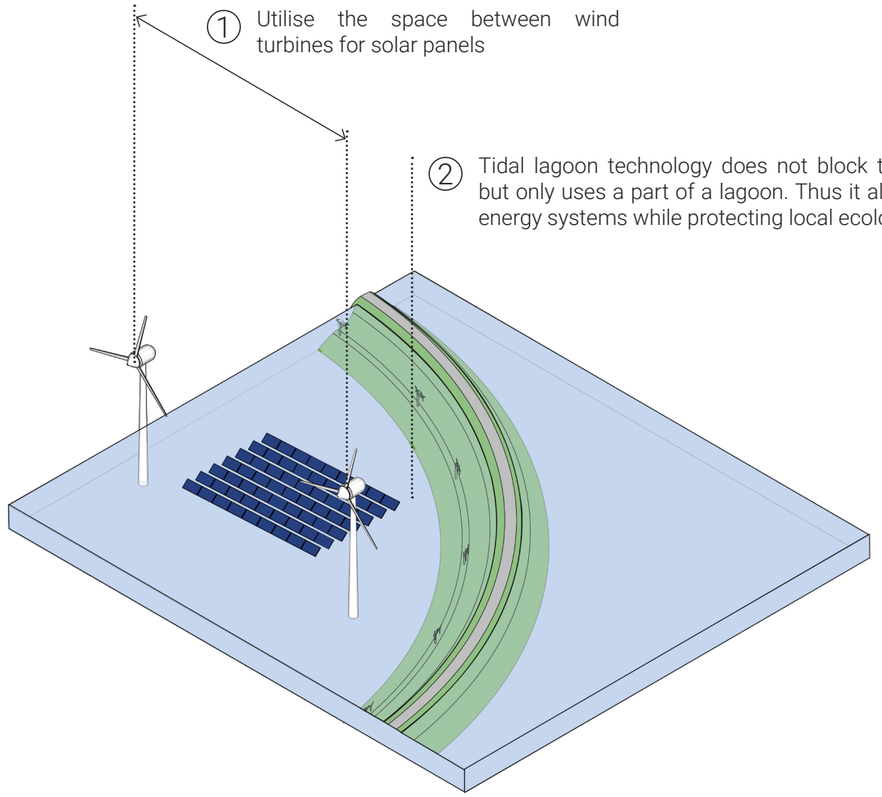


Figure 5. 07
Water-based energy system integration

	WATER-BASED SYSTEM	FLOATING PV	FLOATING WIND TURBINE	TIDAL ENERGY
Energy density		0,40 - 1,20 kW/ m^2	343,30 kW/ m^2	<0,10 kW/ m^2
Efficiency factor		0,12	0,22 - 0,25	0,30 - 0,33
Area required (per MW)		5.561 m^2	50.000 m^2	100.300 m^2
Location		calm water	deep water	strong tidal water
Scalability		highly scalable	large scale	limited geographical sites
Conditions		day-time	wind-dependent	Predictable and reliable
Environmental impacts		shading, sediment distrurbance, electronic field effect	on large scale- noise, bird migration interfence, electromagnetic radiation	depends on technology used- marine animals and plants disturbance
Other benefits		reducing water evaporation and algae growth	1 - 10% areas occupied, can be combined with Wave Energy	can be integrated with other water infrastructure
Price (LCOE)		EUR 0, 18/ kWh	EUR 0, 18/ kWh	EUR 0, 25 - 0, 47/ kWh

	NUCLEAR POWER
Energy density	0, 20 kW/ m^2
Efficiency factor	0,32
Location	proximity to water and low population for safety reason
Scalability	Low due to physical, maintenance, and cost constraints
Conditions	Stable and continuous
Environmental impacts	Radioactive waste and risk of accidents
Other benefits	Cleaner option in terms of air pollution and climate change mitigation
Price (LCOE)	EUR 0, 12 - 0,31 / kWh

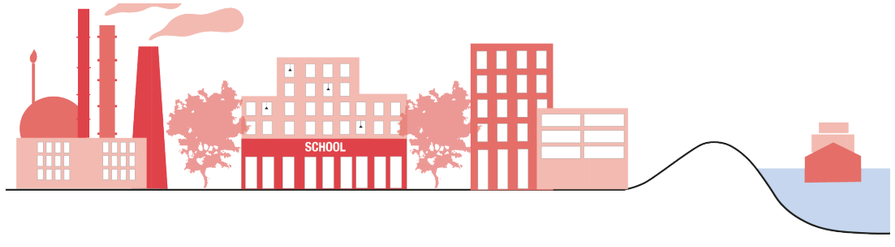
THOUGHTS ON NUCLEAR POWER

1. low-carbon energy source that significantly reduces CO2 emissions by displacing fossil fuel use
2. Reliable and efficient source of energy, capable of providing a stable base load for power grids
3. Rely on finite resources like (Uranium, Plutonium, Thorium)
4. Dependent on other countries (Australia, Canada, Kazakhstan)
5. Radioactive waste from nuclear reactors, fuel processing plants, and nuclear facilities
6. Nuclear power is generally considered expensive due to high and rising capital costs, regulatory complexities, and significant cost risks.

Figure 5. 08
Energy System Comparison
Sourve: Various sources *(see Literature)*

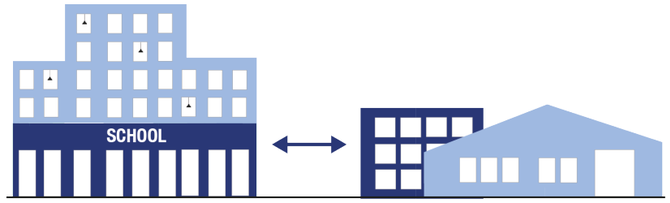
Students' Concerns

"How can we make sure that modernization does not disturb the cultural landscape?"

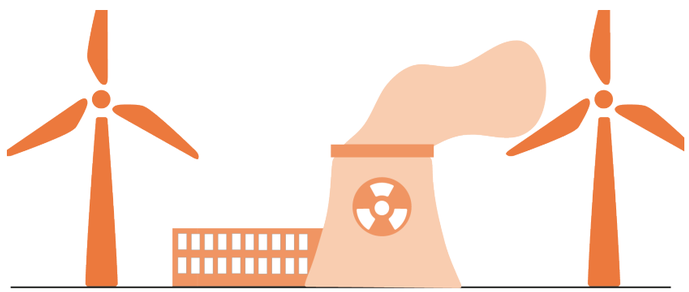


"Is there a way to integrate different landuses?"

"How can amenities be easier to access?"



"How do the education possibilities connect to the work environment in the future?"



"How can we keep on using the same amount of energy?"

Figure 5. 08
Student Wishes

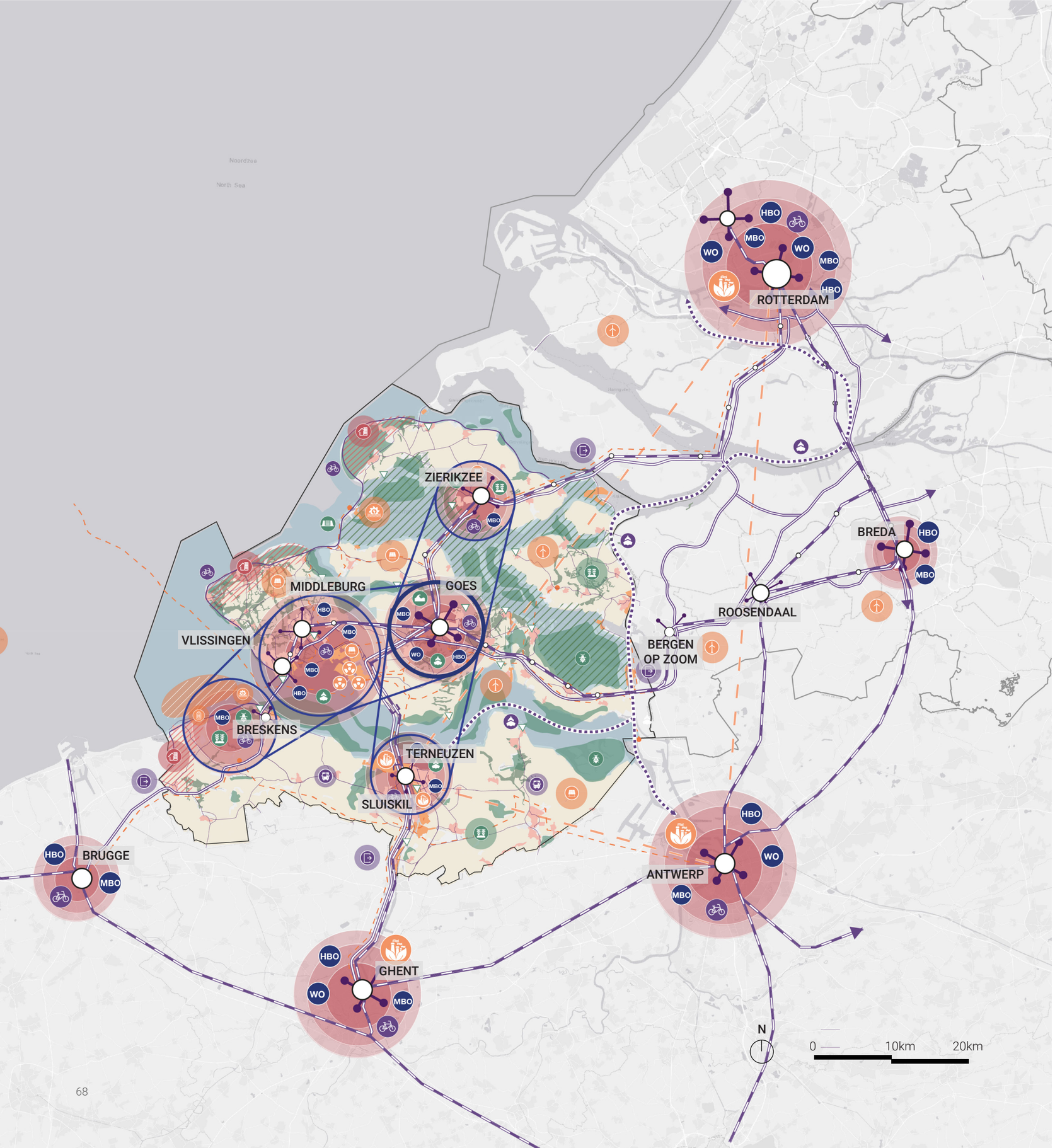
Vision Statement

“The vision for Zeeland in 2100 focuses on creating a **thriving, innovative environment** where students not only want to live and work but also feel inspired to shape the region’s future. By developing innovation clusters tailored to Zeeland’s unique spatial qualities, the region will become **a region for sustainable energy, circular economies, and technological advancements**. The energy transition will play a key role in connecting students to their career paths while improving the quality of life for the entire region.

Strategic spatial planning will ensure that Zeeland’s cultural identity and natural beauty are preserved, **balancing modernization with tradition**. Improved accessibility, both locally and regionally, through enhanced public transport and infrastructure, will make it easier for students to live, work, and travel within the province and beyond, creating a truly connected region.

This vision will not only enhance the quality of life but also project a **technologically innovative image**, attracting students who seek both dynamic career opportunities and a strong sense of community. By strengthening Zeeland’s position in the knowledge economy, this vision will provide students with the opportunities and environment they need to build their future in the region, ensuring lasting ties and the development of a thriving, interconnected network of young professionals.”

Vision



LEGENDS

Spatial qualities
- Agriculture
- Settlements
- Industries
- Main greenery
- Current touristic area
- Mixed-use development
- Contourwings t o create seamless transitions

Cultural landscape
- Greek ridges
- Water
- Protected nature
- Biodiversity improveme
- Agricultural sector
- Deltaworks

Mobility
- Train
- Industrial ship network
- Local car roads
- Highways
- Scenic bike route
- Mobility hubs
- Entrance points to Zeelanc
- Industrial shipping route
- Public transport
- Bike

Energy
- Industry (CO2 free)
- Windturbine
- Nuclear plant
- Solarpower
- Main port
- Tidal energy
- Powerline
- Hydrogen corridor

Knowledge- economy
- MB O Vocational school
- HB O Theoretical education
- WO Theoretical education (university)
- Internal education clusters Zeeland

Figure 5. 09
Vision Map

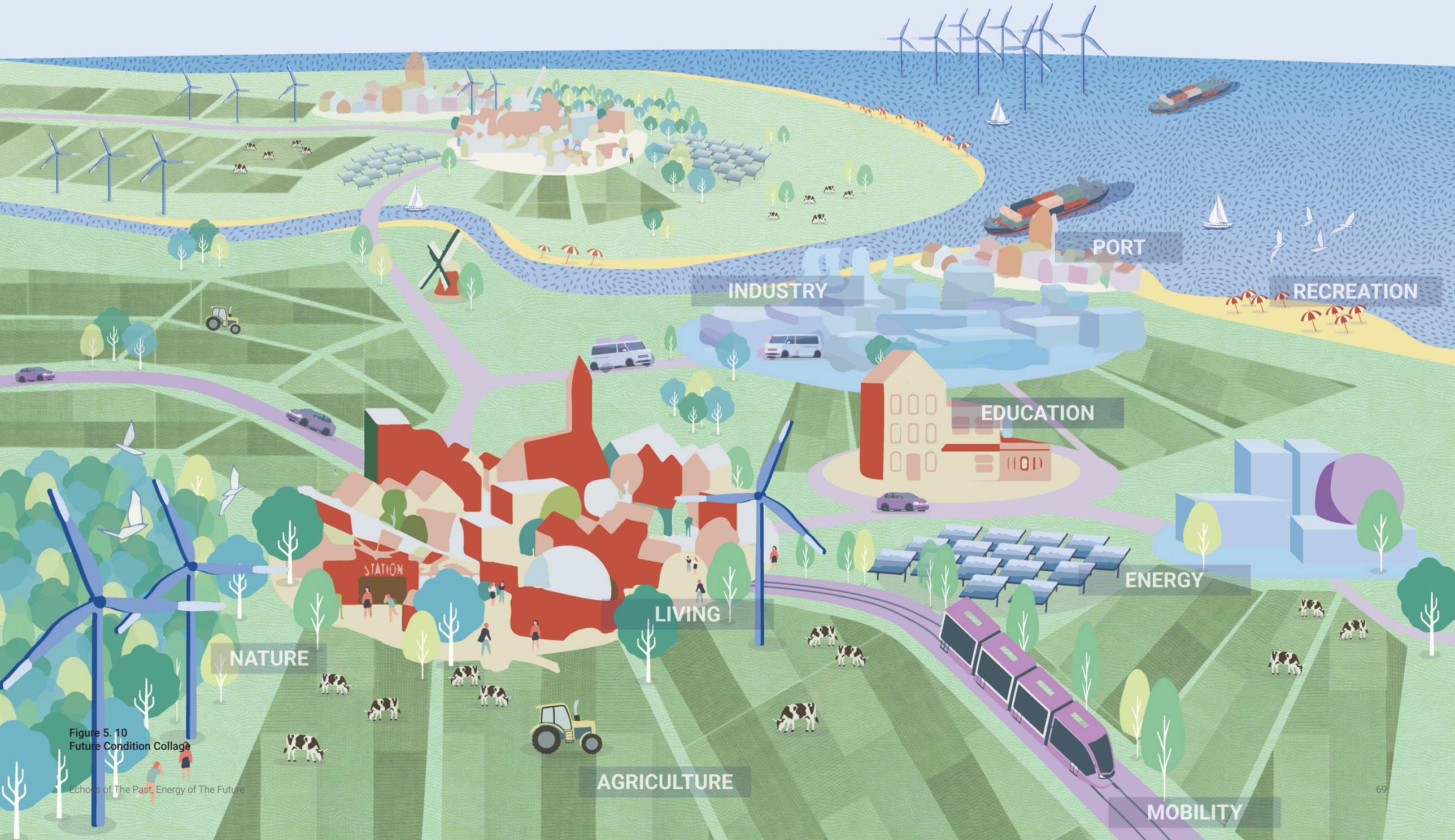
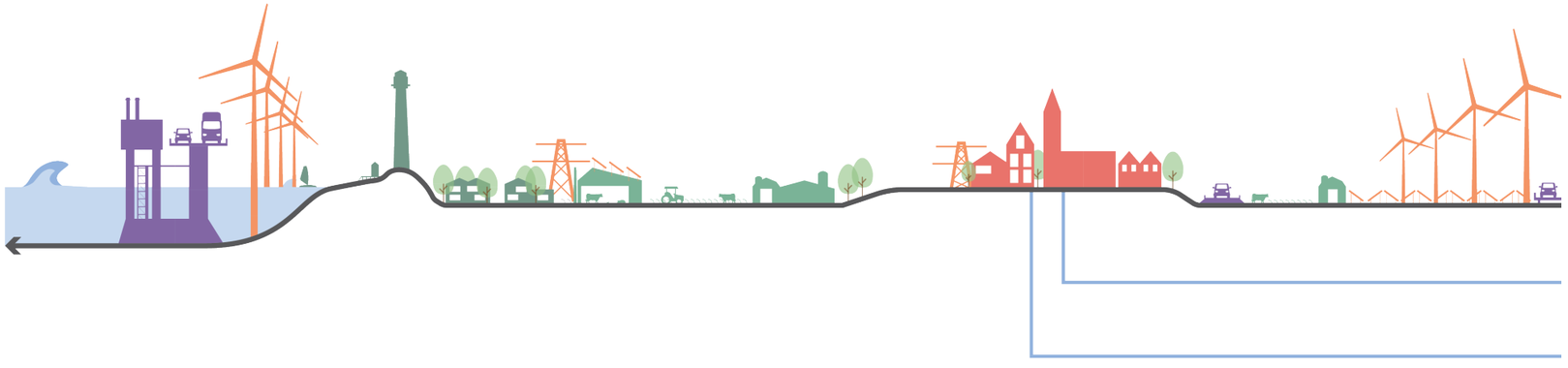


Figure 5. 10
Future Condition Collage

Systemic Section

The systemic vision section shows the new renewable energy production. Wind farms are expanded on the land and in the sea. This goes in combination with solar farms that fit in between the turbines. The tidal energy production is integrated into Deltawerken infrastructure to maximize the energy potentials. The educational institutions are now more spread out over the region and better connected because of new public transportation systems. This means that less students will leave the province for the Randstad, and they will find more opportunities in Zeeland. These opportunities also appear in the reformed industries, which now focus on using and producing green hydrogen. This eliminates the need for fossil fuels.

Current



Future

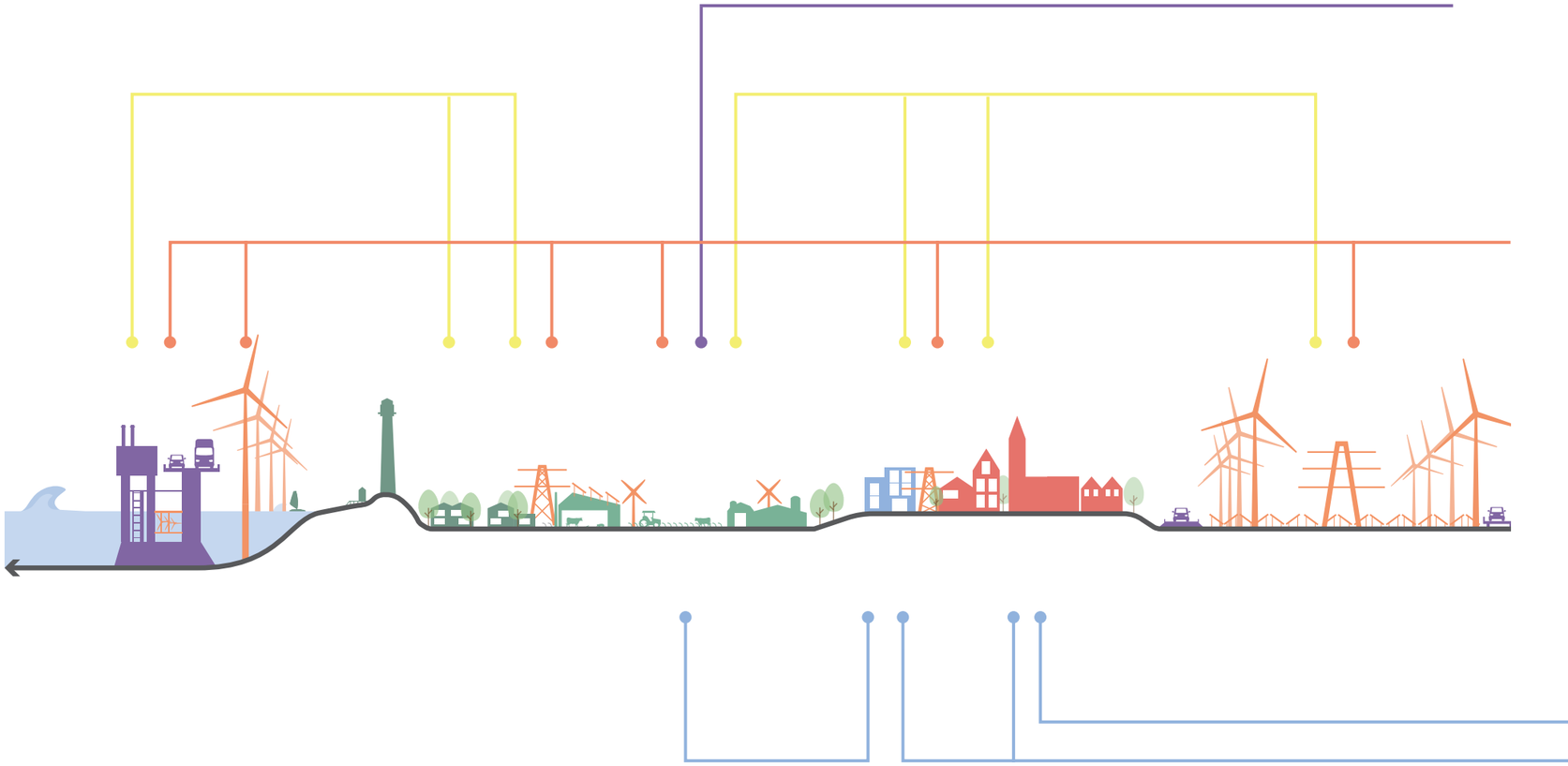


Figure 5. 11
Current and Future Systemic Sections

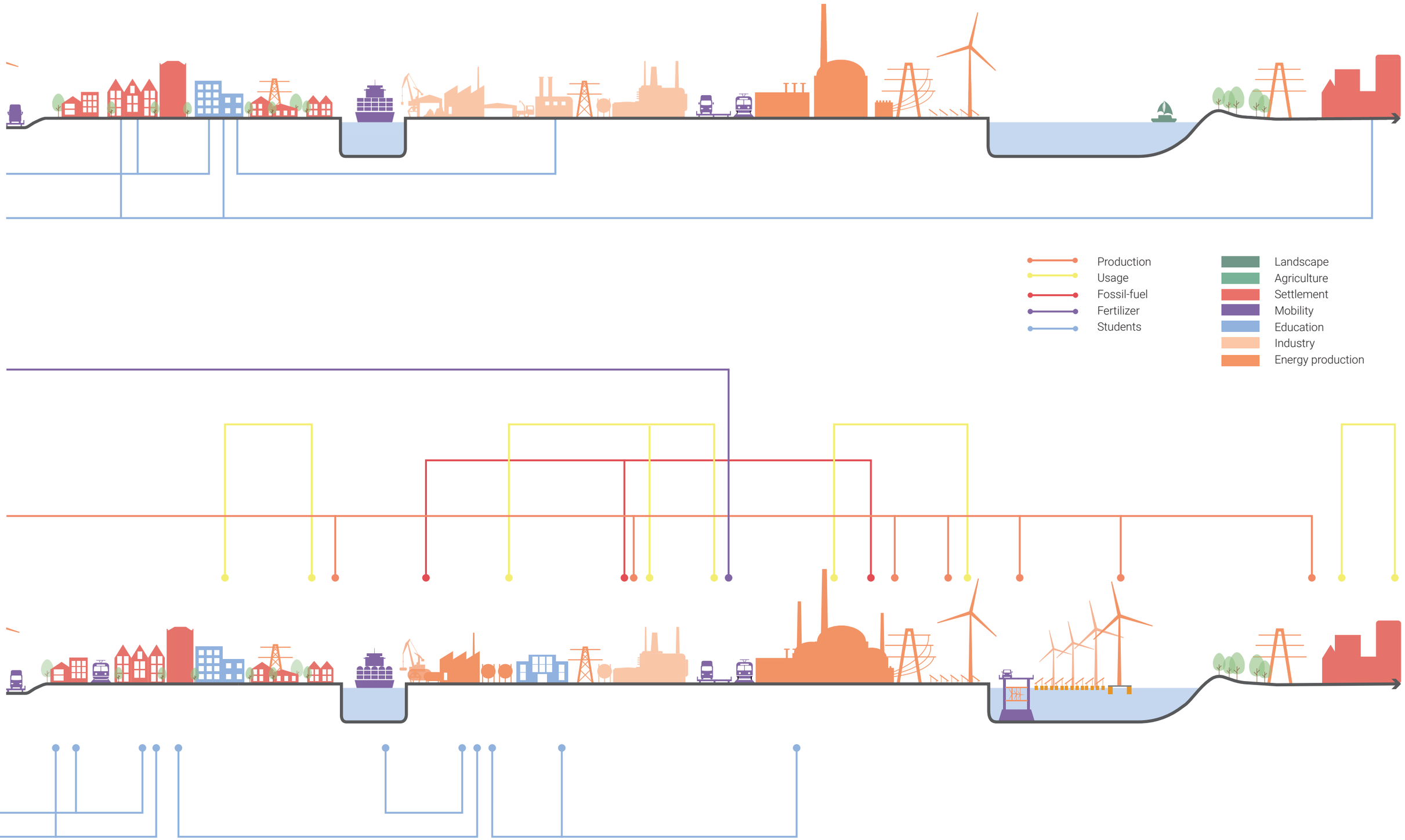

Production
Usage
Fossil-fuel
Fertilizer
Students
Landscape
Agriculture
Settlement
Mobility
Education
Industry
Energy production

Figure 6. 01.Zeeland's Satelite View. Source: Google Earth © 2025

CHAPTER 06

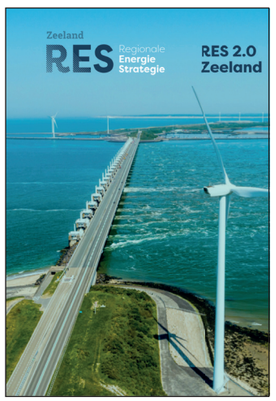
Strategy

Introduction to Policy | Policy Analysis | Stakeholder Analysis | Conflict and Stategy
Strategic Question and Framework | Key Actions | Governance System
Phasing | Transition Areas | Key Locations | Conclusion

Introduction to Policy

Policy Documents

This project proposes a community vision (for students) that prioritizes liveability, inclusive growth and puts Zeeland on the map so students will be attracted and stay in the region. However, to ensure this vision is feasible and can be implemented, it must be critically tested against the existing policies of Zeeland and the interests of key stakeholders before going in to the strategy phase. A key tool for this testing process is the bubble diagram, see figure 6.03, which serves as a visual method for mapping and analyzing the alignment or friction between the community vision, existing government policies and the existing industry policies. For the policies, nine different sources has been used to determine the government and industry policies within Zeeland which can be seen in figure 6.02.



Regionale Energie Strategie (RES)

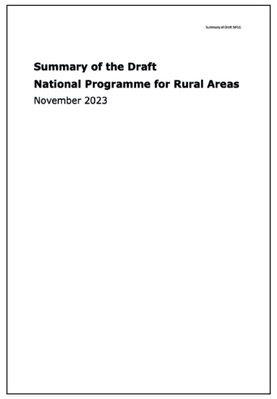
This document outlines Zeeland's Regional Energy Strategy (RES) (Provincie Zeelanda, 2023)

Ruimte voor Economie

National program dedicated to allocating space for economic activities ((Ministerie van Economische Zaken en Klimaat [EZK], 2023)

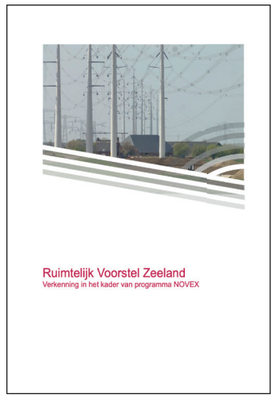
Voorontwerp Nota Ruimte

A preliminary draft that presents a spatial vision for the Netherlands up to 2050 (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties [BZK], 2024)



National Programme for Rural Areas

Draft program aimed at guiding provinces and stakeholders toward sustainable rural development (Ministerie van Landbouw, Natuur en Voedselkwaliteit [LNV], 2023)



Ruimtelijk Voorstel Zeeland

This spatial proposal provides insight into current challenges impacting the living and working environment in Zeeland (Provincie Zeeland, 2023b)

National Delta programme 2025

The Delta Programme works on flood risk management, freshwater availability, and climate-resilient planning of the living environment in the Netherlands (Staf Deltacommissaris, 2025)

Agenda Economic Board Zeeland

The strategic agenda of the Economic Board Zeeland outlines initiatives to enhance livability, economic structure, and regional cooperation within Zeeland. (Economic Board Zeeland, 2021)

Regio Deal North Sea Port District

A collaborative agreement between the Dutch government and regional parties to improve the quality of life, living, and working conditions in the North Sea Port District (Rijksoverheid, 2023)

SDR Regioplan 2030-2050

A regional plan by Smart Delta Resources detailing strategies for the industrial region to achieve climate neutrality (Smart Delta Resources, 2020)

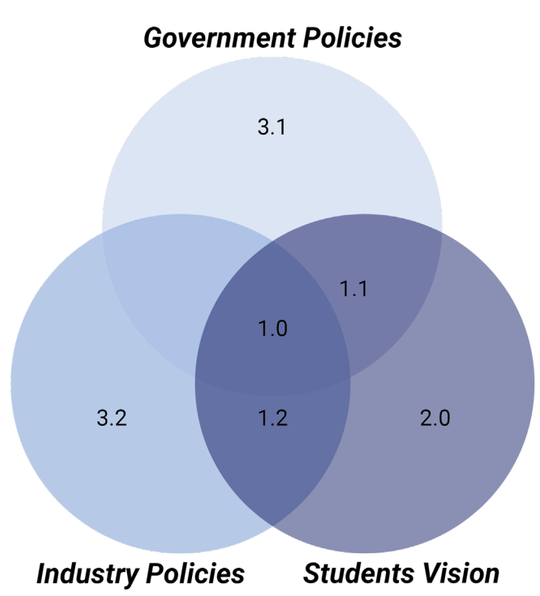


Figure 6. 02
Policy Documents

Figure 6. 03
Policy Bubble Diagram

Policy Analysis

Spatial Planning Policies

There are multiple policies published by different municipal bodies, through different scales. Some focus more on the energy, industry and economical aspects, and the others on the cultural and natural landscape. They all give an indication on how these themes should be implemented in future projects. The information is organized according to the themes: Students, Mobility, Education, Industry, Energy and Spatial Qualities. The diagram summarizes the main idea on those topics in the policy, the full table on this is placed in the appendix 3.

National Delta Program

A governmental initiative focused on protecting the Netherlands against flooding, ensuring freshwater supply, and adapting to climate change through integrated water management strategies.

Education

The Southwest Delta as an international paragon of a sustainable, highly innovative and circular agricultural sector and food chain

Energy

Energy from water (tidal, wave, fresh salt) and wind turbines along the edges of the delta waters. Development of charging infrastructure in ports for electric boating.

Nota Ruimte

A strategic policy document outlining the Dutch government's vision and framework for spatial planning and sustainable development across the Netherlands.

Energy

Large-scale offshore energy generation and solar panels on roofs get priority to 'safe' landscapes.

NOVEX Zeeland

NOVEX Zeeland is a collaborative spatial planning initiative between the Dutch government and the Province of Zeeland, focused on addressing regional challenges like housing, nature conservation, and energy transition.

Students

Challenge with connectivity and accessibility, could affect ability to commute to educational institutions.

Mobility

Improving regional road connections and railway to Antwerp

Education

Economic and industrial transitions create demand for skilled workers, which could lead to new educational programs

Industry

New opportunities for business sectors: hydrogen production, offshore wind energy, and circular industries

Spatial

Coastal zone for recreationspace, a demand for forest and nature.

National Rural Area Program

A governmental initiative designed to support the development and sustainability of rural areas, addressing challenges such as agriculture, biodiversity, and rural infrastructure.

Mobility

Focus on low emission transport and connectivity.

Education

Universities and research institutes are expected to play a role in advancing sustainable farming, water management, and energy transition.

Industry

Industrial growth is not a primary focus.

Spatial

Guidelines for balancing rural development with nature conservation, including spatial strategies for agriculture, water, and climate adaptation.

Ruimte voor Economie

A policy framework aimed at allocating and optimizing space for economic activities, fostering regional development, and enhancing the Netherlands' competitive position.

Mobility

Accessible and well-connected business districts and efficient mobility for logistics and supply chains, with an emphasis on multimodal transport to reduce emissions.

Education

Emphasizes the need for knowledge clusters and innovation districts, such as campuses that bring together universities, research institutions, and industries.

Energy

Energy transition goals will require significant space for wind farms, solar energy, hydrogen production, and battery storage.

Spatial

Mixed use development: integrating work, education, and residential functions.

NOVi: Nationale Omgevingsvisie

The National Environmental Vision, establishing an integrated approach to spatial planning, environment, and infrastructure to achieve a sustainable and resilient living environment.

Mobility

By 2030 most vehicles electrical, and by 2050 all transport emission free. Good corridors strategically placed along water canals. The focus is on optimal (inter)national accessibility of cities and the economic core areas.

Industry

Physical and environmental space must remain available for port and industrial areas. Use of energy hubs

Energy

Wind turbine parks in the North Sea, Making the energy infrastructure suitable for renewable energy sources and reserving space for them.

Spatial

Preserving the core qualities and collective values of the coastal zone on the one hand and developing the coastal zone on the other.

Table 6. 04
Spatial Planning Policy

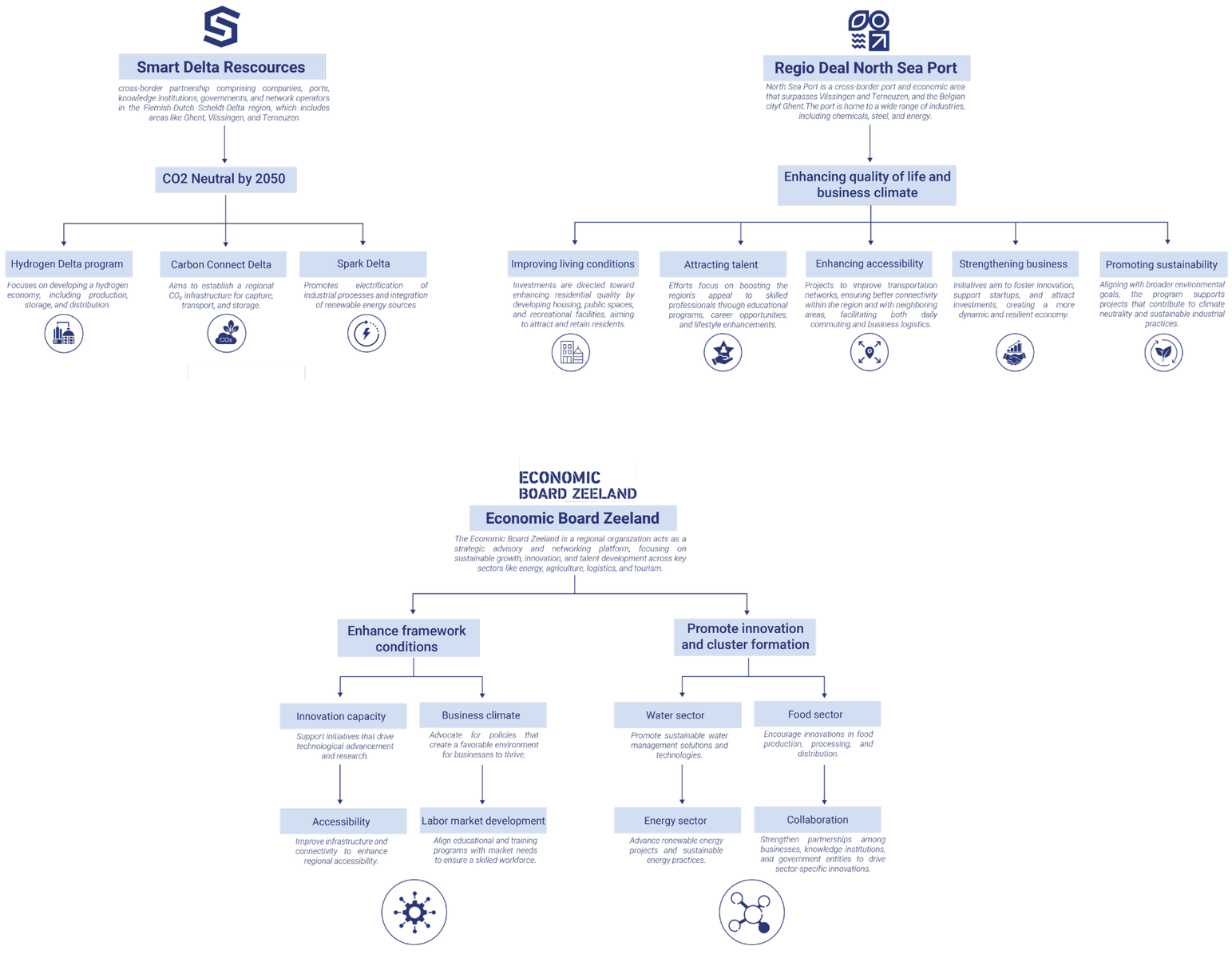


Figure 6. 05
Industry Policy

Industry Policies

Zeeland's industry plays a key role in the region's development and is undergoing major changes due to the energy transition. Central to this shift are initiatives like Smart Delta Resources (SDR), the Regio Deal North Sea Port District, and the Economic Board Zeeland (EBZ).

Smart Delta Resources is a cross-border industrial alliance aiming for climate neutrality by 2050, involving major companies, ports, and governments from Zeeland, East Flanders, and West Brabant. Its key programs include:

- Hydrogen Delta: Developing Zeeland into a hydrogen hub through integrated production and infrastructure.
- Carbon Connect Delta: Implementing carbon capture and storage to reduce emissions.
- Spark Delta: Shifting industrial processes from fossil fuels to renewable electricity.

The Regio Deal North Sea Port District is a Dutch national-regional program enhancing livability and economic development through five goals:

- Improving urban living conditions
- Attracting and retaining talent through education
- Boosting accessibility (transport and digital)
- Supporting business innovation and infrastructure
- Promoting sustainability and landscape preservation

The Economic Board Zeeland (EBZ), a regional collaboration platform, focuses on strengthening Zeeland's economy by improving conditions for innovation and clustering. It targets eight areas:

- Innovation capacity
- Business climate
- Accessibility
- Labor market alignment
- Water, food, and energy sectors
- Cross-sector collaboration

Conflicts and Alignment

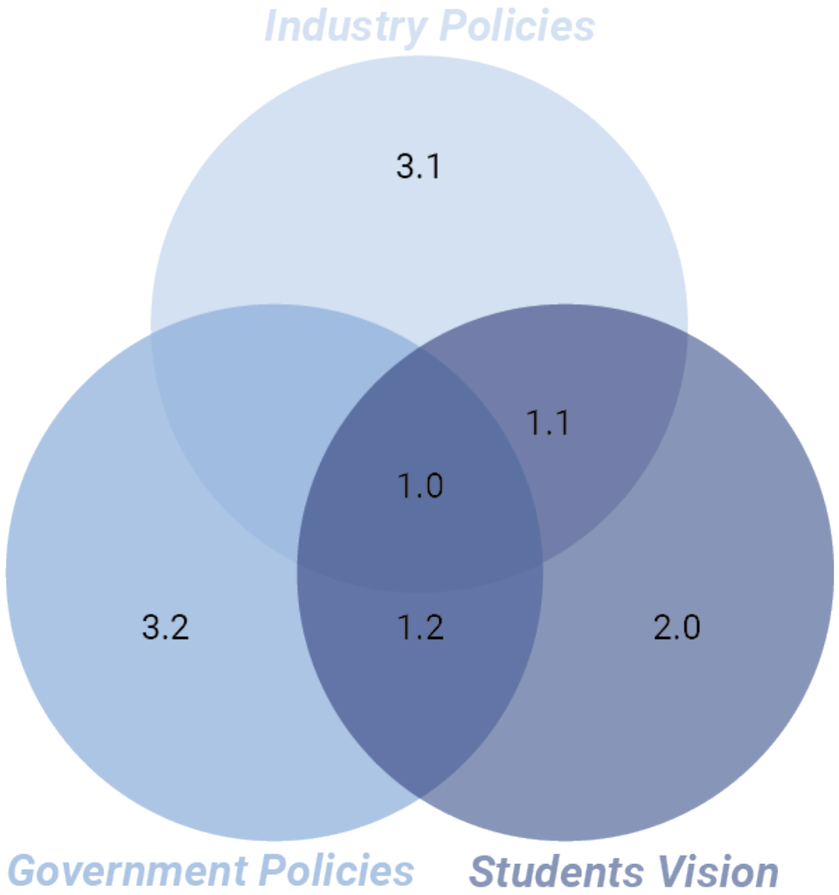


Figure 6. 06
Policy Bubble Diagram

1.0	1.1	1.2
Alligning policy	**Alligning policy**	**Alligning policy**
Sustaining and growing existing industries	Reducing and storing carbon emissions	Improve public transport connections and access
Contributing to the sustainable energy transition	Electrifying industries and reducing fossil fuel ussage	Preserve and strengthen the nature for leisure and ecology
Emphasis on the cross-border cooperation and connection	Become biggest hydrogen producer in Europe	Use the sea as space and source for energy production
Improving the connections between eduction and industries	Develop healthy and liverly transition areas at industries	Expansion of high voltage network
Developing the area's and functions around industrial land use	Invest in mobility hubs in North Sea District	Mixed-use integration of land use
Expansion of the nuclear power production	Make public transport more accessible	Focus on population growth for public welfare
Focus on hydrogen as energy storage and transport		Use industries and harbours as drivers for development
Conflicts	**Conflicts**	**Conflicts**
Reerving space for growth of industries and no limitations for agricultural development.	No focus on Zeeland as a location fore innovation and research development	Maintain coastal zones for recreation and tourism
	Educational institutes are not represented in SDR plans	Priority for solar panels on roofs of buildings
	Focus on renewable energy production on land	Reserving space for industries and ports
	Space for shipping lanes on water instead of energy	

2.0	3.1	3.2
Reduction of industries power related to education	No intention to change the power dynamics of industries	National plans for knowledge clusters do not include Zeeland
Goes as the new centrality of the region	Usage of raw and finite materials in circular economy	Regional policy to preserve agricultural land use and minimal limitation
Decreasing agricultural land whilst making it sustainable		Economic focus on development of harbours
More mixed use developments in the coastal region		Mobility plans do not focus on infrastructure expansion or new public transport connections
New public transport infrastructure across the region		
Develop Zeeland as delta research and innovation hub		
New mobility infrastructure across the delta		

Figure 6. 07
Aligning Diagram

Stakeholder Analysis

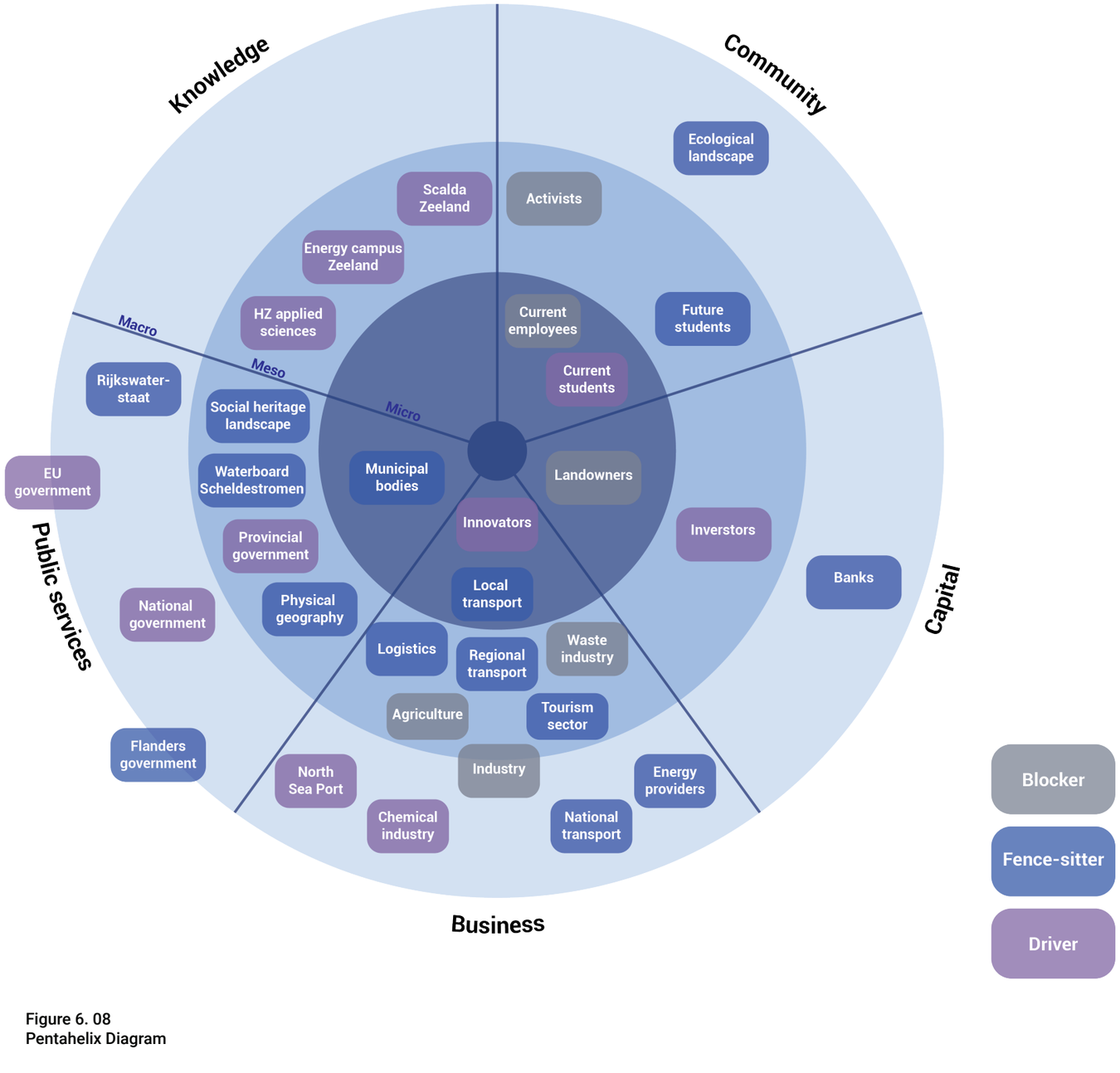


Figure 6. 08
Pentahelix Diagram

The stakeholders involved in the forming of the strategy can be divided into five subgroups which are visible in the penta helix diagram (see figure 6. 08). This diagram helps to understand which domains are well represented and which are not. It also relates actors on different scales and their interest in the vision.

The transition toward a sustainable North Sea region is driven by a range of stakeholders. Governments at EU, national, and provincial levels support this vision through frameworks such as the Paris Agreement and the Green Deal, while also aiming to boost innovation, public welfare, sustainable industries, and hydrogen production.

North Sea Port and the chemical industry align with these goals, focusing on sustainability, hydrogen development, and the creation of mobility hubs and transition zones around industrial areas.

Educational institutions and students are also key drivers. There is a clear need for a more diverse academic offering and increased student numbers to sustain regional institutions.

On the other hand, agriculture and industry present challenges. Many are hesitant to shift power dynamics or reduce land use, and employees often fear job loss, hindering engagement with the energy transition. Their cooperation and investment remain essential.

Additionally, landowners and activists may resist the vision, potentially blocking progress through participatory channels. To ensure a democratic and inclusive strategy, it's crucial to address concerns about environmental impact, job security, and gentrification.

In the current power dynamics, governmental bodies and the chemical industries hold significant influence over regional decision-making. Their interests are closely tied to policy and planning. However, since the visions and goals of these sectors align with the student vision, they can act as strong drivers for the proposed strategy.

A critical challenge lies in reducing the dominant position of the industries without losing them as key investors. Strategic policies and interventions will be necessary to ensure their continued involvement while managing their influence to prevent them from becoming blockers.

The proposed vision aims to create a more balanced power dynamic between industries, educational institutions, and students. This is essential for engaging current students and future generations of innovators in the energy transition. Shifting power in this way positions them as new drivers of regional progress.

Among the blockers, agriculture, industry, and landowners are the most powerful actors. Their limited interest in the vision means they need to be convinced to participate or cooperate. While their power position may remain unchanged, the strategy should focus on aligning their interests with the goals of the transition.

The ecological landscape is considered a stakeholder, yet it holds minimal influence within the business-dominated policy environment. Therefore, continuous efforts are needed to empower and protect this landscape throughout the transition process.

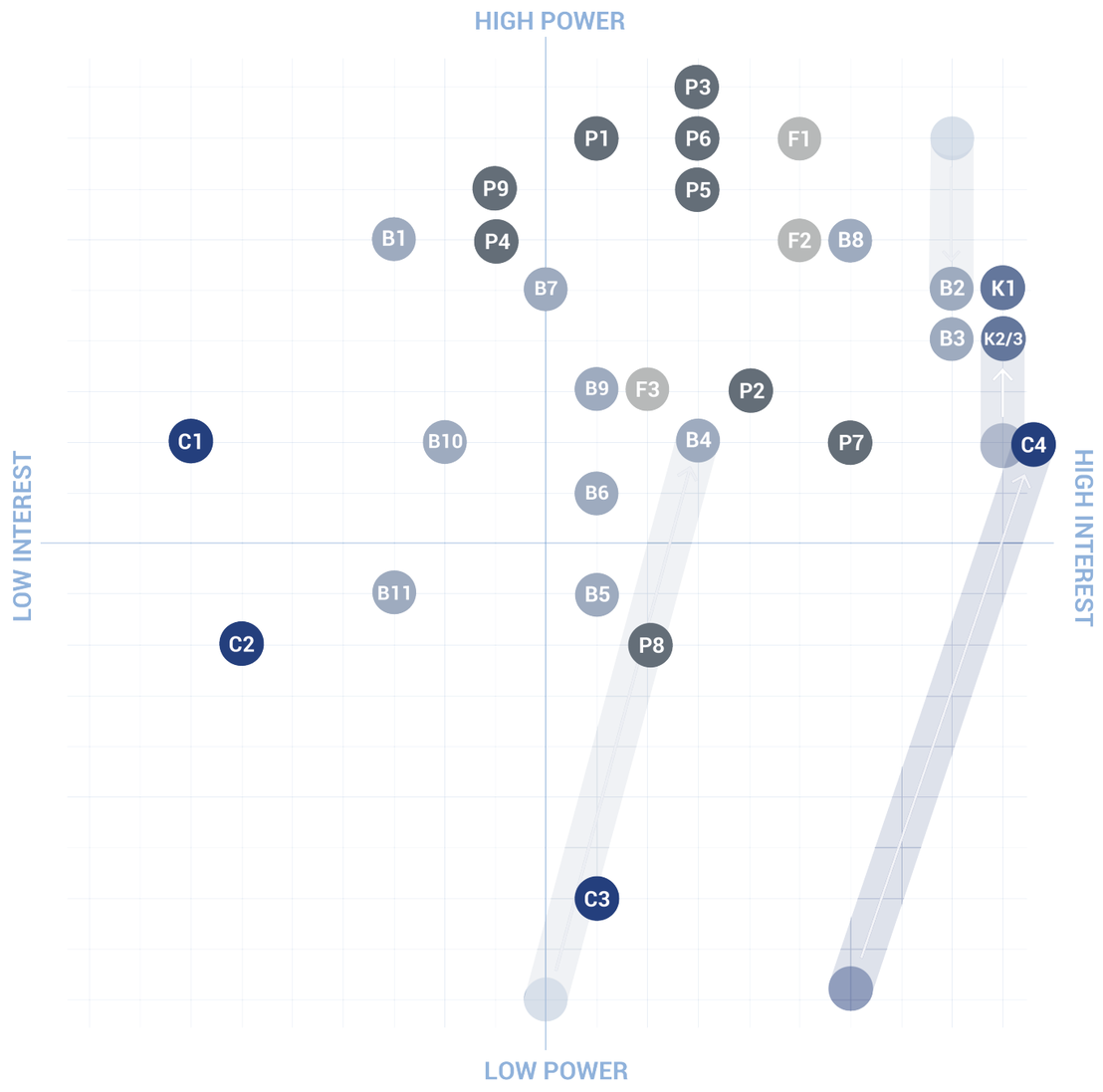
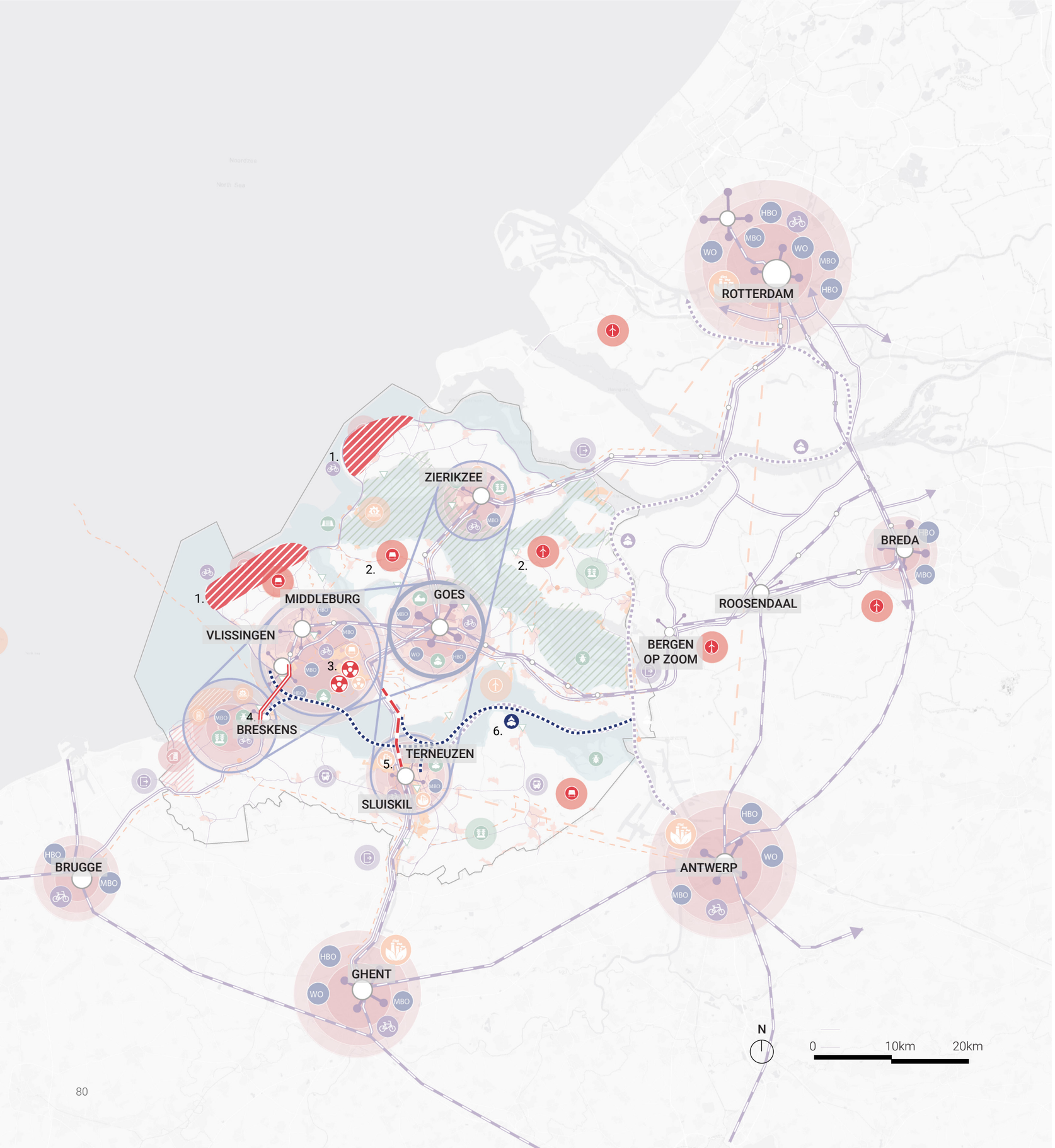


Figure 6. 09
Stakeholder Power Matrix

Conflict Map

The stakeholder and policy analysis show the current and potential key actors and plans for Zeeland. These do not entirely match the student's vision, which leads to some conflicts. A big conflict arises between the geological landscape and new infrastructure. As the delta landscape is very vulnerable, it is less suited for big infrastructures. The railway line from Borssele to Terneuzen or the connection between Vlissingen and Breskens will give negative impact to the environment. Therefore, the development focuses on transportation via water such as the ferry. Also, the implementation of mixed-use areas near the coastline did not align with policies, these areas need to be altered for preserving and enhancing nature.

Within the energy theme, there were also some conflicts. One of them is the policies that state how the new renewable energy production should be located on sea instead of land. This would also help preserve the cultural landscape. Next to this is the conflict of the nuclear plants, as there is an ongoing discussion whether two plants should be added to the existing plant in Borssele. These policies will be reassessed from a neutral perspective in the strategy phase.



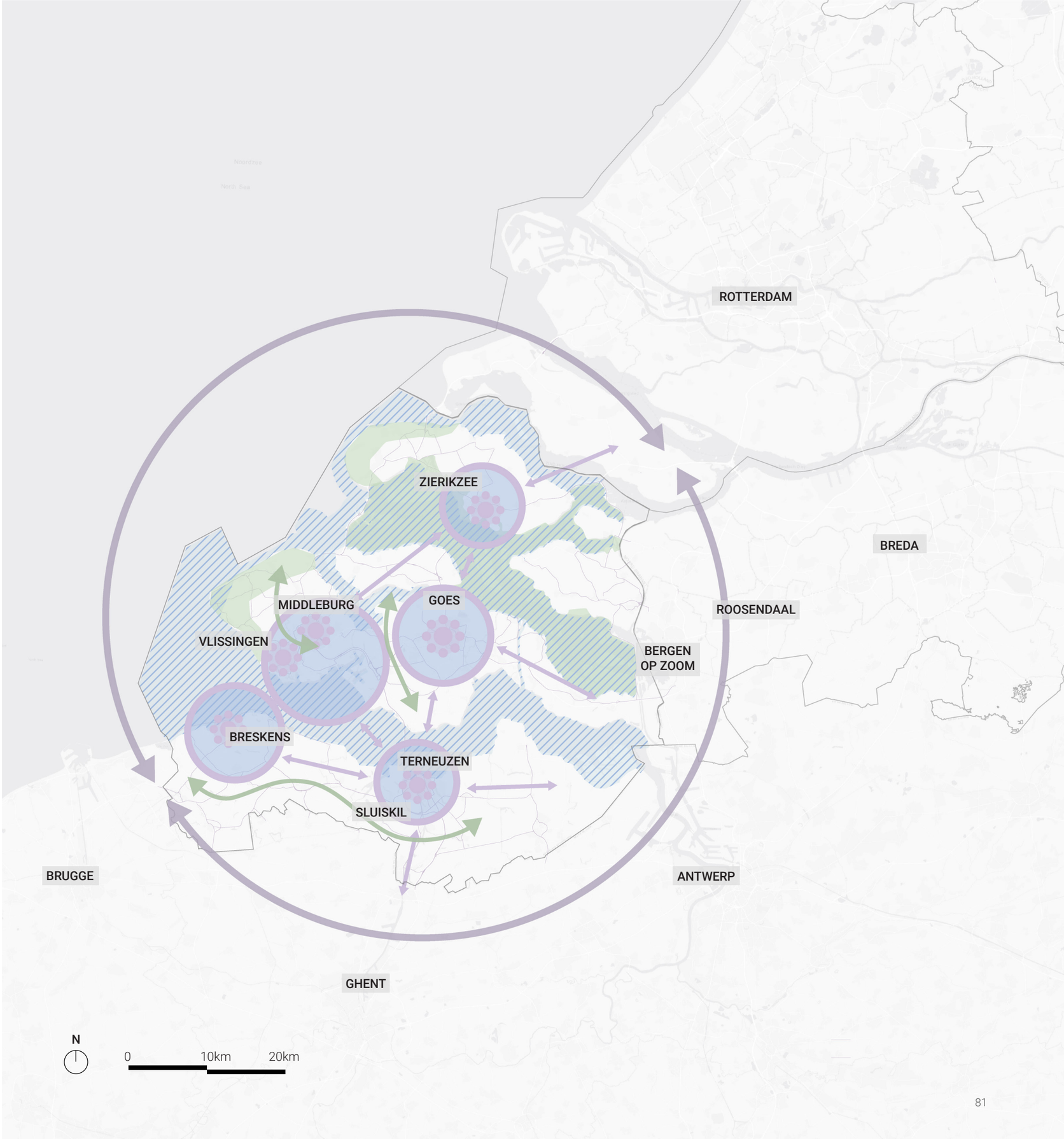
LEGENDS

1. No mixed used areas on the coast, they focus on preserving and enhancing nature.
2. No windturbines or solar panel fields on land, they should be placed in water.
3. No building of two new nuclear plants.
4. No connection between Vlissingen and Breskens.
5. No railway line from Borssele to Terneuzen to minimize interference with the delta landscape.
6. The ferry line will be expanded.

Figure 6. 10
Conflict Map

Strategy Map

Most parts of the student's vision are already aligned with existing policies, or do so after small adjustment. This vision can then be translated into actions, which will form the strategy. The main idea for the strategy is shown in the strategy map. The focus lies on these five settlement clusters, each of them with their own specialized innovation and education hub. The settlements will densify and have mixed-use transition zones. These clusters will be well-connected with each other to improve accessibility. The natural landscape of Zeeland well be preserved and enhanced, with the water bodies playing a big role in the renewable energy production and transportation. Lastly, to tie it all together, a new decentralized governance system is introduced.



LEGENDS

- Transition zones and 15 min city
- Research and development core
- Strengthening cultural landscape
- Water used for renewable energy production
- Mobility connections
- Ecology connections
- Innovation governance

Figure 6. 11
Strategy Map

Strategic Question

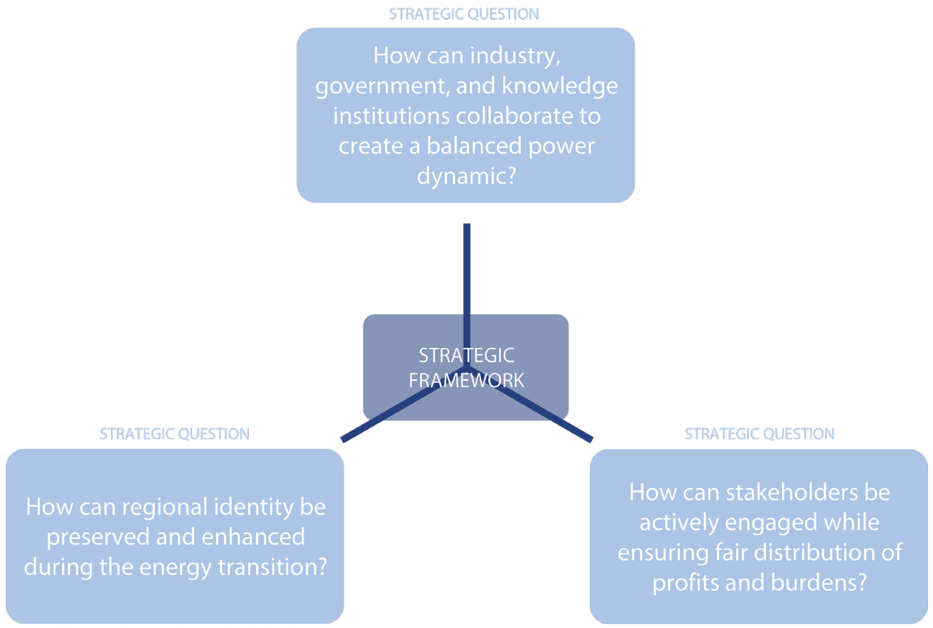


Figure 6. 12
Strategic Question

The policy and stakeholder analysis revealed several key issues that must be addressed to realize the vision. While the drivers of change need to be supported or guided, the blockers must be convinced and motivated to take part. To engage all stakeholders, both the benefits and burdens of the transition must be distributed fairly. Responsibilities, as well as capacities and resources, should be shared equitably.

Currently, the chemical industries require support in financing their sustainability goals. However, their dominant position should be balanced by giving more governance influence to educational institutions and students.

This connects to the broader challenge of stakeholder engagement in the energy transition and the development of a shared strategy. The transition must become a win-win scenario for all involved. The student vision should also speak to farmers and local businesses, ensuring mutual benefit and cooperation. Strong collaboration among key stakeholders can be achieved through democratic participation.

Lastly, preserving and strengthening the regional identity (ecological, cultural, and industrial) is crucial. Empowering stakeholders connected to these aspects will help foster engagement within specific communities.

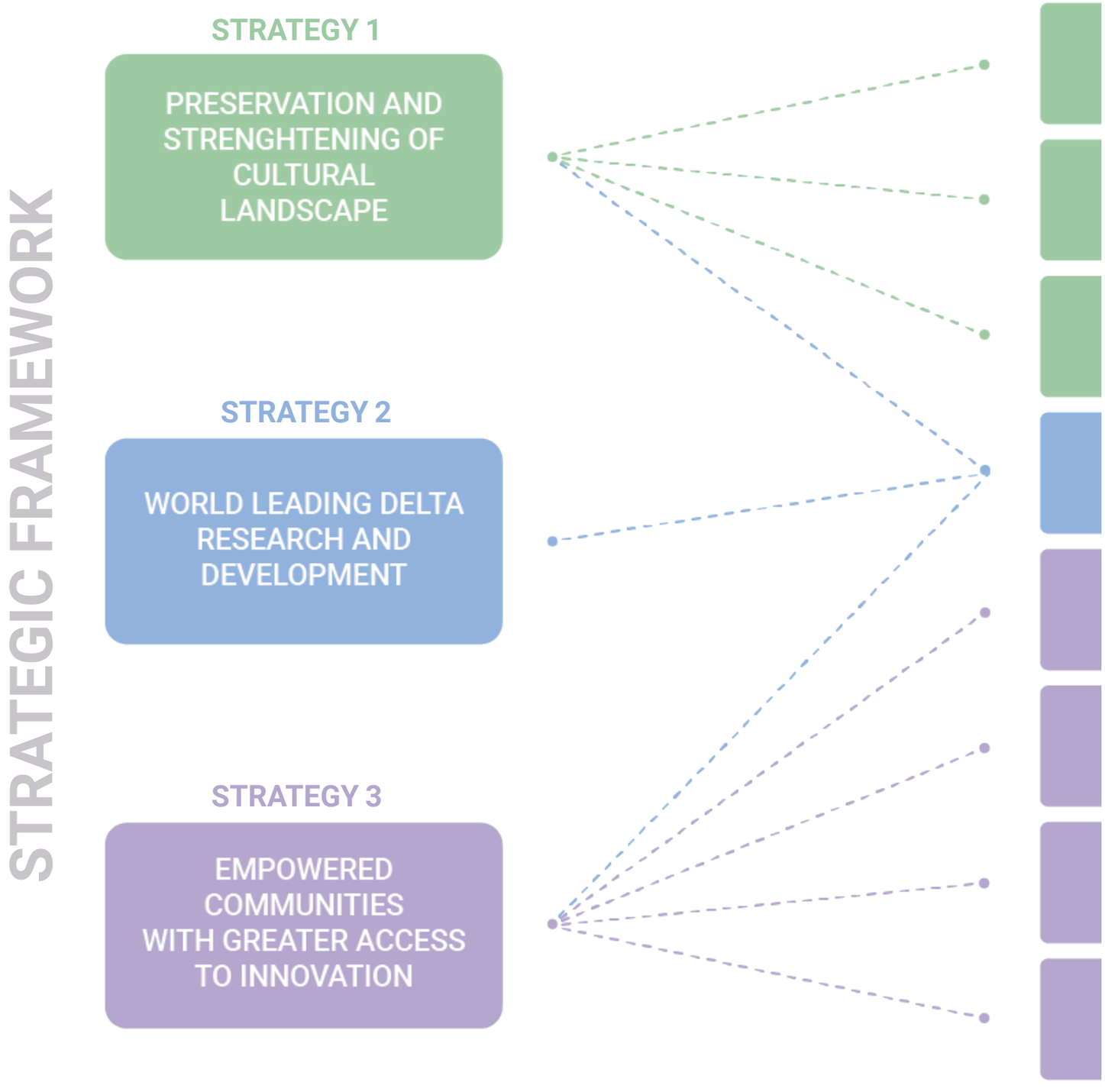
Strategic Framework

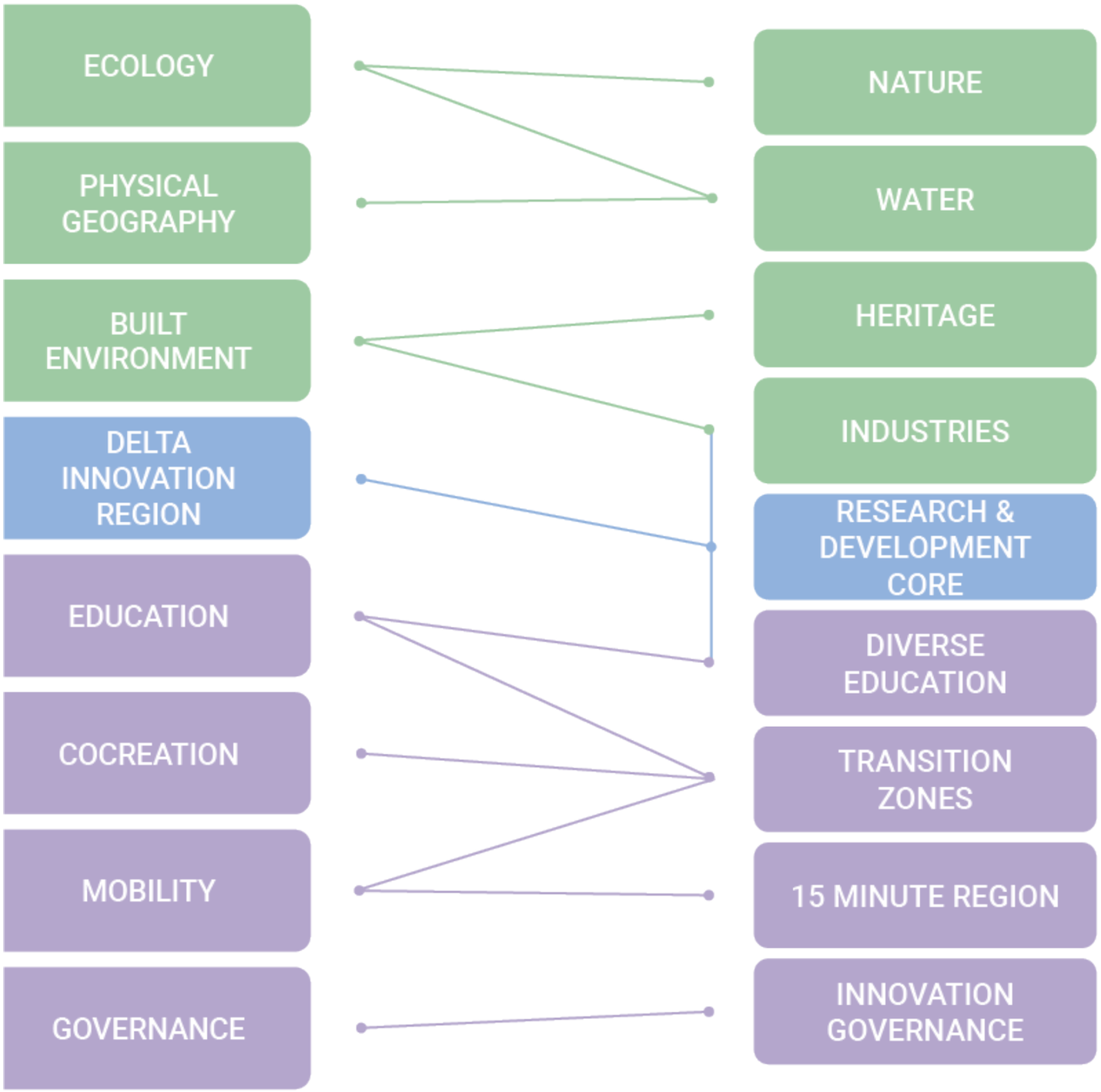
The strategic questions lead to the strategic framework and its key themes. The three main themes act as guiding principles for the key actions that aim to achieve the overall strategy, and ultimately, the student vision. These three strategies can be interpreted as goals that respond to the strategic questions. They are supported by a layer of methods that outline different approaches.

The preservation and strengthening of the cultural landscape focuses on protecting and enhancing regional identity. This includes aspects such as ecology, physical geography, and the built environment. By engaging and empowering related stakeholders, the aim is to maintain this identity throughout the sustainability transition. The focus lies on the current landscape and its heritage, and how to ensure their continuation into the future.

The delta research and development strategy sets the ambition to become a uniquely innovative region, not only within the Netherlands but also on a global scale. It proposes a long-term plan in which various stakeholders can contribute and benefit. This strategy promotes an ambitious vision that appeals to current stakeholders as well as future ones, including those outside the region. Although it focuses on growth and new development, it is rooted in the strengths and opportunities of the existing cultural landscape.

The greater access to innovation strategy is intended to ensure that the innovation process is inclusive, balancing both bottom-up and top-down approaches. It provides communities with the opportunity to guide and participate in the sustainability transition of the delta region. This strategy guarantees a just and equitable path toward becoming a thriving innovation region.





The key themes of the strategic framework are divided into subgroups that shape the approach and methods of the strategy. These subgroups share a common purpose or function but are defined by the specific set of actions that follow.

The preservation of the current cultural landscape focuses on strengthening local flora and fauna, natural water systems, urban and cultural heritage, and essential industries in the province of Zeeland. These four areas are currently facing negative trends such as biodiversity loss, gentrification, and economic decline. Key actions will aim to reverse these trends and transform them into sustainable, positive developments.

The delta innovation region will develop research and development hubs that work in close collaboration with local industries and educational institutions. Innovation will be redefined in Zeeland through new forms of cooperation and policy-making that actively drive the sustainability transition and respond to future delta challenges.

To ensure that innovation is accessible, the strategy emphasizes education, co-creation, mobility, and governance. These methods are intended to lower the threshold for community involvement in the development of knowledge and research. Current and future students will benefit from more diverse educational opportunities, which will focus on region-specific qualities, potentials, and urgencies.

To bridge the gap between communities and powerful industries, transition zones will be implemented. The concept of 15-minute regions addresses the mobility aspect of accessibility. Additionally, a new governance system will be introduced to maximize participation and collaboration. Empowering student and educational communities remains a key principle of this governance model.

NUCLEAR ENERGY

Current government policy includes plans to expand the existing nuclear power plant in Borssele, and the student vision aligns with these plans. However, the strategy does not prioritize investment in nuclear energy as a means to achieve its main goals. While the vision chapter still lists arguments against nuclear expansion, the most pressing concerns are economic.

Industrial companies in Zeeland are currently struggling with high energy prices, limiting their ability to invest in the sustainability transition. This weakens their long-term position in the region and increases the risk of permanent departure. As a result, allocating funds to a nuclear project, likely to take around 20 years to complete, is not considered a strategic choice.

Moreover, there are currently no construction partners willing to take on the project, and the necessary expertise is lacking in the Netherlands (Pak, 2023). Instead, the reserved budget of fourteen billion euros will be redirected toward renewable energy sources. Although these alternatives require more space, they are significantly cheaper and faster to build and connect. This approach gives industries a better chance to remain in the region, which is essential to preserving the cultural landscape.

Key Actions

Based on the strategy framework and its three guiding themes: Preservation of the Cultural Landscape, Delta Innovation Region, and Greater Access to Innovation, a series of concrete actions have been developed. These actions represent the operational dimension of the strategic vision, offering a translation of the broader ambitions into actual concrete actions. Together, they are designed to bridge the gap between the vision and the strategy.

To make these actions accessible and adaptable across both scales and levels of governance, each has been categorized into a clearly defined action module. Each action module contains of four core leaders, educators, students, citizens etc. to understand how the strategy translates into their sectors.

These modules are not only tools for implementations, but also serve as instruments for dialogue, negotiation and alignment among the various stakeholders involved. They allow policymakers, industry leaders, educators, students, citizens etc. to understand how the strategy translates into their sectors.

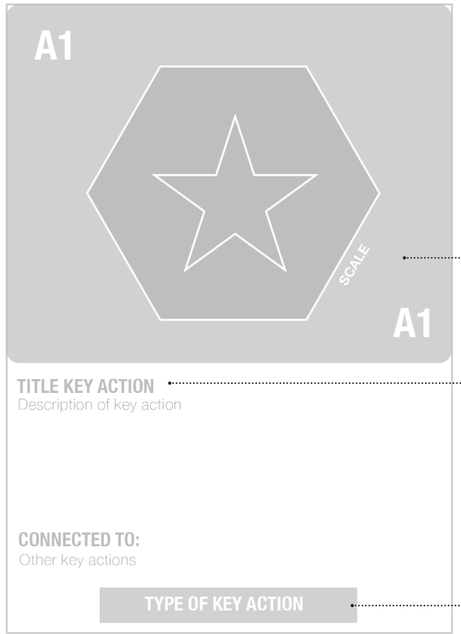
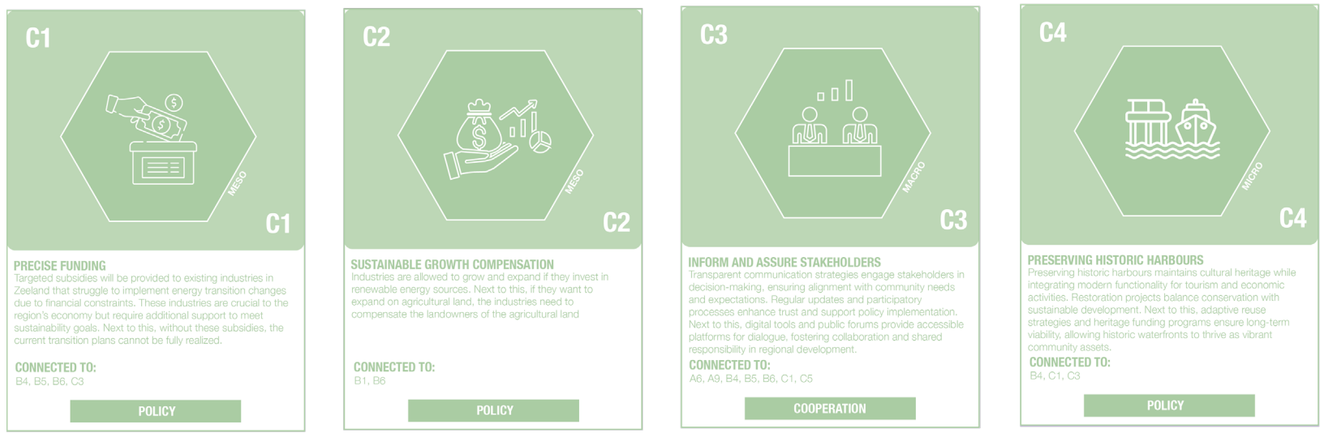


Figure 6. 13
Key Action Module



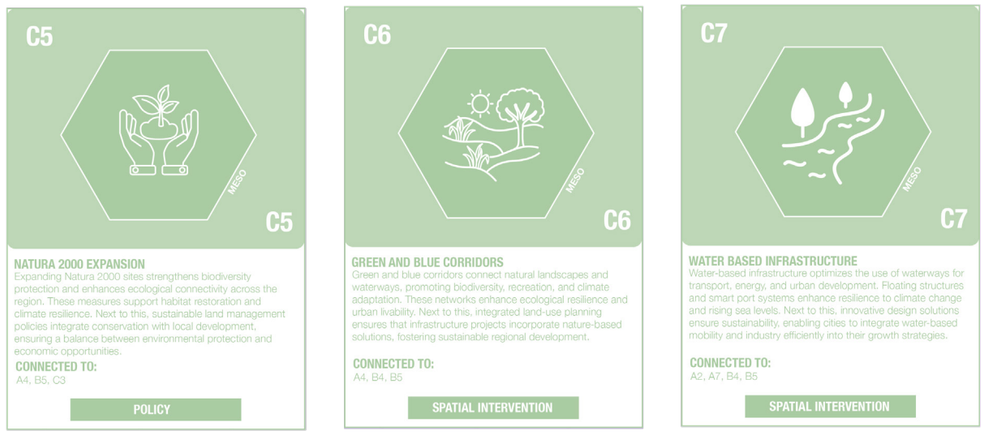


Figure 6. 14
Strategy 1: Preservation of the Cultural Landscape Key Actions

Figure 6. 15
Strategy 2: Delta Innovation Region Key Actions

Figure 6. 16
Strategy 3: Greater Access to Innovation Key Actions

Governance System

Zeeland 2100

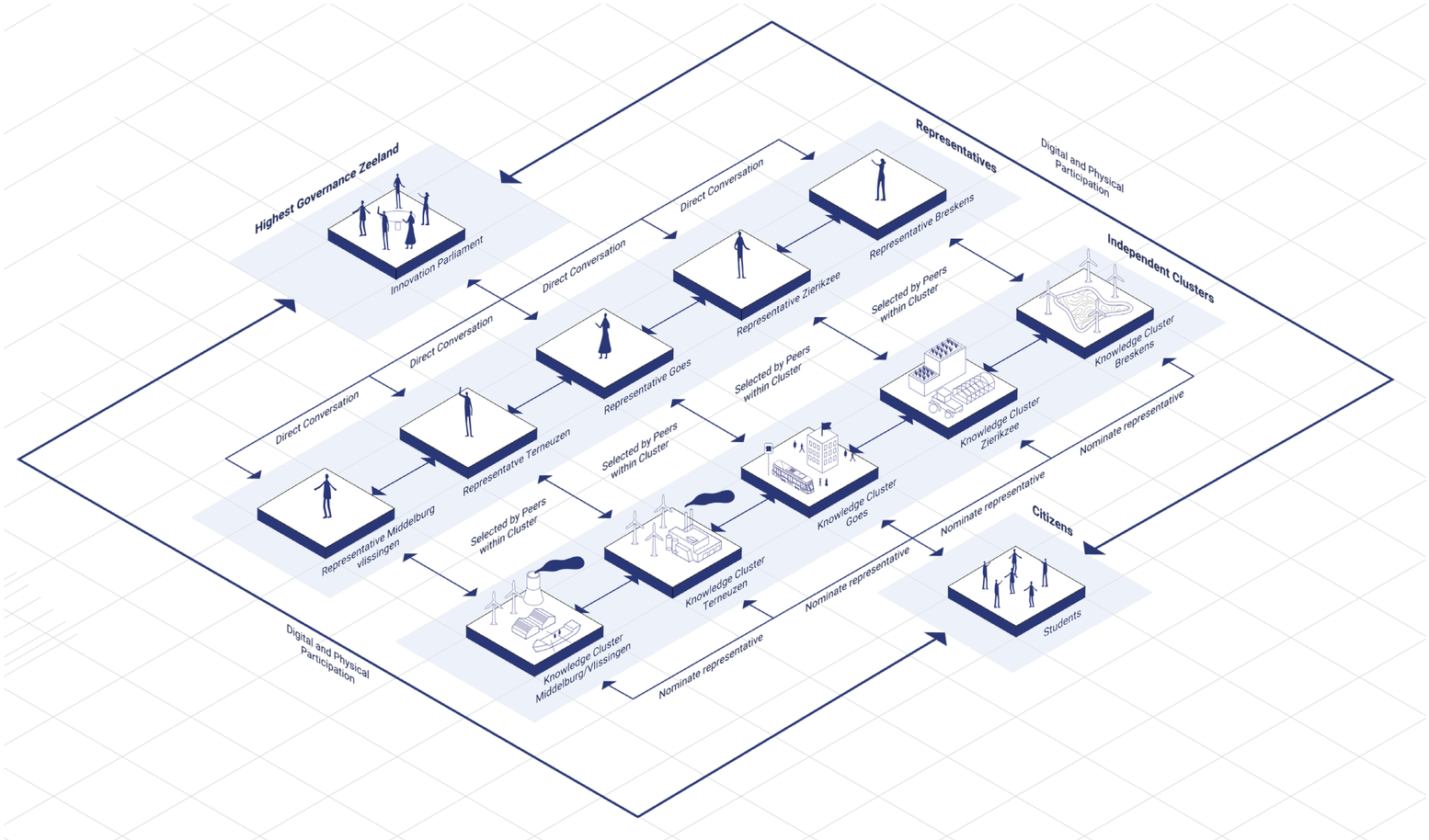


Figure 6. 17
Vision Governance Scheme

The proposed governance system for Zeeland in 2100 presents a transformation from traditional top-down provincial administration toward a decentralized, sector-based, and participatory model. Central to this vision is the Innovation Parliament Zeeland (IPZ), which replaces the current Provinciale Staten and Gedeputeerde Staten. The IPZ will operate on principles of expertise-based representation, sectoral decentralization and cocreation.

The IPZ forms the legislative and executive board of the provincial governance model of Zeeland. Members of the parliament are not associated with political parties but are representatives that are elected by experts from diverse sectors within a knowledge cluster. Their legitimacy is based on peer recognition and professional expertise rather than popularity or appeal. Citizens do not directly vote for these representatives but participate in the nomination process through community centers and digital platforms that contribute to the democratic legitimacy of the region. The IPZ is responsible for both policy formulation and implementation and make sure that decisions are translated into action.

Zeeland will be divided into five independent regional knowledge clusters that each focus on a societal and spatial domain (see appendix 4 for detailed information on each knowledge cluster). These knowledge clusters are: Middelburg/Vlissingen, Goes, Terneuzen, Zierikzee and Breskens. These clusters operate as both research hubs and governance units. Each cluster is governed by a board of directors and represents its cluster in the IPZ through a chosen representative. These representatives bring cluster-specific insights into parliamentary discussions and ensure that policy reflects bottom-up imput. Within each cluster different sectors are represented equally with knowledge institutions and municipalities that are part of that area. Ensuring that not all the power directly goes towards the industries.

Citizens can nominate representatives, contribute to policy proposals and vote on regional priorities. Citizens maintain direct communication with the knowledge clusters, providing feedback, submit proposals and even monitor developments through community centers. This will create a dual interaction and ensures a continiouys dialogue between governance structures and civil society.

In this future governance model, the province no longer acts as a centralized governing body but instead becomes a facilitator and connector. It will support collaboration across knowledge clusters, ensuring knowledge circulation and aligning with national and European frameworks to ensure a higher rate in the innovation index. The national government will receive signals from diverse representatives in the Innovation Parliament Zeeland (IPZ). This governance structure acknowledges that spatial challenges in delta regions like Zeeland, can actually use their spatial qualities that shape the identity of that area, require integrated and locally based solutions that needs their own cluster in terms of knowledge and governance.

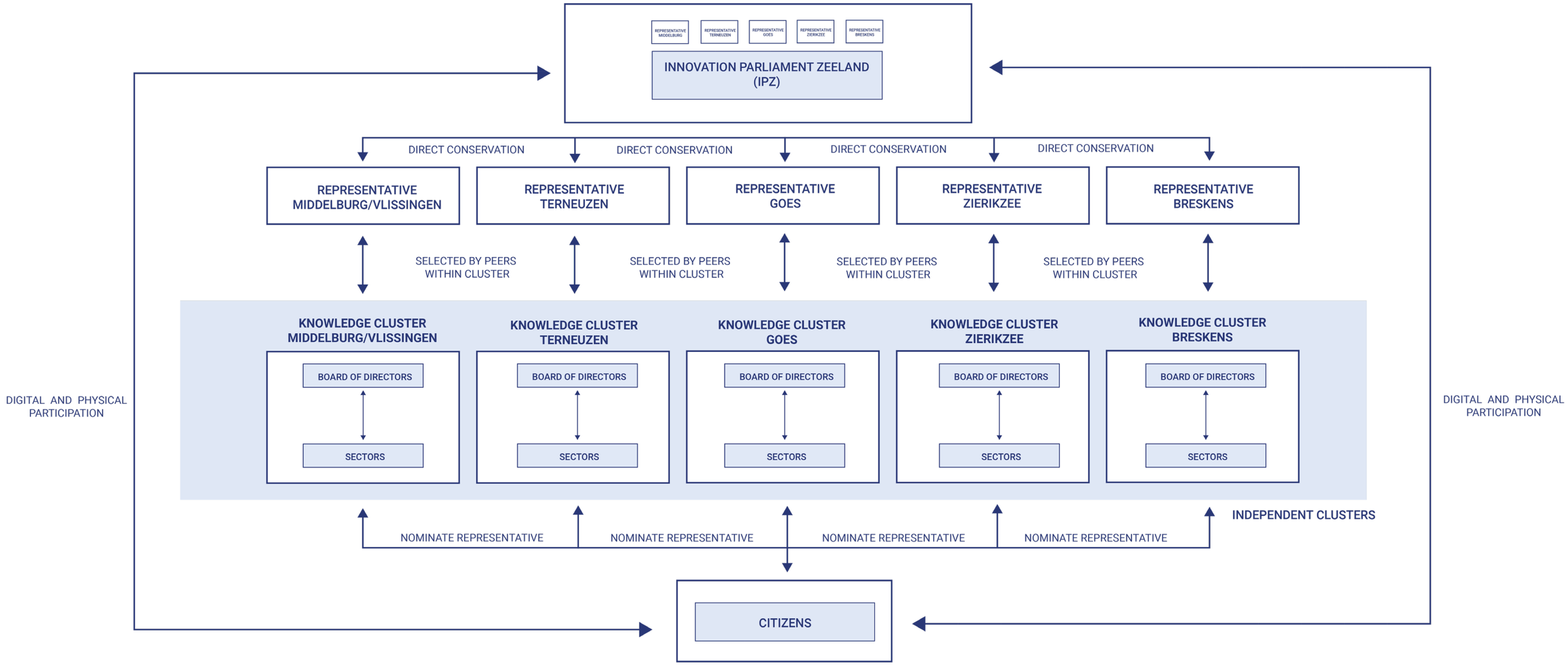
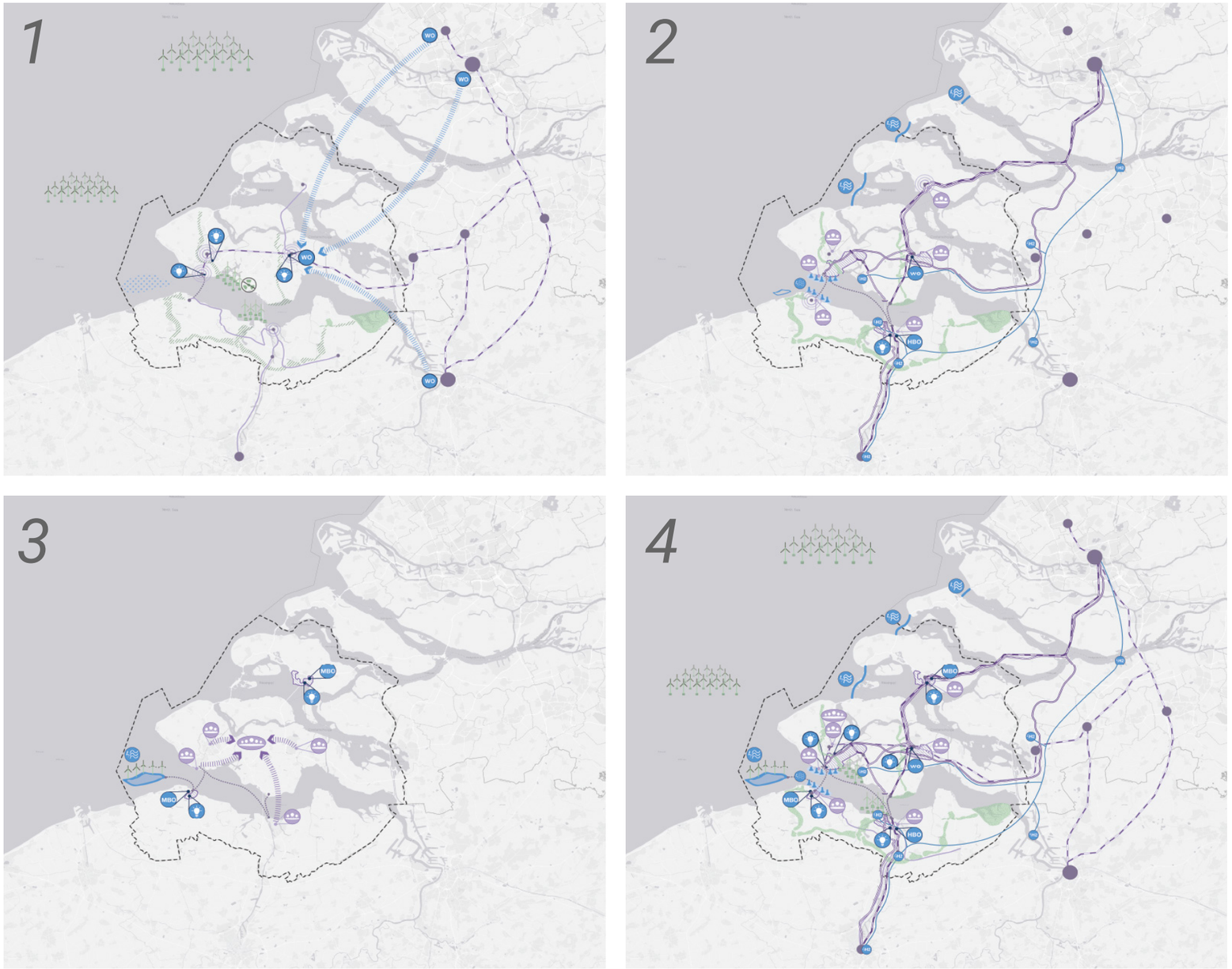


Figure 6. 18
Vision Governance Diagram

Phasing



The phasing of the strategy has a clear methodology, experimenting and expanding. This is to reach the goal of a new innovation parliament and new supportive systems. The central cities of Middelburg, Vlissingen and Goes are the places where new projects and actions are being initiated to test their functionality and to include participatory interaction. With this information the strategy then expands to the cities of Terneuzen, Zierikzee and Breskens. In these towns the development will be more focused and specialised.

The resilience of the strategy lies in the actions which are key to the three strategy goals. The pilot projects and cooperation tactics are therefore essential, as well as the strengthening of certain systems like the hydrogen network. The systems and network will make the strategy feasible, but the cooperation and participation of the stakeholders is crucial to make the strategy achievable.

LEGENDS

- Tidal energy
- Innovation campus
- Educational institution
- Green hydrogen
- Research area
- Educational cooperation
- Knowledge cluster
- Provincial innovation boar
- Densification
- Transition zone
- Valuable nature
- Natura 2000

Figure 6. 19
Phasing Diagram

Timeline

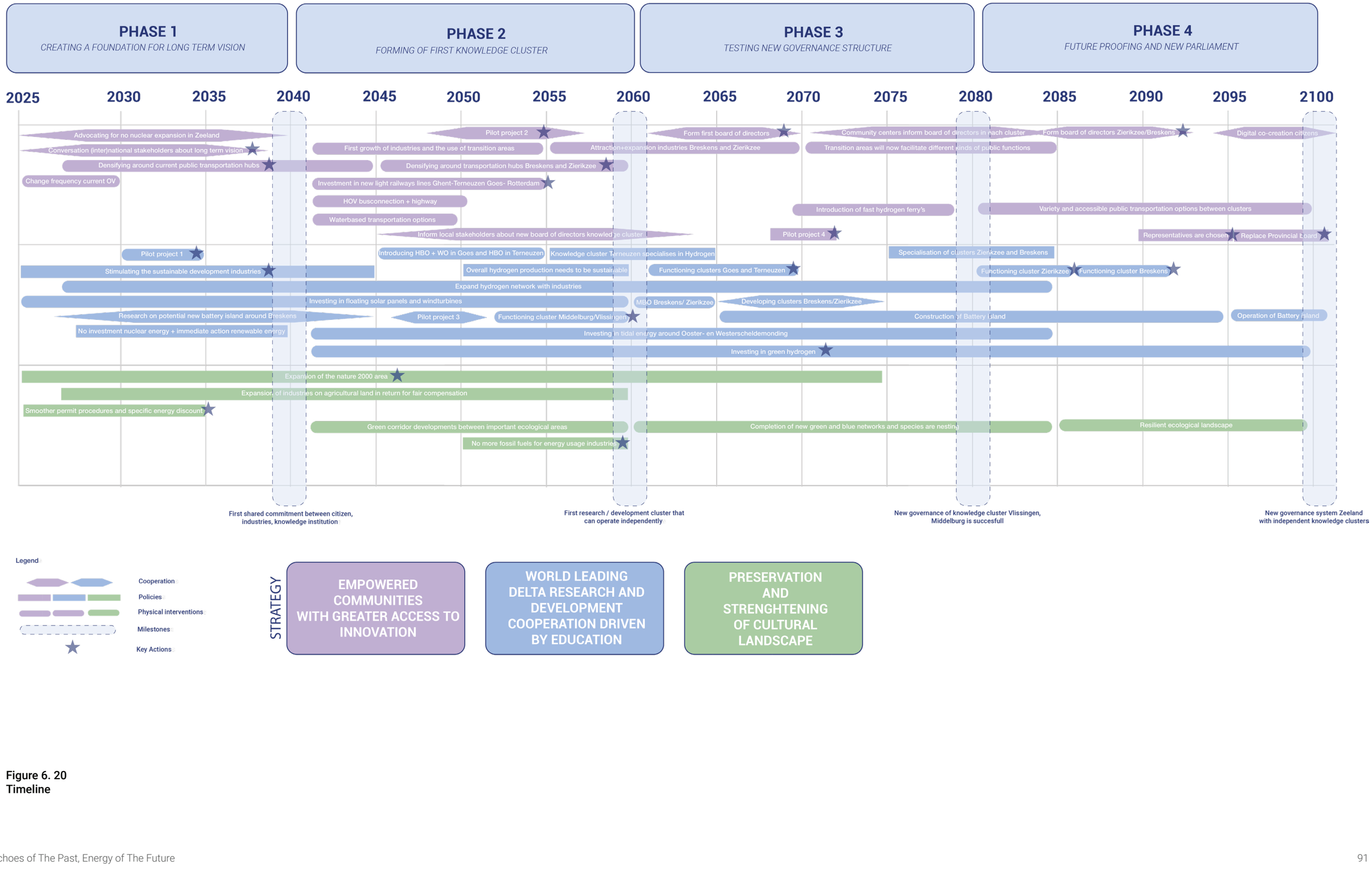


Figure 6. 20
Timeline

Introduction to Key Sites

To highlight the development of key actions, three case studies are presented. Each site has its own specific strategic focus and timeline. They have been chosen for their differences, showcasing the diversity and adaptability of the overall strategy.

Vlissingen–Middelburg, the largest urban centre in the province, serves as the starting point for interventions. With existing educational institutions, industrial businesses, and diverse energy landscapes, the new development focuses on strengthening the connections between these elements.

Goes is set to become the province's new transportation hub, as well as the location of Zeeland's first university. This site emphasizes the integration of mobility and innovation.

Zierikzee will develop as a knowledge cluster shaped by its unique spatial qualities. Its strong ties to ecology and agriculture create opportunities for innovation in sustainable nature and delta farming. Here, the relationship between education, industry, and landscape is central.

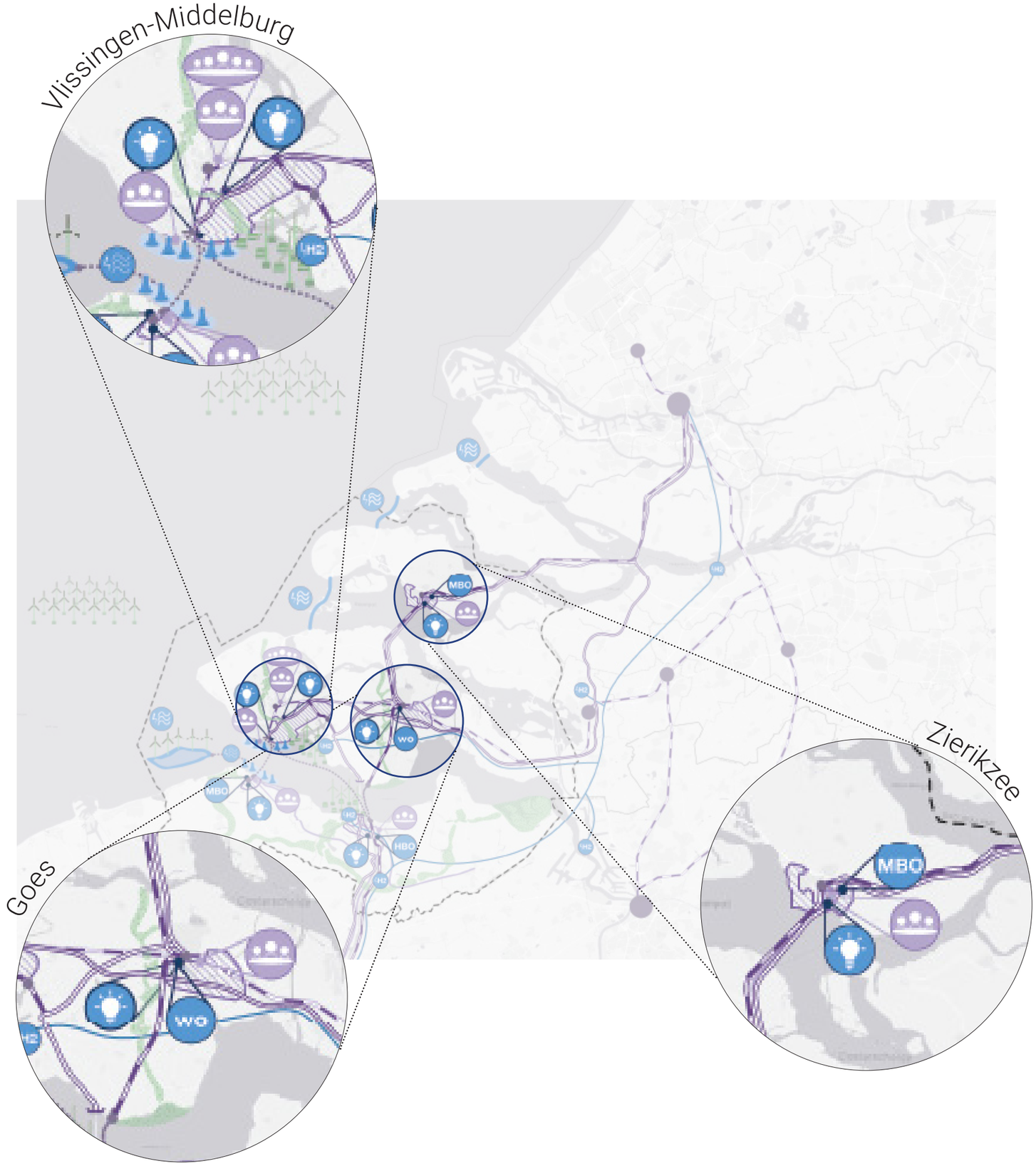
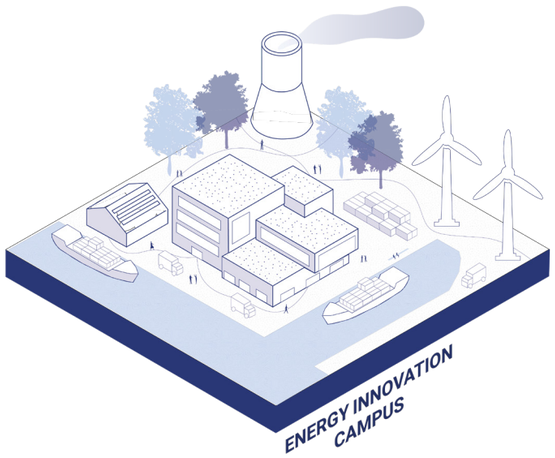


Figure 6. 21
Introduction to Key Sites

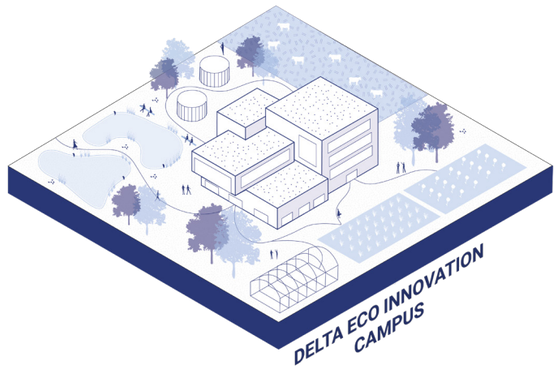
Transition Areas



ENERGY INOVATION CAMPUS

The energy innovation campus represents a strategic hub for renewable energy research and system innovation that supports Zeeland's ambitious climate and energy goals. It facilitates direct collaboration between research institutions, industry partners and government bodies to create a high-density environment of technological exchange and experimentation. It will consist of two HBO schools and two MBO schools and a range of research centres.

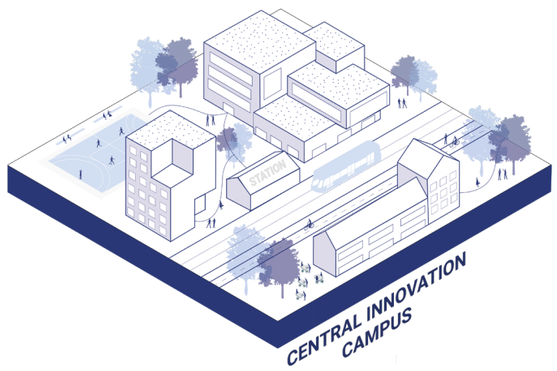
The Energy Innovation Campus will focus on all types of renewable energy sources, nuclear power, but also on the port activities. It will integrate shared infrastructure such as energy labs, pilot plants and will implement technologies like hydrogen, offshore wind, storage systems and carbon capture.



DELTA ECO CAMPUS

The Delta Eco Campus is a campus that will link scientific research with ecological responsibility, sustainable agriculture and climate adaptation. Zeeland faces environmental pressures due to sea-level rise, biodiversity loss and this campus will function as the region's innovation space for ecology and agriculture.

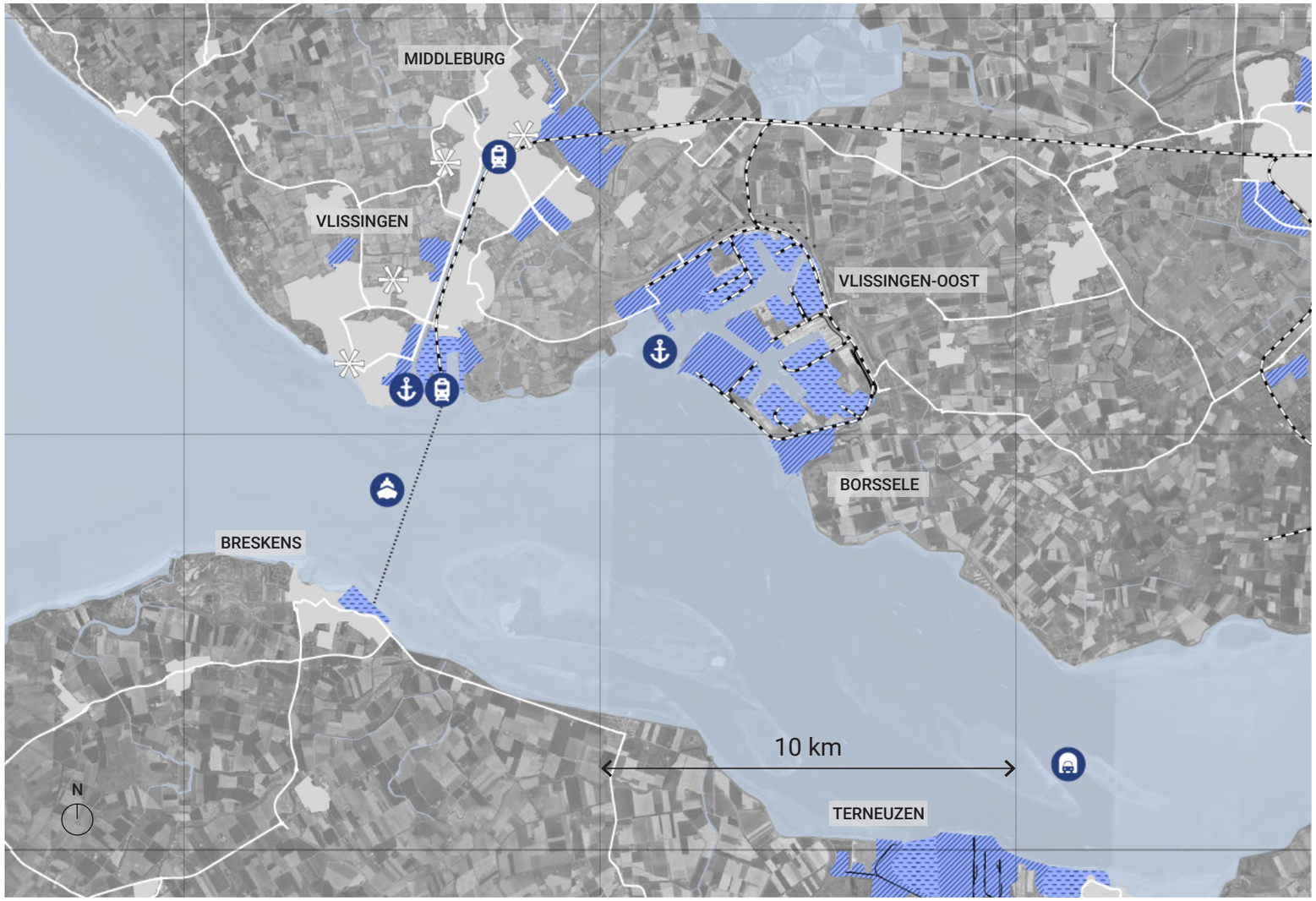
It will be located near important ecological corridors and agricultural zones and will host an MBO school that will engage in landscape-based research that aligns farming innovation with nature-based solutions. Topics of research can include nature-inclusive farming, blue-green infrastructure, wetland restoration and coastal defense systems. The campus seeks to connect ecological health to economic opportunities. It will contribute to a resilient and multifunctional delta landscape.



COLLEGE INNOVATION CAMPUS

The College Innovation Campus is situated in the urban center of Goes and will operate as an educational and logistical hub. Uniquely positioned, this campus will focus on cross-cluster collaboration, which means that it will connect students and researchers to the broader network of knowledge clusters in Zeeland and their specializations. It will have a university (WO), HBO school and MBO school to reinforce collaboration through all levels of education. Through partnerships with local colleges, universities and vocational schools, it will provide students the tools to become skilled workers and innovators for the region.

Vlissingen-Middelburg



LEGENDS

- Water body
- Settlement
- Industry
- Ports
- Energy plant
- Train station
- Port
- Ferry
- Underwater tunnel
- Education institutes
- Road
- Railway
- Ferry route

Figure 6. 22
Existing Map Vlissingen-Middelburg

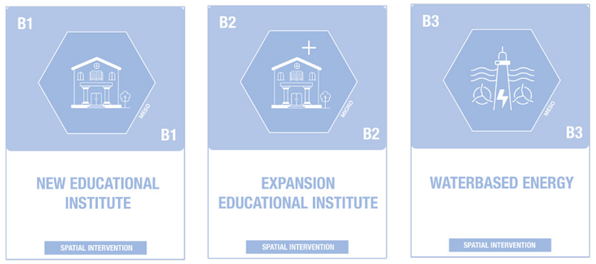
THE PILOT PROJECT

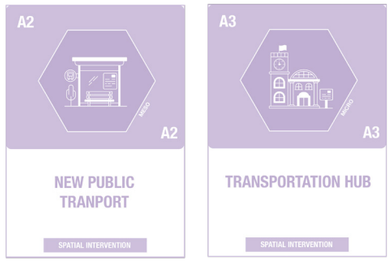
This area is situated in an area dominated by industrial and port activities which are important for the province's economy. It is also strategically accessible from both land and water, offering opportunity for multifunctional area development in the near future. Although current settlements are dispersed, the presence of educational institutions will become the foundation of new synergies which aligns with our vision about integration between education, industry, and energy. We aim to foster collaborations and innovations for future generations while providing a high quality living environment. In addition, as part of its identity, water will play important role to support accessibility, biodiversity, and renewable energy infrastructure.

KEY INTERVENSIONS

- Expanding green spaces and Natura 2000 to enhance ecological value
- Implementing buffer zones around industrial zones
- Strengthening educational institutes by expanding existing institutions and collaboration in establishing energy innovation campus
- Expanding renewable energy landscape by developing floating energy park close to industry to support energy transition
- Preserving and densifying around ports as part of cultural and economy identity
- Developing mixed-used developments to accommodate increasing population in the future
- Developing a new ferry connection to Terneuzeun, a neighboring industrial area

Key Actions





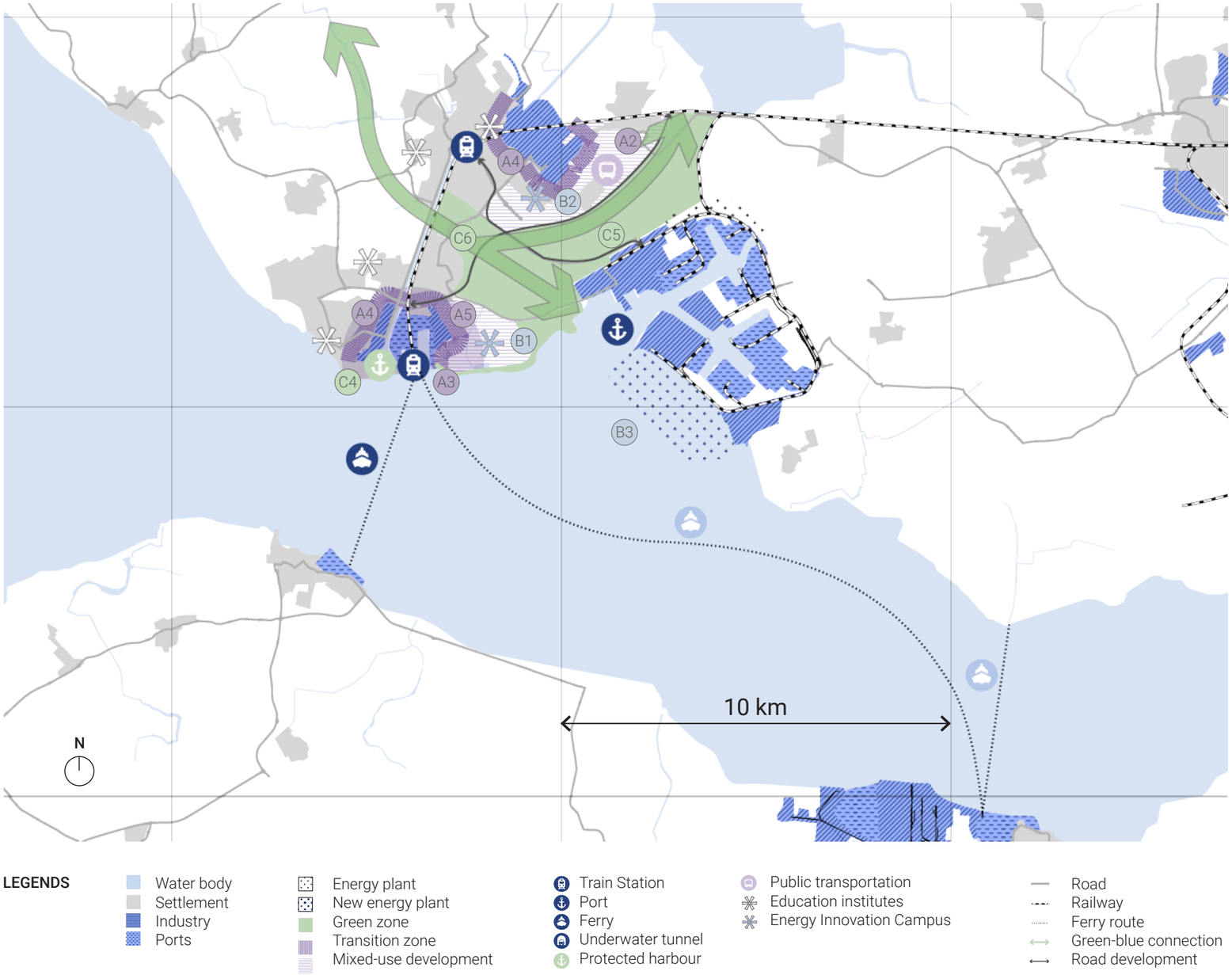
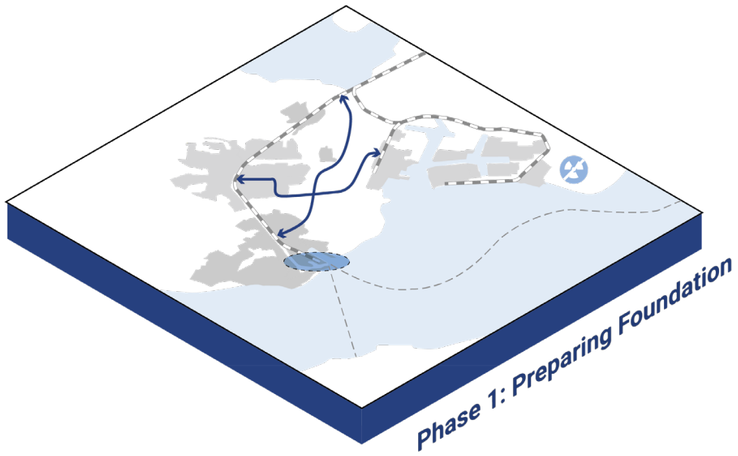
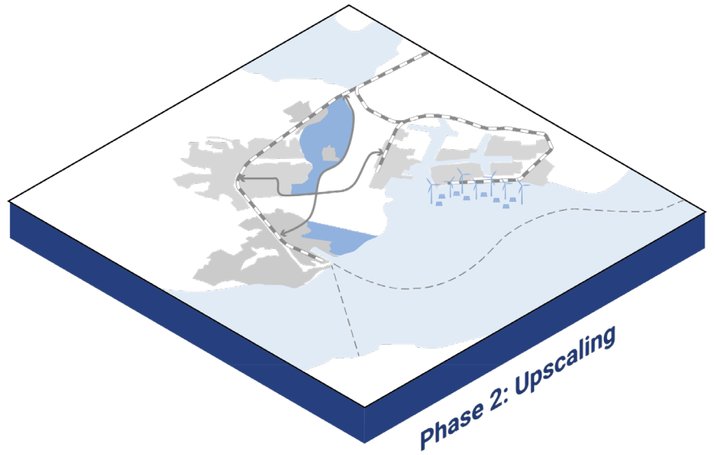


Figure 6. 23
Proposed Map Vlissingen-Middelburg



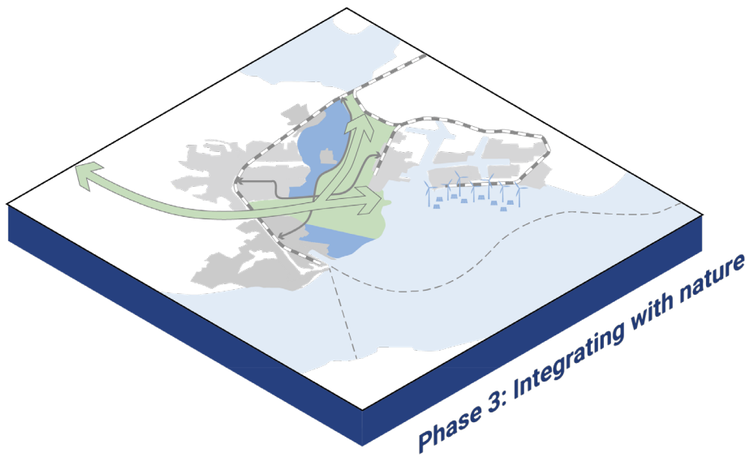
PHASE 1: PREPARING FOUNDATION

In the first phase, preparing essential aspects for transition and synergy is the main focus. This approach includes developing infrastructure to connect industry and settlements, optimizing area around transportation hub for densification, and advocating no further development for nuclear power plant.



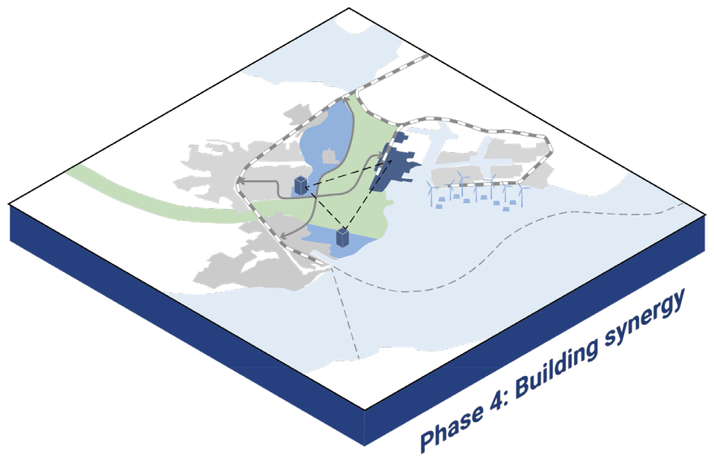
PHASE 2: UPSCALING

After optimizing current use of land, mixed-use expansions are prepared for increasing population. In addition, development of new water-based energy area is started to support the shift.



PHASE 3: INTEGRATING WITH NATURE

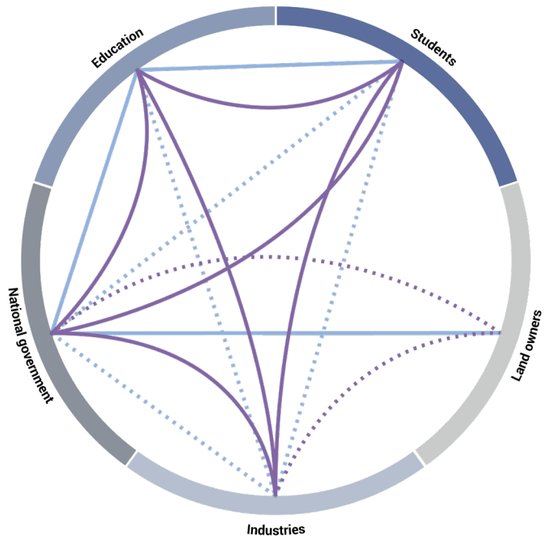
This phase prioritizes expansion green-blue networks and Natura 2000 areas, and integration of nature with urban areas to maintain the province's identity and enhance quality of the living environment.



PHASE 4: BUILDING SYNERGY

In the last phase, educational institutes are expanded based on the previous phases, enabling collaborations and supporting environment for innovations.

Process Diagram



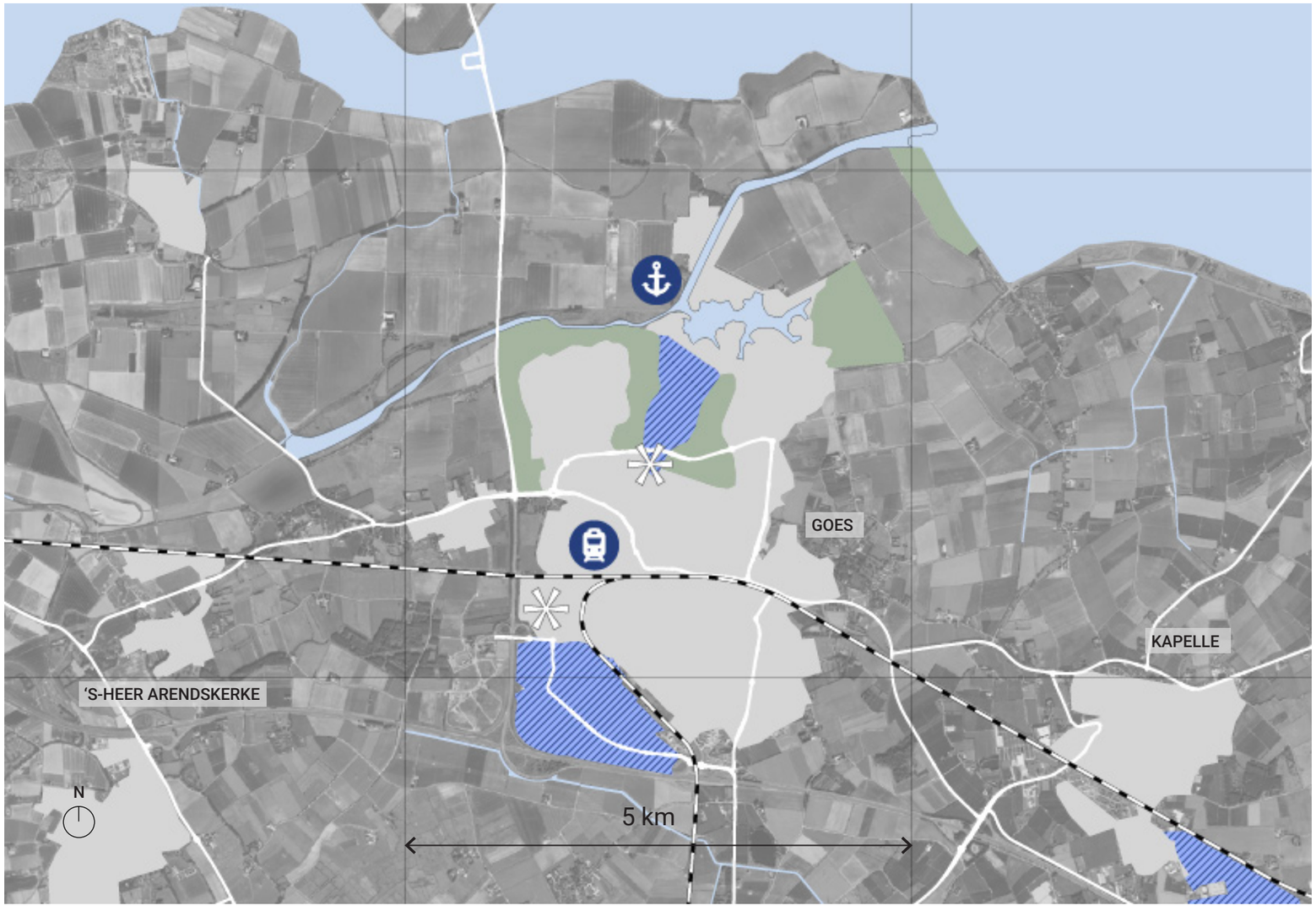
STAKEHOLDER ROLE

The stakeholder relation circle shows the improvement of the connection between the industry and the surrounding actors. Because of the new transition zone and its cooperative functions, the industry is now more integrated with education and students. This eliminates the conflicts between the government and students because the students now have a more direct voice in the local governance. However, new conflicts are at risk. Landowners such as farmers will need to be compensated for their land. This is certainly possible but it is a difficulty as proven in the current CO_2 crisis.

Figure 6. 24
Stakeholder Diagram Vlissingen-Middelburg

Figure 6. 25
Future Collage Vlissingen-Middelburg

Goes



LEGENDS

- Water body
- Settlement
- Industry
- Ports
- Green zone
- Train station
- Port
- Education institutes
- Road
- Railway

Figure 6. 26
Existing Map Goes

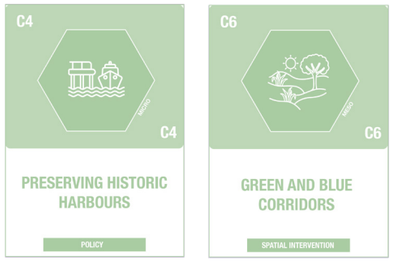
MAIN HUB

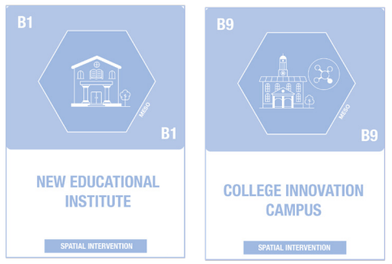
As the main hub in our vision, Goes plays a significant role in driving the transformation in terms of mobility. It is connected by train and water. This strategic location makes Goes a potential node for the dispersed surrounding settlements. The close proximity to water, also highlights the need to take into account ecological integration with future development.

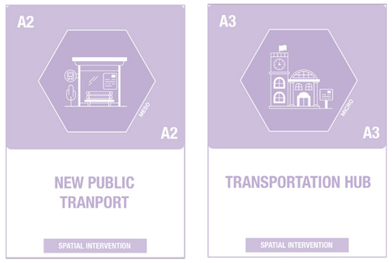
KEY INTERVENTIONS

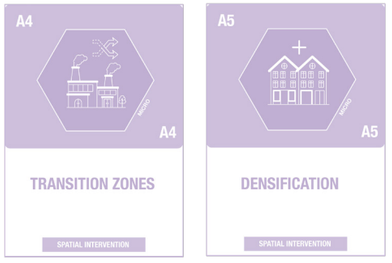
- Developing mixed-use development area between dispersed settlements to encourage compact and connected living.
- Integration with new train corridor connecting with northern part of the Netherlands
- Creating green buffer zones from urban expansion area to protect coastlines
- Implementing transition areas around industrial area for smooth transitions to urban settlements
- Establishing Central Innovation Campus in the transition area to foster connection with industry
- Developing transportation hubs to enhance connectivity around Goes
- Densification around transportation hub to optimize land use
- Preserving the existing port to maintain the province's identity

Key Actions









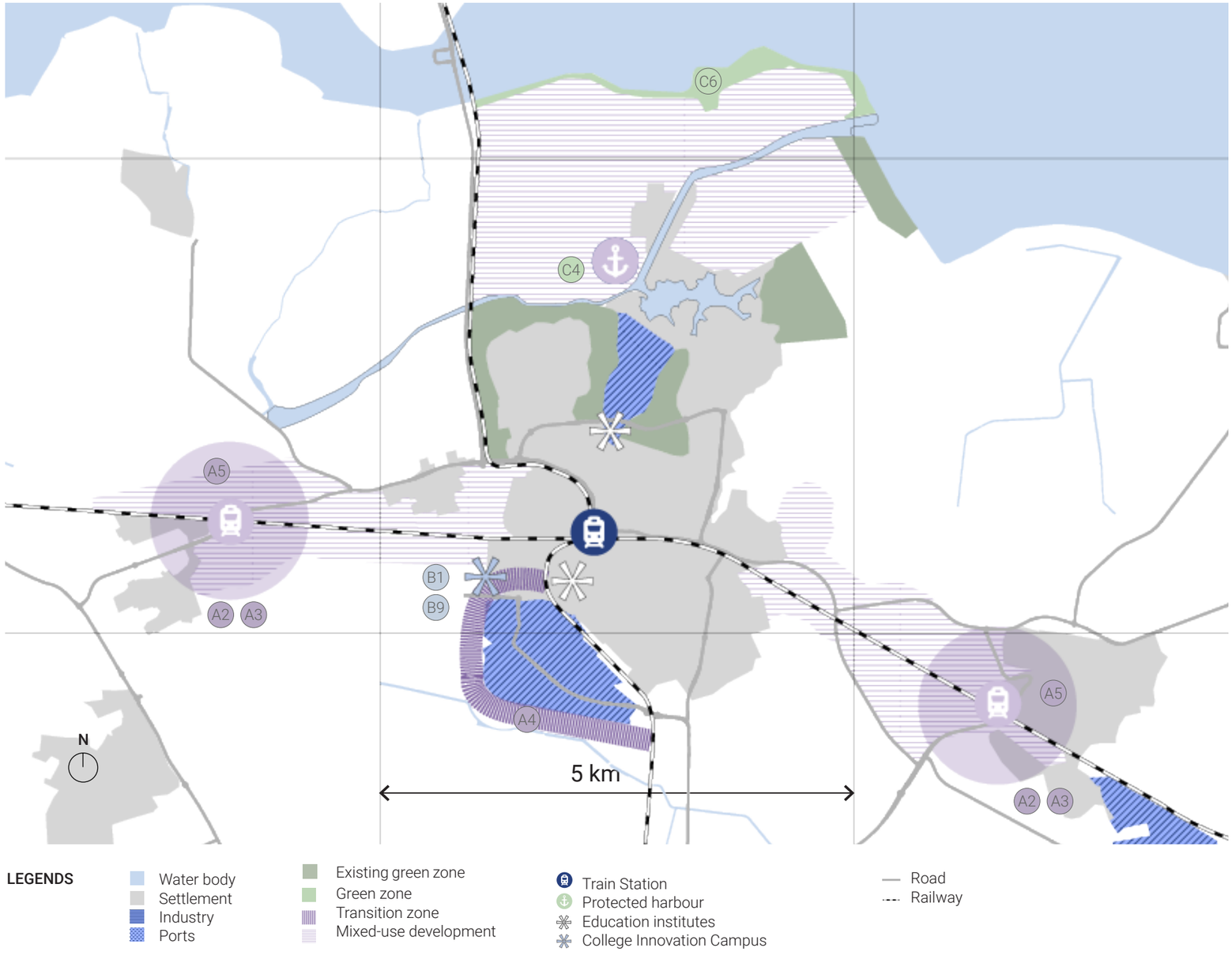


Figure 6. 27
Proposed Map Goes

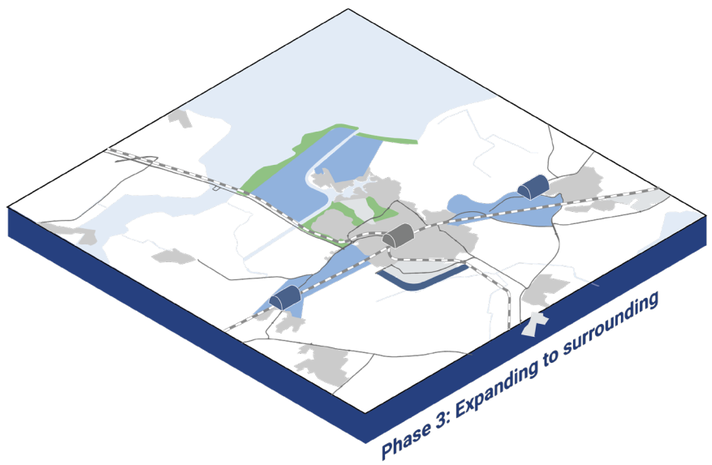
Process Diagram

PHASE 1: SETTING BUFFERS

Green buffers are introduced to safeguard waterfront areas and create a smooth transition to nature, as well as transition areas surrounding industrial area for transition to future settlements.

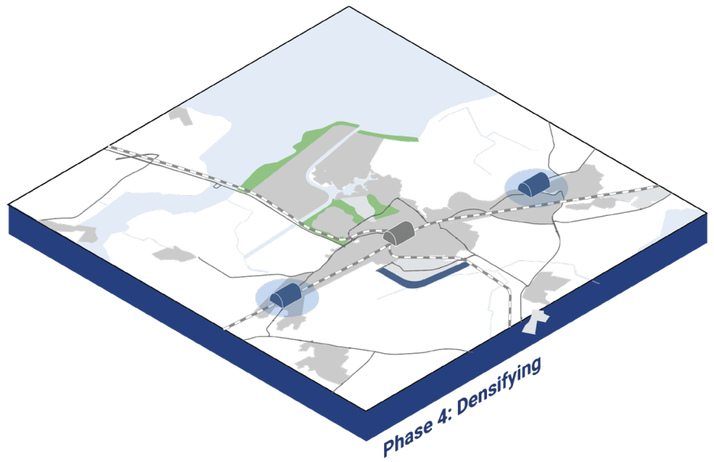
PHASE 2: INTEGRATING WITH NATURE

In this phase, mixed-use development will expand within the buffer. This approach allows gradual expansion and access to nature environment while protecting the natural landscape.



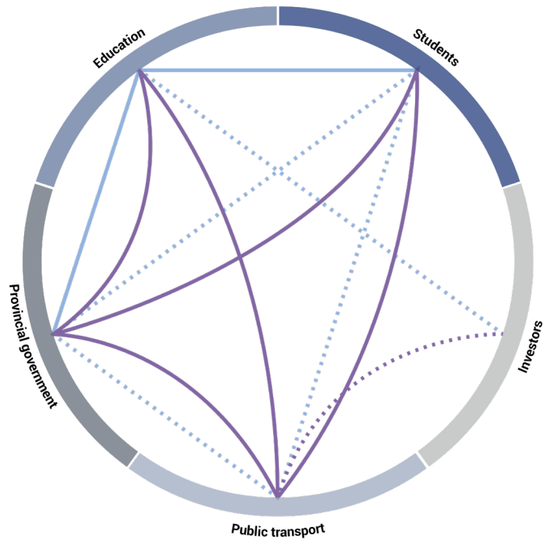
PHASE 3: EXPANDING TO SURROUNDING

As the population number is increasing due to the development in our vision and strategy, more space is needed. The city will expand to the surrounding areas, which will require the development of more transportation hubs.



PHASE 4: DENSIFYING

In the last phase, densification will be centered around transportation hubs to optimize the use of the land.



STAKEHOLDER ROLE

This location is evolving around mobility hubs, fostering new functions and closer integration between public transport and education. In the future, cooperation between these sectors is expected to grow. Current tensions between education institutions, students, and transport providers can be eased, as they ultimately benefit from one another. Students rely heavily on mobility and they are generally willing to pay for it, while improved accessibility and urban densification will help attract the students needed to drive innovation. These elements are interdependent, growth in one area supports the others. However, a potential conflict could emerge if rising land prices deter investors from developing essential public amenities.

Figure 6. 28
Stakeholder Diagram Goes

Figure 6. 29
Future Collage Goes

Zierikzee

Figure 6. 30
Existing Map Zierikzee

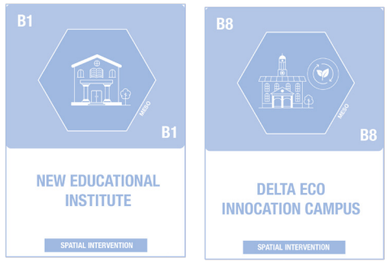
GATE TO ZEELAND

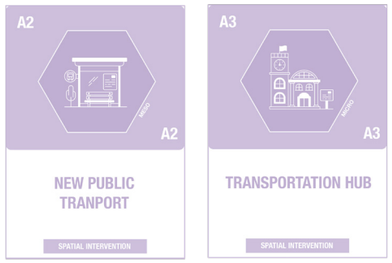
Zierikzee serves as the gate to Zeeland as it is strategically located along main roads. Its unique wet landscape represents Zeeland's identity as delta region. Zierikzee is a small city with most of the land use utilized for agricultural activities with limited industrial activities and settlements. This strategy aims to highlight these unique characters as potentials for becoming the face of Zeeland. In relation with this, Delta Eco Innovation Campus is introduced to bring together education and innovation to maintain ecological resilience.

KEY INTERVENTIONS

- Protecting natural landscape and increasing green spaces
- Developing a train network to enhance connectivity in a regional scale
- Creating access through green connection from the transportation node to nature
- Implementing transition areas around industrial area to ensure soft edges to settlements and nature
- Expanding industrial cluster for future demand
- Expanding land-based energy infrastucture as the surrounding water body holds high value for ecology
- Expanding urban areas to accommodate increasing population while respecting the water landscape
- Establishing Delta Eco innovation Campus as a catalyst for innovations
- Developing a new transportation hub and promoting densification around it

Key Actions





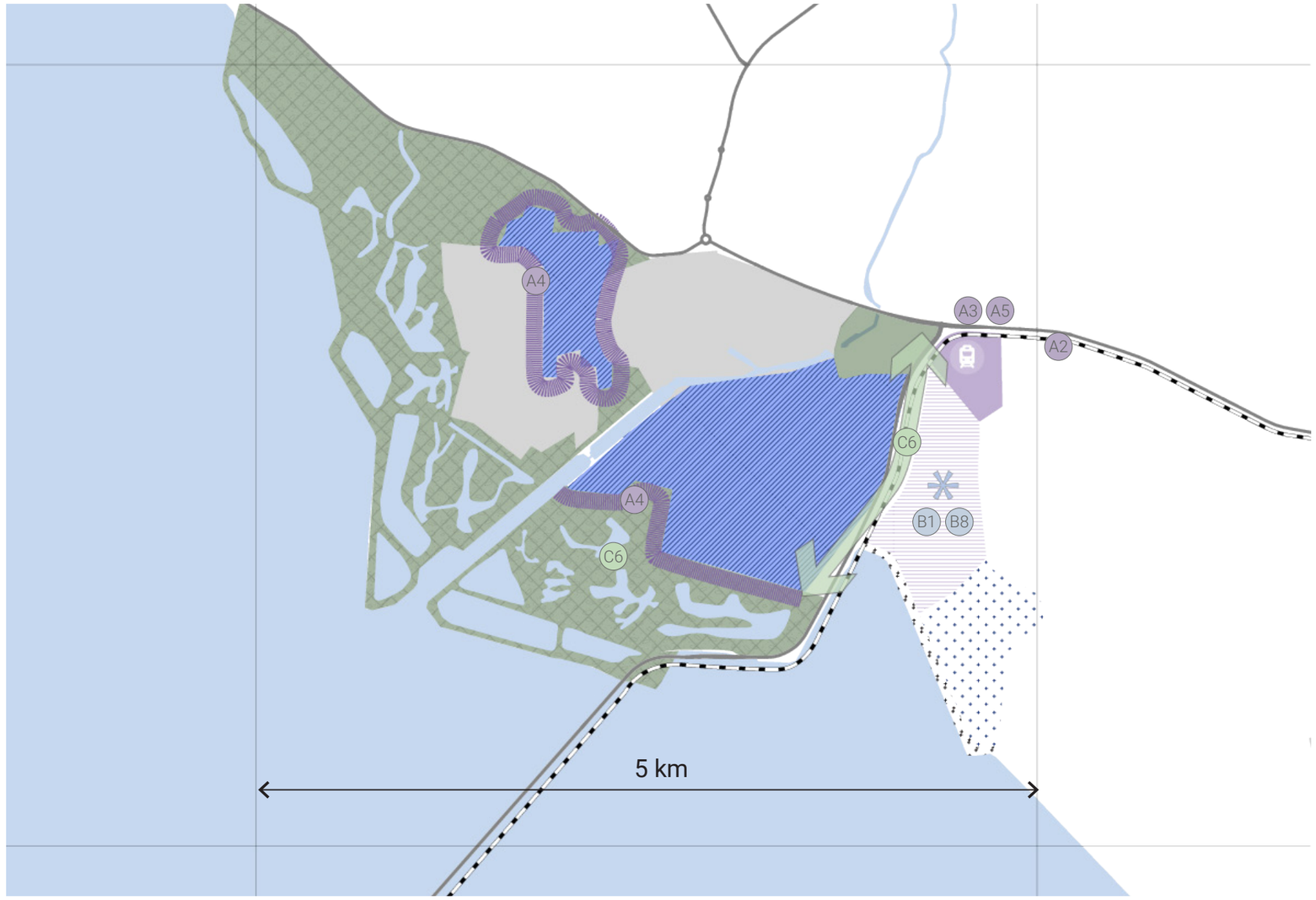
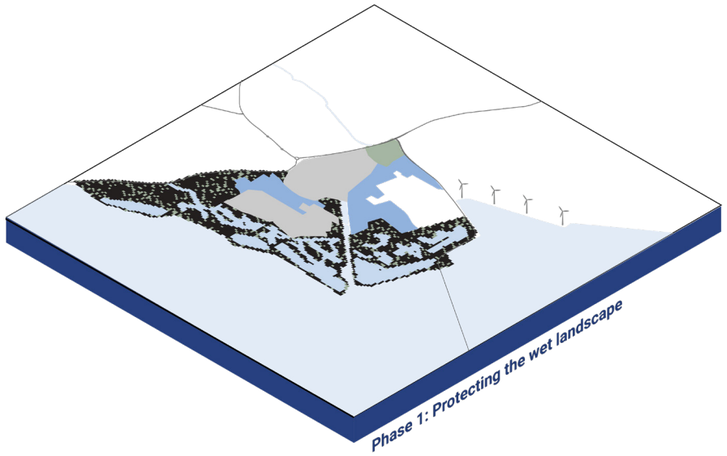
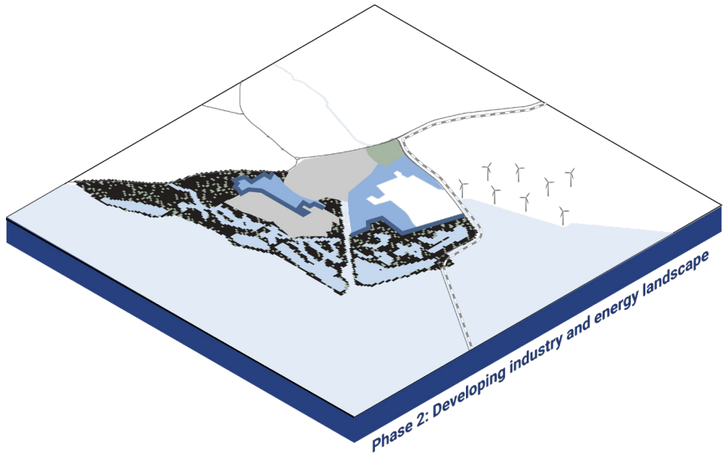


Figure 6. 31
Proposed Map Zierikzee



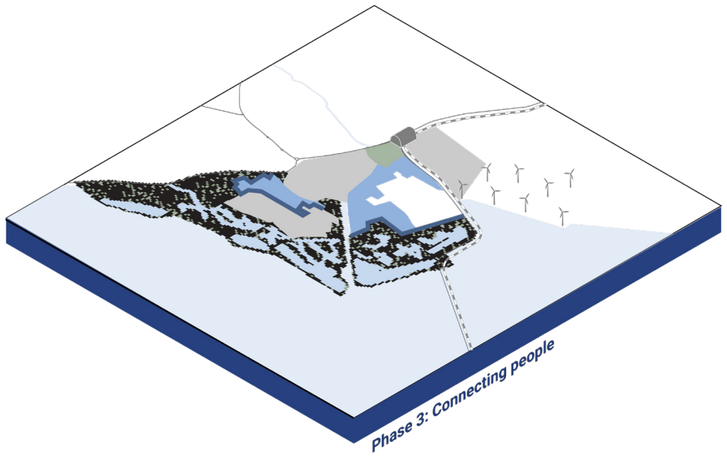
PHASE 1: PROTECTING THE WET LANDSCAPE

Protecting and expanding the wet delta landscape that represents Zierikzee's identity. This approach will set the foundation for future development , emphasizing integration with water.



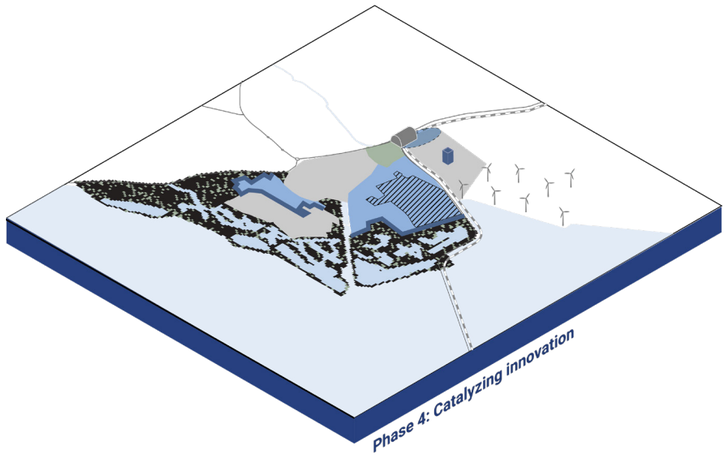
PHASE 2: DEVELOPING INDUSTRY AND ENERGY LANDSCAPE

This phase focuses on establishing transition areas around industry to ensure balance with the netural landscapes. At the same time, the train network is developed and a land-based energy area is expanded as water-based energy production is not viable in this area.



PHASE 3: CONNECTING PEOPLE

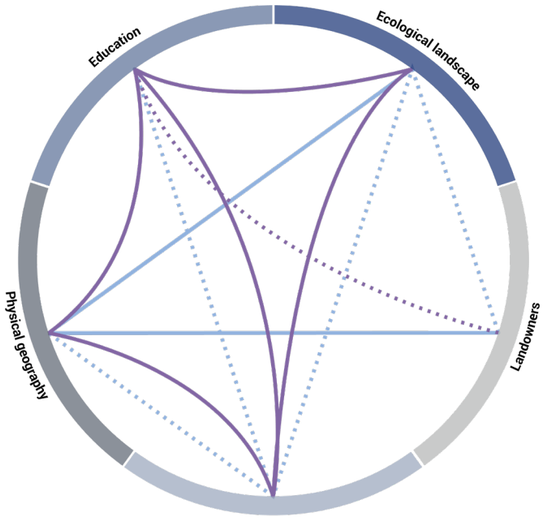
With the development of the train network, the transportation hub is developed, along with a green connection to the delta landscape and the mixed-use area is expanded.



PHASE 4: CATALYZING INNOVATION

Industry is developed within the transitional zone and densification around transportation hub is introduced. In this final stage, Eco Delta Innovation Campus is established to position Zierikzee as the leader in this knowledge cluster.

Process Diagram



STAKEHOLDER ROLE

The innovation campus in Zierikzee will improve the relation between agriculture and the natural elements. Research and development on delta agriculture will help understand how to create a sustainable relationship between those two actors. It will also bring education and farmers closer together, trying to keep this craftmanship in the region. New difficulties amongst landowners and education could come forth when the research area will conflict with the wish to expand and develop.

Figure 6. 32
Stakeholder Diagram Zierikzee

Figure 6. 33
Future Collage Zierikzee

Conclusion

Climate change and the global energy transition present one of the greatest challenges of our time, demanding innovation across all sectors and regions. As countries are reducing emissions and adapting to new energy realities, the need for regional strategies that balance sustainability, equity, and innovation has become urgent. With innovation, meaning that we use the theories, craftmanship, culture and knowledge of the past to shape a sustainable future. While the Netherlands performs well on the European innovation idex, recognized for its leadership in sustainable technologies and systems, Zeeland struggles to match this momentum. Despite its geographic advantages, rich cultural and ecological heritage, and significant role in the national energy transition, the province is falling behind. A key symptom of this is the continued outflow of students.

Students, both vocational and theoretical, are leaving Zeeland in search of greater opportunities elsewhere. This weakens the region's innovation capacity and limits the development of a knowledge-driven economy. At the core of this challenge lies a misalignment between education, industry, renewable energy, and the cultural landscape. Many students do not see a future for themselves in Zeeland. Industry feels distant, education lacks visibility in regional development, and the cultural identity, though strong, does not yet translate into career prospects or inclusive innovation pathways.

To address this, spatial planning must go beyond physical land use and placemaking, it must guide relationships between stakeholders. A central conclusion of this study is that innovation cannot be driven solely by dominant industries or imposed through top-down strategies. Instead, a more balanced and participatory governance model is needed, one where educational institutions and students are co-decision-makers and equally represented. Strengthening the relationship between sectors will reduce industrial dominance and open space for collaboration that reflects both current urgencies and future aspirations.

The strategy developed in this project rests on three core ambitions: preserving and enhancing the cultural and ecological landscape, becoming a delta innovation region, and increasing access to innovation through inclusive systems. These goals respond to both stakeholder needs and student visions. They provide a direction for long-term regional development that acknowledges the climate and energy challenges, while leveraging local strengths in culture, education, and spatial identity.

To make this future more concrete, key methods such as co-creation, transition zones, improved mobility, and decentralized governance must be implemented. These tools ensure that innovation is not only present, but accessible and relevant. When students are actively involved in shaping the region's future, their connection to Zeeland becomes deeper and more meaningful, shifting the trend of outmigration towards long-term engagement.

Ultimately, Zeeland's future depends on spatial planning to transform the relationship between renewable energy, industry, education, cultural landscape, and most importantly, students and their future. By creating opportunities for students to engage, Zeeland can grow into a resilient, inclusive, and forward-thinking region, prepared to play an active role in the energy transition at both national and global levels

Future Students

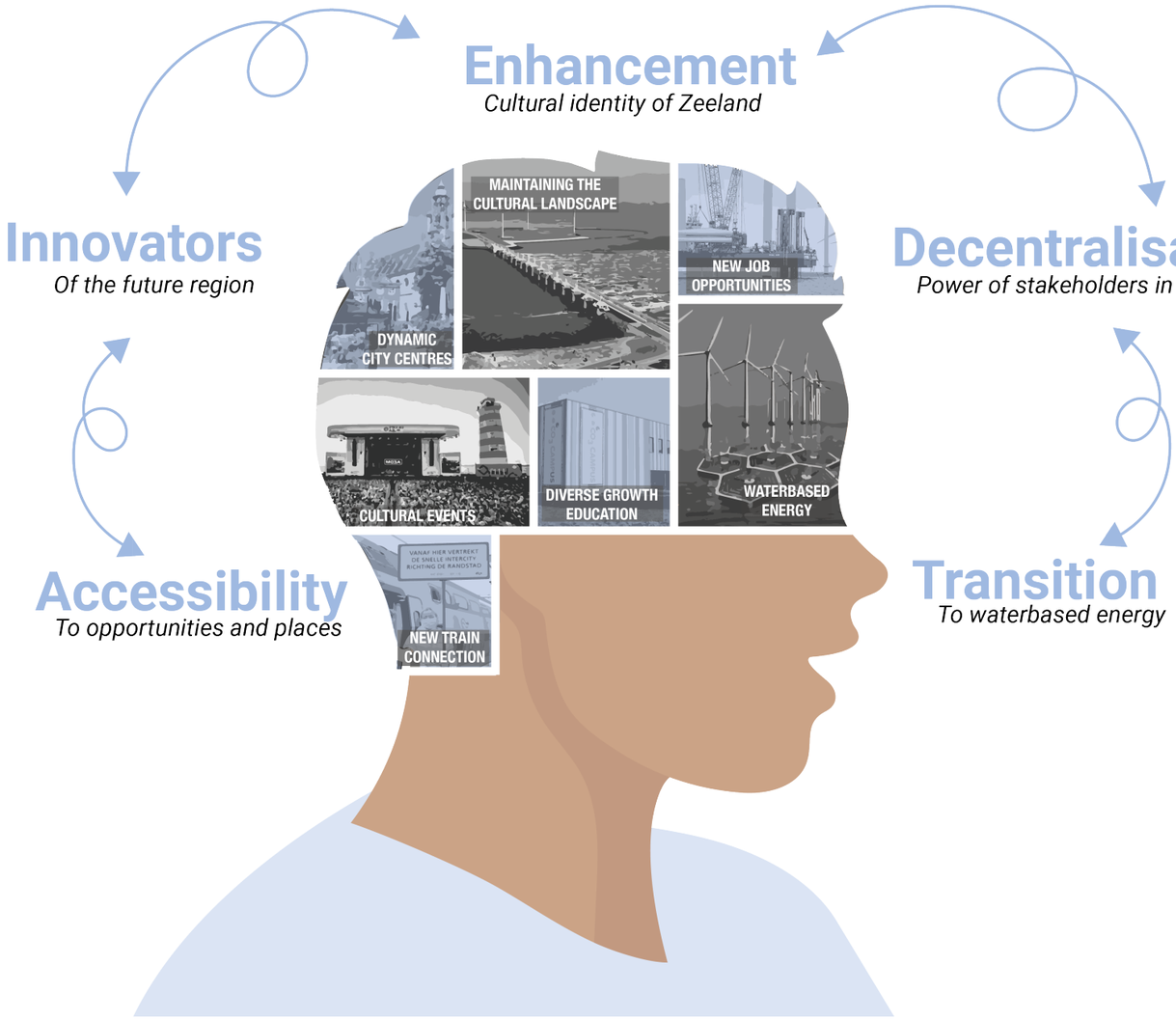


Figure 6. 28
Future Student

Figure 7. 01.Zeeland's Satellite View. Source: Google Earth ©2025

CHAPTER 07

Discussion

Group Reflection | Individual Reflection

Group Reflection
Community

What was the added value of starting with the community vision?

This project was initiated with a focus on a specific transition community, as part of the broader sustainability transition. The students of Zeeland were chosen as the community to drive the vision-making process. While this approach was initially unusual for us as designers, it added significant value and brought forward new insights.

Selecting a single community allowed us to understand the specific impacts that urban planning can have on distinct social groups. The contours of a community shape the demands and challenges for a particular demographic or cultural group, which might otherwise be overlooked in traditional planning approaches. The qualitative media analysis played a key role in painting this picture, adding emotional and narrative layers to a large-scale spatial challenge like the energy transition. It opened our eyes to the profound social and emotional impacts that regional planning can have, making clear that there are many more dreams, frustrations, and desires to take into account, far beyond one community alone.

The community-driven approach also enabled us to initiate a bottom-up design process within the context of a large-scale project. Starting from a single perspective gave us a way to navigate a common challenge in our field: the fear of becoming too abstract or overambitious. Tackling complex issues like sustainability transitions from a neutral standpoint often limits our willingness, or bravery, to be radical (Luque Martín, 2021). Faced with numerous stakeholders and competing interests, urban designers may feel paralyzed, afraid of leaving people out. By starting with the students of Zeeland, we gave ourselves permission to imagine radically.

Furthermore, this approach promotes more democratic and transparent transitions. Solving global sustainability problems requires more than top-down solutions, it calls for shared commitment and a fair distribution of burdens and benefits. This aligns with the principles of deliberative democracy, where inclusive dialogue helps shape just and effective outcomes.

Has the vision delivered the wishes of the community?

Some elements proposed in the initial vision, such as the expansion of nuclear energy or new mobility infrastructure, were later excluded during the strategy phase. These decisions followed the stakeholder analysis and were made to ensure the viability and feasibility of the strategy. However, the strategy still aimed to realize a significant part of the students' envisioned future.

The most important wishes voiced by the students were improved mobility connections and better job opportunities. These two key targets were addressed. We introduced new light rail connections and increased the frequency of local public transport. However, more attention could have been placed on improving connectivity between smaller towns and larger cities, since much of the development remains concentrated in urban centres.

On the topic of employment, job security was supported by fostering existing industries and attracting new businesses. These sectors were encouraged to invest in long-term strategies, which would ideally lead to more stable employment opportunities. However, this remains outside our direct control. While the alignment between our sustainability-focused vision and the industries' goals suggests they are inclined to stay in Zeeland, unforeseen economic or political events could still impact this projection. This presents a potential vulnerability in the resilience of our strategy.

A critical note is that the innovation-focused vision does not fully include all students. By prioritizing industry and technology, we unintentionally neglected students who are not drawn to those fields. For them, few alternative opportunities were proposed, meaning that part of the current student migration pattern may remain unchanged. Nonetheless, the community is likely to evolve over time, with future generations of students potentially moving to Zeeland in greater numbers.

Another concern tied to future growth is the risk of gentrification. Although it may not be a pressing issue for the current student population, future generations may face challenges such as rising housing prices and the loss of local culture.

In conclusion, our vision and strategy address many of the current wishes and needs of the student community. While the future may unfold differently than predicted, the strategy builds on the region's existing strengths, knowledge, and culture to offer new opportunities for current and future students in Zeeland.

Is the community engaged?

One of the main goals of the vision was to engage students in the energy transition and empower them to steer future developments. A key part of this process was to balance the power dynamics between industry, education, and students. The new governance structure is designed to achieve this balance, but it does not automatically guarantee student engagement.

The growing optimism surrounding delta research can help spark enthusiasm among students for participating in the transition within their home region. However, a willingness to engage must also come from the students themselves, it cannot be created out of thin air.

The participation centres, combined with the digital platform proposed in the strategy, aim to make innovation and democratic interaction more accessible. This will enable the majority of the community to contribute to decision-making processes. Together with the new governance system, this can lead to a more equal distribution of power.

However, the decentralised nature of the new structure also introduces risks, such as corruption and instability. This makes transparency a critical concern, one that, so far, has not been fully addressed in the proposed policies.

Values

What kind of justice does our project aim to achieve?

The foundation of our proposal lies in the pursuit of spatial justice, operationalized through recognitional, procedural and distributive justice (Rocco, 2024). We address recognitional justice by highlighting the socio-economic vulnerabilities of Zeeland's youth, especially vocational students, who are often invisible in policy and planning processes. Procedural justice is advanced through the co-creation model, positioning students and knowledge institutions as active co-decision-makers in regional development. And distributive justice is pursued by decentralizing governance through locally embedded knowledge clusters. These clusters serve to rebalance power away from dominant industrial actors and towards marginalized educational communities, correcting unequal access to innovation and opportunity.

However, ethical awareness is necessary. If these knowledge clusters become absorbed by powerful stakeholders or constrained by structural inequalities, the vision of justice could fail. Ensuring that participation remains genuinely inclusive across class, gender, cultural background, and sector is key. Equity cannot be a reconsideration; it must be a design principle.

How does our project relate to the ethics of care?

For this project, we recognize the deeply relational nature of place-making and sustainable development by acknowledging the relationships between students, cultural landscapes, industries, knowledge institutions and other stakeholders. The attentions that we pay for preserving the cultural landscape is more than the symbolic meaning, it's an effort to protect both the ecological systems as the social memory that is embedded in the landscape. By valuing this emotional connection and safekeeping, we emphasize care as an ethical mode of design, planning and even governance.

What kinds of virtues does our design stimulate or depend upon?

Through our spatial strategies and even engagement practices, we want to focus on civic pride, ecological responsibility and future-orientation. We want to create this sense of belonging for not only students, but also the wider community of Zeeland that they are not only proud of their heritage, but also confident in their ability to actually contribute and think along for the future of Zeeland. Knowledge institutions and industries are encouraged to act, not only out of obligation, but also from a commitment to the common good and regional and national well-being.

What public goods or commons does our project support, and what capabilities does it enable?

The project generates multiple public goods: from open-access knowledge infrastructure to enhanced regional mobility and shared innovation ecosystems. These are designed to actually strengthen the commons, including shared knowledge, cultural heritage and spatial resources. Our decentralized model resists enclosure by placing governance in the hands of local actors, promoting resilience through collective governing.

In terms of capabilities, we aim to expand what students and by extend the wider community are able to do and become. By linking education, governance and the energy transition, we are giving individuals more control over their future and create more opportunities for participation. Yet, we need to remain aware that capability-building must be equitably distributed. Attention must be paid whether these expanded freedoms are equally accessible among different groups.

How does our project consider ontological diversity and the Pluriverse?

Ontological diversity and the Pluriverse refer to the coexistence of multiple ways of being, knowing, and living in the world, challenging the idea that there is only one universal reality or path to progress (Rocco, 2024). Instead of only focusing on a single vision of innovation, we try to take into account ontological diversity. We emphasize the place-based innovation that uses the spatial qualities and multiple forms of knowledge and specialization. Our approach allows room for alternative futures, slower transitions and context specific adaptations in which we are moving away from the economic logic of 'growth-at-all-costs'.

At the same time, we recognize the need to include more perspectives beyond students, like other stakeholders into the design and vision.

How is participation organized and whose voice is central?

Finally, our proposed decentralized governance model of Zeeland is intentionally participatory and democratic. It is designed to avoid tokenistic forms of inclusion and focuses on structural power-sharing between different stakeholders. Participation in this project can be seen as a value and not a tool, that is embedded in the spatial and political structure of the project.

Ethically, with this project, we aim to bridge the gap between global urgencies and local social realities and how this affects our chosen community (students). We are focusing our interventions in values of care, justice, responsibility and inclusion. While there are challenges that remain, particularly in maintaining equal participation and resisting structural inequalities, we believe that this project has a strong foundation for ethical spatial transformation.

Sustainable Development Goals

In our project, the Sustainable Development Goals (SDGs) served as a guiding framework to align our regional plan with global ambitions. We covered multiple themes: Cultural Heritage, Spatial Qualities, Mobility, Knowledge-Economy, and Energy, all of which relate to one or more SDGs. These can be grouped into the following categories:

Climate Nature and Environment (SDG 13, 14, 15)

As we developed the vision and moved towards forming the strategy, we became aware of Zeeland's delta landscape and its highly vulnerable and dynamic nature. We chose to treat the landscape as an active stakeholder, leading to a strategy that preserves the natural environment, including proposals for expanding Natura2000 areas. New infrastructure was avoided as much as possible, with a focus on densifying existing settlements to make better use of current infrastructure. Protecting this natural landscape reflects our alignment with SDG 14 (Life Below Water) and SDG 15 (Life on Land).

A central role in our project, is SDG 13 (climate action), as the sustainability transition is the main theme. This transition is driven by the need to reduce carbon emissions and mitigate rising global temperatures. With Zeeland's position in and around water, the region is well suited for exploring innovative forms of renewable energy. This includes opportunities like tidal energy, floating wind farms, solar panels on water surfaces, and the concept of a battery island.

Education and Economy (DSG 4, 8)

One of the key themes in our project is education. Right now. Currently, the region lags behind in both education and innovation, issues central to SDG 4 (Quality Education). Our goal is to enhance the education, giving it a more prominent role in the governance by linking it more closely to local industry, and by making Zeeland more attractive to students. This empowers future generations and positions them as pioneers in different sector. This approach is closely connected to SDG 8 (Decent Work and Economic Growth). By creating opportunities for local talent and investing in an education system that reflects both current and future labour needs, we contribute to the long-term resilience of Zeeland's economy.

Sustainable Cities and Infrastructure (SDG 11, 9, 7)

With our goal to improve mobility and densify settlements with mixed use areas, we directly support SDG 11 (Sustainable Cities and Communities). These actions aim to make the region more attractive, especially to younger generations, increasing its resilience for the future.

We also aim to create better conditions for innovation by spatially and administratively connecting education to industry, particularly through the development of an innovation campus. The industry will benefit from this stronger connection, as it helps create a more skilled workforce. This aligns with SDG 9 (Industry, Innovation, and Infrastructure), as our strategy proposes a more integrated and future-proof system. In terms of energy, Zeeland holds a unique position as the energy plug of the Netherlands. While the region has historically relied on fossil fuels, our proposal supports SDG 7 (Affordable and Clean Energy) by shifting towards renewable energy sources such as tidal energy, floating wind turbines and solar panels and a battery island.

Throughout the project, the SDGs served as a valuable lens to assess priorities and impacts. While it is hard to address all the SDG's, to meaningfully integrate eight key goals into our proposal. This alignment ensures that our vision for Zeeland is not only locally relevant, but also contributes to a global effort toward a more sustainable future.

Limitations

While all efforts were made to provide an insightful research on the Zeeland Region, it is essential to acknowledge the boundaries within which the study was conducted. Certain limitations shaped the scope and depth of our findings, and will have an impact on the future direction of our proposed plan. Two key boundaries arose from practical considerations, limited time and restricted data availability.

We aimed to present a realistic image of the community's wishes. However, due to time constraints, we were unable to conduct interviews with students. Both qualitative and quantitative interviews would have been valuable additions to our research, as they offer a foundation on which to build our long-term vision. Furthermore, greater community participation could have provided more relevant, diverse, and accurate insights.

These time-related limitations also impacted the variety of stakeholder input. It proved to be challenging to access and incorporate a wide range of perspectives.

The broad and diverse nature of the student community made it difficult to identify a unified voice or shared perspective. Additionally, data limitations on the shared community perspective were hard to find, making our research leaned more on broader institutional viewpoints.

This project primarily focused on education and industries, which meant that certain relevant topics were only briefly touched upon, or excluded entirely. The economic dimension, for instance, plays a crucial role in the feasibility and sustainability of any regional plan, yet it was not deeply explored in this study. While we examined the chemical and fossil fuel industries and their transition toward renewable energy, the agricultural sector, which is an important sector in Zeeland, was not analysed in equal depth.

Individual Reflection

Chelsea Vermeulen

Participating in this regional design studio has significantly expanded my understanding of what it means to collaborate within complex territorial systems. At the start of this course, I approached the project with a primary focus on spatial design and conceptual development. However, as the process evolved—particularly after the midterm review—I experienced a shift in both my interests and my responsibilities within the team. I became especially drawn to the policy and governance dimension of our strategy, which I believe was crucial in grounding our design to really shape Zeeland as an innovation region.

In retrospect, I think I underestimated the power of governance in regional design. Initially, governance seemed very political and something that followed after spatial ideas were developed. It always saw governance and political structures as something that existed next to urbanism and is something that we can not influence. However, I came to realize over the past few weeks is that urbanism is all about shaping the environments and relations of cities and urban structures and this means that governance is definitely part of urbanism and is something that we as students can aim to understand. Also, in terms of creating spatial justice for different people within a certain context. Drawing from Healey's (1997) notion of "institutional capacity", is that spatial change is embedded in existing political, administrative, and social structures. Without actively designing with these systems, a project can become ungrounded. Governance is not simply about 'who decides what', but also about shaping the capacities of institutions and networks to act collectively.

In this project, governance became a key connector between the different types of knowledge clusters, in which these clusters, not only acted as research hubs, but also became governance hubs to actually decentralize power and create a more bottom-up and equal approach between different kinds of stakeholders. Governance all of a sudden became a design material itself, its something that can be shaped, negotiated and prototyped like space. Especially when you look back a hundred years ago when we lived in a time that women were not even allowed to vote. Governance systems change from time to time and I think as urban designers, this is something that we need to keep in mind for the future and evaluate if policies and regulations that we have right now, are still efficient in the future?

One of the most interesting and rewarding aspects of this project was also to see how the team started to value this view of governance and how this could affect and benefit our story, vision and strategy. My fascination with governance structures was not planned, but it emerged quite organically through challenges of the project. Especially after the midterm, when I started to think about our project and innovation on the broader EU scale. Working through the scales is something that have been thought to us through the bachelor, but now it has a whole deeper dimension to it. Not only to think through the scales spatially, but also governmental. I now reflect on my role as a future designer and urbanist, it will be a role that will require for me to navigate space, mediate between stakeholders and take into account governance systems that will help design not just spaces, but also the institutional conditions for change to achieve spatial justice for people and create a sense of belonging.

Personally, what I found especially interesting in this project was how governance became more than a 'supporting' framework and turned into a driver of change.

Grase Stephanie

Taking part in this regional-scale project has given me invaluable experience about developing vision that shapes both my planning and design processes. I still remember at a lecture in the beginning of this project, we were shown a quote from Jens Beckert which argues that it is not only the past that shapes the present, but also the future, representations of what could be, that shapes the present. This quote resonates with our group's case where we were given the theme of post fossil-fuel identity. We initially focus on understanding the history and our community's needs as the foundation of our vision. This is also a challenge for me, coming from a country with a very different background, to understand about the Netherlands's context.

As the project progressed, we realized that a vision is not only about a reflection of current needs but also a bold projection of the future. This turning point challenged us to think beyond the current situation and look toward a long-term benefit. For instance, we had this different point of view towards nuclear power, this plan was supported by the government and aligned with community's preference, but we suggest focusing on water-based renewable energy based on our research about long-term implications, sustainability, and its relation to the water. Another dilemma was how to envision the region's future. The baseline data showed that the province had an aging population and was less attractive for youth. Rather than seeing this as a limitation, we saw it as a challenge: can we change this narrative? Can we create a future where people want to stay and thrive? Can we transform the region to be the leader in innovation and renewable energy development?

I was skeptical about whether we should solely focus on what the community wants and the current needs or think beyond that. As we were encouraged to envision long-term planning, it became clear to me that besides fostering current aspirations, the need to balance with future possibilities is imperative. Thus, this approach is reflected in our vision for the province to become an innovative region while maintaining its identity with water. Our vision may seem over-optimistic looking at the current situation, however, we tried to make it achievable by implementing development strategy through incorporating spatial interventions and policy, setting timeline, and involving stakeholders in our planning.

This shift to thinking beyond what happens now for the sake of long-term resiliency led me to question how this long-term vision can be implemented in my home country, where planning documents are usually designed for a 20-year implementation period. How can we integrate the long-term vision and break down the project into visible actions that adapt with the dynamic changes in a real-life implementation? I continue to reflect on this question by considering what actually happens in practice.

In conclusion, this project has given me a deeper understanding of what it means to be a visioner and future urbanist. I stepped out from my comfort zone by thinking boldly and being critical for a better future. In addition, incorporating policies and including key actors in our strategy helped make the future more tangible although it seems far off at the moment.

Willemijn Cleijndert

First of all, working in a group throughout this project has significantly influenced both my personal and professional development. One of the thing it taught me is the value of diversity, as everyone brings something unique to the table. Collaborating with people from different backgrounds also made me aware of my own ways of communicating and dealing with design problems. I learned, for example, how I tend to rather just start without a detailed action plan. This can work when working alone, but in a group, plans have to be made in order to make the work more beneficial. Additionally, because ideas and decisions had to be discussed continuously, I found myself being pushed to form and articulate my own opinions more clearly than I normally would. This active engagement helped me understand not only what I thought, but why I thought it.

The process of group work also functioned as a mirror, forcing me to confront my own limitations. I became more conscious of my habits, for example how I respond to critique, how I take initiative, or why I also occasionally hold back. Observing my teammates' design processes gave me a more intimate look into alternative approaches to solving problems, and I found myself learning new techniques and perspectives by simply working closely with them.

A personal development that surprised me, was the growth of my interest in energy and the overall energy transition. Initially, I viewed energy more through a technical lens. However, through this project I began to understand how deeply energy systems are intertwined with all aspects of the built environment, how it is imbedded in spatial planning, governance, social equity, and even identity. This realization resonates strongly with what drew me to urbanism in the first place: the complexity of interconnected systems and the challenge of shaping them in a meaningful, future-oriented way.

Developing the regional strategy brought that complexity to the surface. I found it both challenging and exciting to build a narrative of spatial action and reaction, to piece together a puzzle that could drive a long-term transition. It wasn't always easy to connect the different layers and domains involved, and at times it felt overwhelming. But through active discussion with my peers and collaborative thinking, I gained a deeper understanding of the relationships between scales, disciplines, and decisions. Conversations with my group were often the key to unlocking perspectives I wouldn't have reached on my own.

What inspired me most, and what I will take forward into future projects, was the way we were able to work at a large regional scale while constantly keeping the local community in mind. This balance between big-picture thinking and small-scale impact was something I struggled with at the beginning of the master's program. Having a clearly defined community to focus on, supported by in-depth research, helped me stay grounded. It gave purpose to our decisions and made the work feel more tangible and impactful.

This project not only deepened my understanding of complex regional issues, but also helped me grow as a designer and team member. It reminded me that reflection, conversation, and openness to other perspectives are essential to meaningful work. I leave this quarter with a clearer sense of my own values, and the motivation to carry these insights into future projects.

Wouter Versnel

This studio project has given me a lot of food for thought. The scales, themes, and approach have broadened my understanding of what urbanism entails. I used to think regional planning and strategies fell outside the scope of urbanism, but this project showed me they are in fact essential components of designing cities and public spaces. Large-scale policymaking and stakeholder engagement are just as, if not more, important than design when it comes to encouraging behavioural change toward a sustainable society.

I also found it fascinating to dive into complex and wicked problems like the energy transition. It's a topic I usually stayed away from because it felt outside my comfort zone. But through this project, I learned how deeply it connects to our discipline, and how crucial community involvement is in these transitions. That process, along with the SDS sessions and guest lectures, made me realize that as urbanists, we are not the experts. Rather, we are mediators. Our role is to understand how complex challenges impact various stakeholders, and to help shape responses accordingly. This realization shifted my perspective: I now see myself less as a designer and more as an advocate for justice.

Justice, I've come to believe, can only be achieved if we think radically and inclusively. These were the two key approaches enabled by taking a community perspective. By starting with the needs and aspirations of one group, we were able to develop a bold, long-term vision, one that wasn't paralysed by the competing interests of other actors. Ironically, in the strategy phase, we found that our vision wasn't so radical after all. Some actors simply needed more convincing to cooperate. Had we included all stakeholders from the beginning, we might not have reached this point. Balancing all demands and policies too early might have restricted our creativity and progress.

That said, there were some key elements missing in our group process. On a positive note, we worked well together. From the start, we agreed on our shared goal: to preserve communal identity and empower an underrepresented community. This common ground became the driving force behind our vision and strategy. The energy transition served as a lens through which we explored these issues, eventually expanding our focus to include broader socio-spatial themes. Our strategy achieved many of our initial goals, but we overlooked a few critical aspects.

For one, our vision relies heavily on behavioural change, yet our proposed interventions have little academic or empirical basis to suggest they can actually stimulate such change. In addition, our process was quite linear, as reflected in the methodology framework in figure 3.05. We lacked a structured way to critically reflect on our progress and decision-making.

One key decision we didn't evaluate thoroughly was keeping the current industries as part of the cultural landscape and encouraging them to transition sustainably. While preserving culture, jobs, and expertise is a strong argument, we should have reflected more critically on whether these industries truly add value to the local community. Was this really the right and just choice for the future? We didn't fully weigh the potential downsides against the perceived benefits.

Overall I think that we have learned a lot about the justice within a sustainability transition. It will give a lot of context to the graduation thesis and other future projects.

Figure 8. 01.Zeeland's Satellite View. Source: Google Earth ©2025

Bibliography

BIBLIOGRAPHY TEXT

Arjen Nijmeijer. (2025a). Industrie in Zeeland wankelt, brandbrief naar regering en Kamer. BN De Stem.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6FCC-1623-RT5K-P55J-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Arjen Nijmeijer. (2025b). De frustratie druipt eraf in brandbrief aan het kabinet en Tweede Kamer over Zeeuwse industrie. AD/Algemeen Dagblad.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6FCG-BY33-S882-F155-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Balz, V., & Verbeek, T. Et al. (2023). Deliverable 1.1: Theoretical and conceptual framework. In DUST. Retrieved April 5, 2025, from https://www.dustproject.eu/

CBS (Centraal Bureau voor de Statistiek). (2021). Bevolking; kerncijfers. Retrieved from https://www.cbs.nl

Chris Hensen. (dinsdag). KHNP ziet af van bouw Nederlandse kerncentrales . NRC. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6FC1-YC43-RS1K-R0CH-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Deltares. (2023). The Dutch Delta: Resilience in the Face of Climate Change. Retrieved from https://www.deltares.nl/en/

Drent, M., & Buitelaar, E. (2019). De regionale economie van Zeeland: Van kansen naar economische vooruitzichten. Zeeuwse Economische Instelling.

Economic Board Zeeland. (2021). Strategische Agenda Economic Board Zeeland. Retrieved from https://assets.foleon.com/eu-central-1/de-uploads-7e3kk3/4341/strategische_agenda_economic_board_zeeland.28c7b6a510b0.pdf

EenVandaag. (2024). Kabinet wil vier nieuwe kerncentrales, maar waar zijn investeerders? 'Durven stap niet te nemen.' https://eenvandaag.avrotros.nl/item/kabinet-wil-vier-nieuwe-kerncentrales-maar-waar-zijn-investeerders-durven-stap-niet-te-nemen/

European Commission. (2020). Strategic Plan 2020–2024 – DG Research and Innovation. Retrieved from https://commission.europa.eu/document/download/5ac1ff20-d41e-4c10-9a05-048b7339292e_en

European Commission. (2024). European Innovation Scoreboard 2024. Publications Office of the European Union. https://op.europa.eu/en/publication-detail/-/publication/8a4a4a1f-3e68-11ef-ab8f-01aa75ed71a1/language-en

European Innovation Council. (2025). EIC Work Programme 2025. Retrieved from https://eic.ec.europa.eu/document/download/5e1eb75f-e437-477f-9ee9-ef54ff6387fd_en?filename=EIC%20Work%20Programme%202025.pdf

Faguet, J. (2014). Decentralization and governance. World Development, 53, 2–13. https://doi.org/10.1016/j.worlddev.2013.01.002

Frank Balkenende (PZC). (2023). Waarom Zeeland 's werelds grootste groene waterstoffabriek wil laten bouwen. DeOndernemer.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6DYC-3KF3-RTN0-552B-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Generatie Y - de millennials die blijven; vertrekken en terugkeren naar Zeeland - Projectenportfolio. (n.d.). https://projectenportfolio.nl/wiki/index.php/ZS_publication_generatie_y

Gerrit van Loon. (2023). Hoe bind je jongeren aan Zeeland?. BN/DeStem. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a68DD-NCW1-DYRY-X3RD-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Ghisellini, P., Cialani, C., & Ulgiati, S. (2015). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007

Goncalves, J. (2024). Quantitative and qualitative research: Lecture slides from AR2U088 – Methodology Session 2. Department of Urbanism, TU Delft.

Gössling, S., & Hall, C. M. (2022). Pandemics, tourism and global change: A rapid assessment of COVID-19. Journal of Sustainable Tourism, 30(1), 1–20. https://doi.org/10.1016/j.tourman.2022.104399

Harvey, D. (1973). Social Justice and the City (REV-Revised). University of Georgia Press. http://www.jstor.org/stable/j.ctt46nm9v

Healey, P. (1997). Collaborative Planning: Shaping Places in Fragmented Societies. Palgrave Macmillan.

Hepach, M. G. (2023). Sauerian phenomenology: German Theory and Carl Sauer's The Morphology of Landscape. Geographica Helvetica, 78(3), 467–478. https://doi.org/10.5194/gh-78-467-2023

HZ Kenniscentrum Kusttoerisme. (2023). Kerncijfers vrijetijdssector Zeeland 2022. Kenniscentrumtoerisme.nl. https://www.kenniscentrumtoerisme.nl/wiki/index.php/Event_00569

Impuls Zeeland. (2020). Sectors in Zeeland: Agrifood in Zeeland. Retrieved from https://www.impulszeeland.com/sectors-in-zeeland/agrifood-in-zeeland

JANNE CHAUDRON. (2025). Sophie Hermans zit klem tussen groene droom en noodkreten vanuit de industrie. Trouw. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6FCC-1P73-RVG5-P0N0-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Joeri Wisse. (2025). Hoogleraar over groei als middel om voorzieningen overeind te houden: 'Dat moeten we niet overschatten'. PZC.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6DWX-RDJ3-RY5X-D4S2-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Joeri Wisse. (2024). Jetten na werkbezoek van Schoof aan Scalda: 'Met alleen een pluim krijgen we geen vakmensen opgeleid'. PZC.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6D0R-DT21-JBHV-K1KC-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Josten, B. (December). Minister Bruins: "Zeeland is het stopcontact van Nederland." Omroep Zeeland. https://www.omroepzeeland.nl/nieuws/17073479/minister-bruins-zeeland-is-het-stopcontact-van-nederland

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. Resources Conservation and Recycling, 127, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Kogabayev, T., & Maziliauskas, A. (2017). The definition and classification of innovation. HOLISTICA – Journal of Business and Public Administration, 8(1), 59–72. https://doi.org/10.1515/hjbpa-2017-0005

Luque Martin, I. (2021). Radical Spatial Imagination: designing the otherwise. In Mainstreaming Alternative Spatial Design (MAS-project) [Workshop].

Mario Wisse. (2023). 'Hierover zullen we het nooit eens worden'. Provinciale Zeeuwse Courant. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a69MJ-5FD1-JC8X-6247-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Meerstra, Y. (2022). The Frisian Brain Drain: Out-migration of (highly educated) youth in rural areas of Fryslân and the role of place attachment in stimulating return migration. University of Groningen. Retrieved from https://frw.studenttheses.ub.rug.nl/4005/

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. (2024). Voorontwerp Nota Ruimte schetst ruimtelijk beeld van Nederland in 2050. Retrieved from https://www.rijksoverheid.nl/actueel/nieuws/2024/06/21/voorontwerp-nota-ruimte-schetst-ruimtelijk-beeld-van-nederland-in-2050

Ministerie van Economische Zaken en Klimaat. (2023). Programma Ruimte voor Economie. Retrieved from https://www.rijksoverheid.nl/documenten/rapporten/2023/10/13/ezk-programma-ruimte-voor-economie

Ministerie van Infrastructuur en Waterstaat. (2019). Mobiliteitsarmoede in de provincie Zeeland. Publicatie | Kennisinstituut Voor Mobiliteitsbeleid. https://www.kimnet.nl/publicaties/rapporten/2019/01/28/mobiliteitsarmoede-in-de-provincie-zeeland

Ministerie van Landbouw, Natuur en Voedselkwaliteit. (2023). Summary of the Draft National Programme for Rural Areas. Retrieved from https://www.platformparticipatie.nl/nationaalprogrammalandelijkgebied/ontwerpprogramma-nplg/documenten-ontwerpprogramma-nplg/HandlerDownloadFiles.ashx?idnv=2632543

Mohindru, S. (2002). Cultural landscapes in contemporary planning framework. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84875830751&partnerID=40&md5=51da198aa9adc166f340b03d61f9f50c

Natuurmonumenten. (n.d.). Roggenplaat in Oosterschelde gered | Natuurmonumenten. https://www.natuurmonumenten.nl/natuurgebieden/zuidkust-van-schouwen/projecten/roggenplaat-in-oosterschelde-gered

Oates, W. E. (1999). An Essay on Fiscal Federalism. Journal of Economic Literature, 37(3), 1120–1149. http://www.jstor.org/stable/2564874

OECD (2019), Making Decentralisation Work: A Handbook for Policy-Makers, OECD Multi-level Governance Studies, OECD Publishing, Paris, https://doi.org/10.1787/g2g9faa7-en.

OECD. (2020). Why do countries decentralise?. OECDiLibrary. https://www.oecd-ilibrary.org/sites/e5b9ba7den/index.html?itemId=/content/component/e5b9ba7den.

Pak, V. (2023). Wie gaat de nieuwe kerncentrales betalen? EWmagazine.nl. https://www.ewmagazine.nl/nederland/achtergrond/2023/03/wie-gaat-de-nieuwe-kerncentrales-betalen-43406w/

Planbureau voor de Leefomgeving, & Menkveld, M. (2024, 24 oktober). Klimaat- en Energieverkenning 2024.

Planbureau Zeeland. (2022). Jongeren in Zeeland: Onderwijs en Arbeidsmarkt. Retrieved from https://www.zeeland.nl/onderwijs-arbeidsmarkt

Provincie Zeeland. (2023a). Concept RES 2.0. Retrieved from https://www.zeeland.nl/sites/default/files/digitaalarchief/IB24_8d016c2e.pdf

Provincie Zeeland. (2023b). Ruimtelijk Voorstel Zeeland. Retrieved from https://www.zeeland.nl/sites/default/files/digitaalarchief/IB24_330a58f2.pdf

Provincie Zeeland. (2024a). Commissie Bestuur van 6 september 2024. Retrieved from https://www.zeeland.nl/sites/default/files/digitaalarchief/IB24_28320642.pdf

Provincie Zeeland. (2024b). Het Zeeuws Jongerenparlement 2024. Retrieved from https://www.zeeland.nl/over-ons/jouw-zeeland/het-zeeuws-jongerenparlement-2024

Publications Office of the European Union. (2024). European Innovation Scoreboard 2024. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/8a4a4a1f-3e68-11ef-ab8f-01aa75ed71a1/language-en

Redactie PZC. (2020). On-Zeeuws omdenken. PZC.nl. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a60WV-S541-JBHV-K4NK-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Regio Deal North Sea Port District. (2023). Investeringsprogramma Regio Deal North Sea Port District. Retrieved from https://assets.foleon.com/eu-central-1/de-uploads-7e3kk3/4341/investeringsprogramma_regio_deal_north_sea_port_district.d91495f02540.pdf
Rijksoverheid (2019). Nationaal Klimaatakkoord.

Rijksoverheid. (2023). Regio Deal North Sea Port District 'Op de grens van kracht & kwetsbaarheid'. Retrieved from https://www.rijksoverheid.nl/documenten/rapporten/2023/09/26/regio-deal-north-sea-port-district-op-de-grens-van-kracht-kwetsbaarheid

Rocco, R. (2022). Spatial Justice: A crucial dimension of sustainability. In R. Rocco, G.

Roberto Rocco. (2024). Frameworks provided MET course [PDF]. Master Education Track, TU Delft.

Bracken, C. Newton, & M. Dabrowski (Eds.), Teaching, Learning & Researching Spatial Planning (pp. 276-287). TU Delft OPEN Publishing.

ROLF BOSBOOM JOERI WISSE. (2025). Zorg over vertraging waterstofnetwerk. BN/DeStem. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6F2R-14F3-RS6P-W094-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Sijmons, D., FABRICations, H+N+S Landschaparchitecten, POSAD spatial strategies, Studio Marco Vermeulen, NRGlab/Wageningen Universiteit, & Vereniging Deltametropool. (2017).

Sijmons, D., Hugtenburg, J., Van Hoorn, A., & Feddes, F. (2014). Landscape and Energy:

Smart Delta Resources. (2020). SDR-Rapport Regioplan 2030-2050. Retrieved from https://www.smartdeltaresources.com/sites/default/files/inline-files/SDR-Rapport%202030-2050-spread-LR.pdf

Smart Mobility Jongeren Zeeland | AddVision Projectmanagement. (2018). https://www.addvision.nl/projecten/smart-mobility-jongeren-zeeland

Soja, E. W. (2010). Seeking spatial justice. University of Minnesota Press.

Staf Deltacommissaris. (2025). Deltaprogramma 2025. Retrieved from https://dp2025.deltaprogramma.nl/en/

Taylor, S. P. (2017). What is Innovation? A study of the definitions, academic models and applicability of innovation to an example of social housing in England. Open Journal of Social Sciences, 05(11), 128–146. https://doi.org/10.4236/jss.2017.511010

Theo Besteman. (2025). Slag om bouw van kerncentrales; Buitenlandse concerns eisen steun van Staat, EDF lijkt beste kaarten te hebben. De Telegraaf. https://advance.lexis.com/api/document?collection=news&id=urn%3acontentItem%3a6F6B-J1H3-S5CD-H4G9-00000-00&context=1519360&identityprofileid=Q6FFCK68393.

Treinenweb. (2021). Nieuwe dienstregeling afgelopen zondag ingegaan Treinenweb. https://www.treinenweb.nl/nieuws/9265/nieuwe-dienstregeling-afgelopen-zondag-ingegaan.html

Tushman, M. L., & O'Reilly, C. A. (1996). Ambidextrous Organizations: Managing evolutionary and revolutionary change. California Management Review, 38(4), 8–29. https://doi.org/10.2307/41165852

UNITED NATIONS. (2015). PARIS AGREEMENT. https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

UWV. (2023). Regio in Beeld: Krapte houdt aan in Zeeland. Werk.nl. https://www.werk.nl/arbeidsmarktinformatie/regio/zeeland/regio-in-beeld-2023

Van Dijk, T., & Koster, A. (2017). De relatie tussen regionale kennisinfrastructuur en economische groei: Een case study van Zeeland. Tijdschrift voor Regionale Wetenschappen, 46(3), 15-34.

Visser, W. (2017). Cradle to cradle William McDonough and Michael Braungart (2002) (pp. 176–181). https://doi.org/10.4324/9781351279086-41

WERKbedrijf. (2023, October 31). Regio in beeld 2023. https://www.werk.nl/arbeidsmarktinformatie/regio/zeeland/regio-in-beeld-2023

Zeeland | Geopark Schelde Delta. (z.d.). https://www.scheldedelta.eu/nl/gebied/zeeland

Zeeland.nl. (2021). Uitvoeringsprogramma Landelijk Gebied 2021-2030. Retrieved from https://www.zeeland.nl/sites/default/files/2021-12/Rapport%20Uitvoeringsprogramma%20Landelijk%20Gebied%202021-2030%20-%20webversie.pdf

Zeeuwse natuurorganisaties: "bescherm natuur én landschap bij uitbreiding hoogspanningsnet" - ZMf Zeeland. (2025). ZMf Zeeland. https://zmf.nl/nieuws/bescherm-natuur-en-landschap-bij-uitbreiding-hoogspanningsnet/

NEXUS SOURCES

Arenthals, J. van. (2022). Zorgen om daling mbo-studenten: 'Beroepsonderwijs is krachtig, mooi en belangrijk voor Zeeland'. PZC. https://www.pzc.nl

Dane, J. (n.d.). John Dane vertrekt als topman van de HZ: 'Ik denk elke dag: wow, ik ga naar de HZ toe'. BN DeStem. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6776-3211-DY0X-90YS-00000-00&context=1519360

Financieele Dagblad. (2023). Amsterdam voorop in groene transitie, Zeeland blijft achter. Het Financieele Dagblad. https://fd.nl

Financieele Dagblad. (2023). Bedrijven in Twente werken met andere parameters dan alleen harde economische groei. Het Financieele Dagblad. https://fd.nl

Heijmans, H. (2023). Kerncentrale als magneet voor innovatie in Zeeland: 'We zijn het energieplugje van Nederland'. PZC. https://www.pzc.nl

Kickoff Festival Zeeland. (2023). MBO meets HBO: Een brug bouwen tussen studenten. Festival Brochure (internal publication, cited in workshop materials).

Le Clercq, J. (2023). Zeeland moet leren van andere regio's om jongeren vast te houden. BN/DeStem. https://www.bndestem.nl
NOS Nieuws. (2022). Zeeland: weinig aanbod studentenwoningen zorgt voor vertrek. NOS.nl. https://www.nos.nl

Polderman, M. (2024) Huizen bouwen, dan komen mensen vanzelf. BN/DeStem. https://www.bndestem.nl

PZC Redactie. (2020). On-Zeeuws omdenken. PZC.nl.

PZC. (2020). Veel mbo-studenten willen weg uit Zeeland: 'Weinig toekomst hier'. Provinciale Zeeuwse Courant. https://www.pzc.nl

Raspe, O. (2021). Regio's die jongeren vasthouden investeren in aansluiting onderwijs en werk. Het Financieele Dagblad. https://fd.nl

Van Loon, G. (2022). Hoe bind je jongeren aan Zeeland? BN/DeStem. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:68DD-NCW1-DYRY-X3RD-00000-00&context=1519360

ENERGY SOURCES

Ahmed, E. H., Karim, M. S., & Al-Ramahi, F. K. M. (2024). Choosing the best locations to establish a nuclear power plant in Iraq with respect to radioactivity in those areas. Journal of Physics Conference Series, 2857(1), 012012. https://doi.org/10.1088/1742-6596/2857/1/012012

Boccard, N. (2021). Nuclear Power vs. Renewables. The Scale Perspective. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3768026

Clemons, S. K. C., Salloum, C. R., Herdegen, K. G., Kamens, R. M., & Gheewala, S. H. (2020). Life cycle assessment of a floating photovoltaic system and feasibility for application in Thailand. Renewable Energy, 168, 448–462. https://doi.org/10.1016/j.renene.2020.12.082

De Paula, L. F., & Carmo, B. S. (2022). Environmental impact assessment and life cycle assessment for a deep water floating offshore wind turbine on the Brazilian continental shelf. Wind, 2(3), 495–512. https://doi.org/10.3390/wind2030027

Jung, C., & Schindler, D. (2023). Reasons for the recent onshore wind capacity factor increase. Energies, 16(14), 5390. https://doi.org/10.3390/en16145390

Lewis, M., Neill, S., Robins, P., & Hashemi. (2015). Resource assessment for future generations of tidal-stream energy arrays. Energy, 83, 403–415. https://doi.org/10.1016/j.energy.2015.02.038

Li, L., Gao, Y., Yuan, Z., Day, S., & Hu, Z. (2017). Dynamic response and power production of a floating integrated wind, wave and tidal energy system. Renewable Energy, 116, 412–422. https://doi.org/10.1016/j.renene.2017.09.080

Liu, L., Sun, Q., Li, H., Yin, H., Ren, X., & Wennersten, R. (2019). Evaluating the benefits of Integrating Floating Photovoltaic and Pumped Storage Power System. Energy Conversion and Management, 194, 173–185. https://doi.org/10.1016/j.enconman.2019.04.071

Neill, S. P., Haas, K. A., Thiébot, J., & Yang, Z. (2021c). A review of tidal energy—Resource, feedbacks, and environmental interactions. Journal of Renewable and Sustainable Energy, 13(6). https://doi.org/10.1063/5.0069452

Sacramento, E. M. D., Carvalho, P. C., De Araújo, J. C., Riffel, D. B., Da Cruz Corrêa, R. M., & Neto, J. S. P. (2015). Scenarios for use of floating photovoltaic plants in Brazilian reservoirs. IET Renewable Power Generation, 9(8), 1019–1024. https://doi.org/10.1049/iet-rpg.2015.0120

Soulouknga, M., Doka, S., NRevanna, N., NDjongyang, N., & TCKofane, N. (2018). Analysis of wind speed data and wind energy potential in Faya-Largeau, Chad, using

Weibull distribution. Renewable Energy, 121, 1–8. https://doi.org/10.1016/j.renene.2018.01.002

Spencer, R. S., Macknick, J., Aznar, A., Warren, A., & Reese, M. O. (2018). Floating Photovoltaic systems: Assessing the technical potential of photovoltaic systems on Man-Made water bodies in the continental United States. Environmental Science & Technology, 53(3), 1680–1689. https://doi.org/10.1021/acs.est.8b04735

Temiz, M., & Javani, N. (2019a). Design and analysis of a combined floating photovoltaic system for electricity and hydrogen production. International Journal of Hydrogen Energy, 45(5), 3457–3469. https://doi.org/10.1016/j.ijhydene.2018.12.226
Temiz, M., & Javani, N. (2019b). Design and analysis of a combined floating photovoltaic system for electricity and hydrogen production. International Journal of Hydrogen Energy, 45(5), 3457–3469. https://doi.org/10.1016/j.ijhydene.2018.12.226

Wei, Y., Khojasteh, D., Windt, C., & Huang, L. (2024b). An interdisciplinary literature review of floating solar power plants. Renewable and Sustainable Energy Reviews, 209, 115094. https://doi.org/10.1016/j.rser.2024.115094

IMAGES

URGENCY
Banksy picture: Global warming location - Banksy Map. (2023, 10 juli). Banksy Map. https://banksymap.com/listing/global-warming/

COLLAGE FIRST PAGE
Painting: Gezicht op het dorp Zoutelande op Walcheren by Ferdinand Hart Nibbrig

Wikipedia-bijdragers. (z.d.). Bestand:Gezicht op het dorp Zoutelande op Walcheren Rijksmuseum SK-A-2540.jpeg - Wikipedia. https://nl.wikipedia.org/wiki/Bestand:Gezicht_op_het_dorp_Zoutelande_op_Walcheren_Rijksmuseum_SK-A-2540.jpeg

Painting: de Kust in Scheveningen Adrian van de Velde

COLLAGE HISTORY
Zeehavens - Zeeuwse ankers. (2023, September 14). Zeeuwse Ankers. https://www.zeeuwseankers.nl/verhaal/zeehavens

Vissersschepen - Zeeuwse ankers. (2022, June 27). Zeeuwse Ankers. https://www.zeeuwseankers.nl/verhaal/vissersschepen

Vissersschepen - Zeeuwse ankers. (2022, June 27). Zeeuwse Ankers. 2 https://www.zeeuwseankers.nl/verhaal/moderne-scheepsbouw-in-zeeland

Vroeger! Middelburg in beeld als havenstad – Wij zijn De Stad Middelburg. (n.d.). https://wijzijndestad.com/verhalen/vroeger-middelburg-in-beeld-als-havenstad/#:~:text=Wij%20zijn%20De%20Stad%20Middelburg,-Verhalen&text=Maar%20zoals%20het%20was%20in,beeldbank%20van%20het%20Zeeuws%20Archief.

Toerisme en recreatie, Provincie Zeeland. (n.d.). https://www.zeeland.nl/onderwerpen/toerisme-en-recreatie

Omroep Zeeland. (2021, December 17). Drijvend zonnepark bij Krammersluizen met veel onzekerheid omgeven. Omroep Zeeland. Solarpark Zeeland. https://www.omroepzeeland.nl/nieuws/14267051/drijvend-zonnepark-bij-krammersluizen-met-veel-onzekerheid-omgeven

Modern landschap, nieuwe natuur - Zeeuwse Ankers. (2022, April 5). Zeeuwse Ankers. https://www.zeeuwseankers.nl/verhaal/modern-landschap-nieuwe-natuur

Ministerie van Infrastructuur en Waterstaat. (2024, October 14). Watersnoodramp 1953. https://www.rijkswaterstaat.nl/water/waterbeheer/bescherming-tegen-het-water/watersnoodramp-1953

Ministerie van Economische Zaken en Klimaat. (2020, March 11). Eerste Regionale Energiestrategie komt uit Zeeland. Nieuwsbericht, Klimaatakkoord. https://www.klimaatakkoord.nl/actueel/nieuws/2020/03/11/eerste-regionale-energiestrategie-komt-uit-zeeland

COLLAGE STUDENTS CURRENT

Agro&Chemie. (2018). https://www.agro-chemie.nl/nieuws/ontwerp-klimaatakkoord-goed-nieuws-voor-nederland/

BNNVARA. (2021). https://www.bnnvara.nl/joop/artikelen/niet-babyboomers-maar-tien-jaar-rutte-hebben-ons-land-in-de-problemen-gebracht

CO3 CAMPUS (n,d.) https://www.co3campus.nl/

Concertatsea. (n,d.) https://www.concertatsea.nl/nieuws/

DagbladvanhetNoorden. (2019). https://dvhn.nl/binnenland/NS-gaat-vanaf-2023-met-snellere-treinen-rijden-tijdwinst-voor-reizigers-tussen-Noorden-en-Randstad-25056480.html

De Ondernemer. (2021). https://www.deondernemer.nl/mobiliteit/kritiek-op-elektrische-deelscooter-zwelt-aan-de-fiets-wordt-gekannibaliseerd~45c7bde?referrer=https%3A%2F%2Fwww.google.com%2F

DeMorgen. (2009). https://www.demorgen.be/nieuws/zijn-windturbines-gevaarlijk-voor-je-gezondheid~b4806da3/?referrer=https%3A%2F%2Fwww.google.com%2F

IDEAL. (n,d.). https://idealcolours.be/nl/gids/teinture-au-micro-ondes/

Impuls Zeeland. (2024). https://www.impulszeeland.nl/media/DEF-Jaarplan_2024_3.0_met_bijlage.pdf

Jongenzot. (2024). https://www.jezofficial.be/nieuws/bootsea-festival

Lamp (n,d.). https://www.amazon.nl/SKLUM-Tafellamp-Deyan-Mousse-Citroen/dp/B09MT38HZ5

Nerowa. (N,d.) https://www.nerowa.com/

Omroep Zeeland (2025). https://www.omroepzeeland.nl/nieuws/17375018/wat-is-het-effect-van-toerisme-op-de-leefbaarheid-middelburg-onderzoekt-het

Panel. (2024). https://radar.avrotros.nl/artikel/laptop-voor-school-te-duur-deze-partijen-helpen-je-daarbij-60809

Renews. BIZ. (n,d). https://renews.biz/offshore-wind/?p=311&region=Europe

Rijkswaterstaat. (n,d.). https://www.rijkswaterstaat.nl/water/waterbeheer/bescherming-tegen-het-water/waterkeringen/deltawerken/oosterscheldekering

Treinenweb. (n,d.). https://www.treinenweb.nl/nieuws/9265/nieuwe-dienstregeling-afgelopen-zondag-ingegaan.html

WattisDuurzaam. (2016). https://www.wattisduurzaam.nl/7404/energie-opwekken/wind/offshore-windpark-zeeland-wereldwijd-goedkoopste-ooit-727/

GIS SOURCES

https://3dbag.nl/en/viewer?lod=lod22

https://verdichtingskaart.nl/#close

https://www.provincieantwerpen.be/aanbod/dict/gis/digitale-kaarten.html

https://geoloket.provincieantwerpen.be/geoloketten/?viewer=extern&LayerTheme=0

https://opendata.grensdata.eu/portal.html?_la=nl&_catalog=InterReg

https://www.cbs.nl/nl-nl/onze-diensten/open-data/statline-als-open-data

https://dataportaal.zeeland.nl/dataportaal/srv/dut/catalog.search#/metadata/d2e56db5-3123-4e70-ba39-f97e12434f05

https://download.geofabrik.de/europe/netherlands.html

https://globalwindatlas.info/en/

TERMINOLOGY

De Zwarte Hond. (2022). Inspiratieboek voor een kwalitatieve functiemix. Provincie Zuid-Holland

European Commission. (n.d.). Natura 2000. Retrieved April 9, 2025, from https://ec.europa.eu/environment/nature/natura2000

Friedmann, J. (1987). Planning in the public domain: From knowledge to action. Princeton University Press.

Hausleitner, B. (2024). Mapping metropolitan structures: Centralities & borders. Delft University of Technology.

Healey, P. (1997). Collaborative planning: Shaping places in fragmented societies. Macmillan International Higher Education.

Hillier, B., & Hanson, J. (1984). The social logic of space. Cambridge University Press.

Hillier, B., & Iida, S. (2005). Network and psychological effects in urban movement. In A. van Nes (Ed.), Proceedings of the 5th International Space Syntax Symposium (pp. 553–564). TU Delft.

Nationale Geographic. (n.d.). Delta. Retrieved April 9, 2025, from https://education.nationalgeographic.org

Nederlandse Taalunie. (2021). Zeeuwse dialecten. Retrieved from https://taalunie.org

Nuffic. (2020). The Dutch education system: Levels and structure. The Hague: Nuffic.

Rijksoverheid. (n.d.-a). Onderwijssystemen: MBO, HBO en WO. Retrieved April 9, 2025, from https://www.rijksoverheid.nl

Rijkswaterstaat. (n.d.). Deltawerken: Bescherming tegen hoogwater. Retrieved April 9, 2025, from https://www.rijkswaterstaat.nl

SCSx Spatial Circularity & Alexander Wandl. (2021). SCSx_2021_Week_3_1_Systemic_design_theory-video [Video]. YouTube. https://www.youtube.com/watch?v=dYbJLGw8j1c

Figure 9. 01.Zeeland's Satelite View. Source: Google Earth ©2025

Appendix

Appendix 1: Innovation Indicator Index

ANNEX E: ANNEX E – INDICATORS – DEFINITIONS, DATA SOURCES, INTERPRETATION

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
1.1.1 New doctorate graduates in science, technology, engineering, and mathematics (STEM) per 1000 population aged 25-34	Number of graduates at doctoral level, in science, technology, engineering, and mathematics (STEM)	Eurostat	Population between and including 25 and 34 years	Eurostat	2022	The indicator is a measure of the supply of new secondstage tertiary graduates in all fields of training (ISCED 8). For most countries, ISCED 8 captures PhD graduates. There is a complex relation between STEM-graduates and innovation in the private sector. STEM-graduates do well as employees within firms with many of them taking up managerial positions.
1.1.2 Percentage population aged 25-34 having completed tertiary education	Number of persons in age class 25-34 with some form of tertiary education (ISCED levels 5-8)	Eurostat	Population between and including 25 and 34 years	Eurostat	2023	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields, because the adoption of innovations in many areas depends on a wide range of skills. The indicator focuses on a younger age cohort of the population, aged 25 to 34, and will therefore easily and quickly reflect changes in educational policies leading to more tertiary graduates.
1.1.3 Percentage population aged 25-64 participating in lifelong learning	The target popoulation for lifelong learning statistics refers to all persons in private households aged between 25 and 64 years. The information relates to all education or training, whether or not relevant to the respondent's current or possible future job. Data are collected through the EU Labour Force Survey	Eurostat	Total population of the same age group, excluding those who did not answer to the question concerning participation in (formal and non-formal) education and training	Eurostat	2023	Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence. The intention or aim to learn is the critical point that distinguishes these activities from non-learning activities, such as cultural or sporting activities.
1.2.1 International scientific co-publications per million population	Number of scietnifc publications with at least one co-author abroad (where abroad is non-EU for the EU)	Scopus	Total population	Eurostat	2023	International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity. For individual countries all publications with at least one co-author outside the country are included, For the EU only publications with at least one co-author in a non-EU Member State are included.
1.2.2 Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country	Number of scientific publications among the top-10% most cited publications worldwide	Scopus	Total number of scientific publications	Scopus	2021	The indicator is a measure for the quality of the research system, as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English-speaking countries given the coverage of Scopus' publication data.
1.2.3 Foreign doctorate students as a percentage of all doctorate students	Number of mobile students from abroad enrolled in doctorate programs (ISCED level 8)	Eurostat	Number of students enrolled in doctorate programs (ISCED level 8)	Eurostat	2021	The share of foreign doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will secure a continuous supply of researchers.

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
1.3.1 Broadband penetration	Number of enterprises with a maximum contracted download speed of the fastest fixed internet connection of at least 100 Mb/s	Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	All enterprises	Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	2023	Realising Europe's full e-potential depends on creating the conditions for electronic commerce and the Internet to flourish. This indicator captures the relative use of this epotential by the share of enterprises that have access to fast broadband. Data on the speed of mobile connections is not available, the indicator on the speed of fixed internet access is the most suitable proxy.
1.3.2 Individuals who have above basic overall digital skills (% share)	Number of individuals with above basic overall digital skills (all five component indicators are at above basic level)	Eurostat, EU survey on the ICT usage in households and by individuals	Total number of individuals aged 16 to 74	Eurostat	2023	Above basic overall digital skills represent the highest level of the overall digital skills indicator, which is a composite indicator based on selected activities performed by individuals aged 16-74 on the internet in four specific areas (information, communication, problem solving, content creation) during the previous 3 months
2.1.1 R&D expenditure in the public sector (percentage of GDP)	Gross domestic expenditure on R&D (GERD) performed by the government sector (GOVERD) and the higher education sector (HERD)	Eurostat	Gross Domestic Product	Eurostat	2022	Research and development (R&D) expenditure represents one of the major drivers of economic growth in a knowledgebased economy. As such, trends in the R&D expenditure indicator provide key indications of the future. competitiveness and wealth of the EU. R&D spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.
2.1.2 Venture capital (percentage of GDP)	Venture capital expenditures is defined as private equity being raised for investment in companies. Management buyouts, management buy-ins, and venture purchase of quoted shares are excluded. Venture capital includes early stage (seed + start-up) and expansion and replacement capital. Three-year averages have been used.	Invest Europe	Gross Domestic Product	Eurostat	2023	The amount of venture capital is a proxy for the relative dynamism of new business creation. For enterprises using or developing new (risky) technologies, venture capital is often the only available means of financing their (expanding) business
2.1.3 Direct government funding and government tax support for business R&D (percentage of GDP)	Sum of GTARD as a percentage of GDP and Direct funding of BERD as a percentage of GDP	OECD	(empty in 2023)	(empty in 2023)	2021	Public financing of R&D can take two forms: Direct funding for R&D through instruments such as grants and public procurement, and Indirect support through the tax system. Direct funding is well captured in the official data on R&D expenditure by source of fund, differentiating between the following sources: Business enterprise sector, Government sector, Higher education sector, Private non-profit sector, and Abroad. Data on R&D funded by the Government sector are available from Eurostat (EU Member States and other European countries), OECD (OECD member states) and UIS (global coverage). Over time, more and more countries have introduced R&D tax incentives. The OECD has started to systematically collect data on R&D tax incentives since 2018 and with the support of the EC data are currently being collected on an annual basis and made available in the 'OECD R&D Tax Incentives database'. In the EU, 21 countries were offering R&D tax relief in 2019, a significant increase compared to only 12 countries offering R&D tax relief in 2000.

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
2.2.1 R&D expenditure in the business sector (percentage of GDP)	Gross domestic expenditure on R&D (GERD) performed by the business sector (BERD)	Eurostat	Gross Domestic Product	Eurostat	2022	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sectors (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
2.2.2 Non-R&D innovation expenditures (percentage of turnover)	Sum of total innovation expenditure by enterprises in all size classes, excluding intramural and extramural R&D expenditures	Eurostat - Community Innovation Survey	Total turnover for all enterprises	Eurostat - Community Innovation Survey	2020	This indicator measures non-R&D innovation expenditure as a percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas.
2.2.3 Innovation expenditures per person employed	Sum of total innovation expenditure by enterprises in all size classes, in Purchasing Power Standard (PPS)	Eurostat - Community Innovation Survey	Total employment in innovative enterprises in all size classes	Eurostat - Community Innovation Survey	2020	The indicator measures the monetary input directly related to innovation activities.
2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel	Percentage of enterprises that provided training to develop/upgrade ICT skills of their personnel	Eurostat	All enterprises	Eurostat, Community Survey of ICT Usage and E-commerce in Enterprises	2022	ICT skills are particularly important for innovation in an increasingly digital economy. The share of enterprises providing training in that respect is a proxy for the overall skills development of employees.
2.3.2 ICT specialists (as a percentage of total employment	Employed ICT specialists as a percentage of total employment	Eurostat	Total employment	Eurostat	2023	Eurostat defines ICT specialists as «workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitute the main part of their job». Operationalised in terms of ISCO codes, this definition converts into a statistical definition of ICT specialists as follow: from 2011 onwards - corresponding to the application of the ISCO-08, Eurostat and OECD adopted a joint approach to define the occupations to be treated as ICT specialists (OECD, 2015).
3.1.1 SMEs introducing product innovations (percentage of SMEs)	Number of Small and Medium sized Enterprises (SMEs) who introduced at least one product innovation. A product innovation is the market introduction of a new or significantly improved good or service with respect to its capabilities, user friendliness, components, or sub-systems	Eurostat - Community Innovation Survey	Total number of Small and Medium sized Entreprises (SMEs)	Eurostat - Community Innovation Survey	2020	Product innovation is a key ingredient to innovation as they can create new markets and improve competitiveness. Higher shares of product innovators reflect a higher level of innovation activities.
3.1.2 SMEs introducing business process innovations (percentage of SMEs))	Number of Small and Medium sized Enterprises (SMEs) who introduced at least one business process innovation (new or improved business process)	Eurostat - Community Innovation Survey	Total number of Small and Medium sized Entreprises (SMEs)	Eurostat - Community Innovation Survey	2020	Many firms innovate not by improving new products but by improving their business processes. Business process innovations include process, marketing and organisational innovations.

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
3.2.1 Innovative SMEs collaborating with others (percentage of SMEs)	Number of innovation-active Small and Medium sized Enterprises (SMEs) that co-operated on business activities with other enterprises or organisations	Eurostat - Community Innovation Survey	Total number of Small and Medium sized Entreprises (SMEs)	Eurostat - Community Innovation Survey	2020	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate in the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms, and between firms and other firms. The indicator is limited to SMEs, because almost all large firms are involved in innovation co-operation.
3.2.2 Public-private co-publications per million population	Number of public-private coauthored research publications. The definition of the «private sector» excludes the private medical and health sector. Publications are assigned to the country in which the business companies or other private sector organisations are located.	Scopus	Total population	Eurostat	2023	This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications.
3.2.3 Job-to-job mobility of Human Resources in Science & Technology	Job-to-job mobility of Human Resources in Science & Technology as a percentage of the working age population aged 25 to 64	Eurostat	Working age population aged 25-64	Eurostat	2020	Human Resources in Science & Technology (HRST) are people who fulfil one or other of the following conditions: 1) have successfully completed a tertiary level education; 2) not formally qualified as above but employed in a S&T occupation where the above qualifications are normally required. Job-to-job mobility in this context is defined as the movement of individuals between one job and another from one year to the next. It does not include inflows into the labour market from a situation of unemployment or inactivity.
3.3.1 PCT patent applications per billion GDP (in PPS)	Number of patent applications filed under the PCT	OECD	Gross Domestic Product, in Purchasing Power Standard (PPS)	Eurostat	2020	The capacity of firms to develop new products will determine their competitive advantage. One measure of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications.
3.3.2 Trademarks applications per billion GDP (in PPS)	Number of trademark applications applied for at EUIPO	European Union Intellectual Property Office (EUIPO)	Gross Domestic Product, in Purchasing Power Standard (PPS)	Eurostat	2023	Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and it is a form of communication, a basis for publicity and advertising.

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
3.3.3 Designs applications per billion GDP (in PPS)	Number of individual designs applied for at EUIPO	European Union Intellectual Property Office (EUIPO)	Gross Domestic Product, in Purchasing Power Standard (PPS)	Eurostat	2023	A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programmes. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State, and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States.
4.1.1 Employment in knowledge-intensive activities (percentage of total employment)	Percentage of employed persons in knowledge-intensive activities in business industries	Eurostat	Total employment	Eurostat	2023	Knowledge-intensive activities provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy.
4.1.2 Employment in innovative enterprises	Number of employed persons in innovative enterprises	Eurostat - Community Innovation Survey	Total employment for entreprises with 10 employees or more	Eurostat - Community Innovation Survey	2020	Innovation in enterprises has a profound impact on the employability of workers, but its effect in product- and process-innovation oriented firms varies across countries. Firm innovation proves to be specifically important during a time of economic recession. Although high-skilled employees are less affected by a recession than low-skilled employees, a notable positive effect is observed for low-skilled employees in innovative firms as well.
4.2.1 Exports of medium and high technology products as a share of total product exports	Sum of the trade value of medium and high-tech product exports. Medium and high-tech products are defined as the following SITC Rev.4 product categories: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891	Eurostat, UNComtrade	Total value of all product exports	Eurostat, UNComtrade	2023	The indicator measures the technological competitiveness of the EU, i.e. the ability to commercialise the results of research and development (R&D) and innovation in international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies are vital for the competitiveness of a country in the modern economy. Medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment.
4.2.2 Knowledge-intensive services exports as percentage of total services exports	Value of knowlege-intensive service exports. Knowledge-intensive services are defined as the sum of credits in EBOPS 2010 (Extended Balance of Payments Services Classification) items SC1, SC2, SC3A, SF, SG, SH, SI, SJ and SK1	Eurostat, UNCTAD	Total value of all service exports	Eurostat, UNCTAD	2022	The indicator measures the competitiveness of the knowledge-intensive services sector. Competitivenessenhancing measures and innovation strategies can be mutually reinforcing for the growth of employment, export shares and turnover at the firm level. It reflects the ability of an economy, notably resulting from innovation, to export services with high levels of value added, and successfully take part in knowledge-intensive global value chains.

Indicator	Definition numerator	Source numerator	Definition denominator	Source denominator	Most recent year for which data are available	Interpretation of last year
4.2.3 Sales of new-to-market and new-to-enterprise innovations as percentage of turnover	Turnover from new or significantly improved products for all entreprises	Eurostat - Community Innovation Survey	Total turnover for all enterprises	Eurostat - Community Innovation Survey	2020	This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the firm and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new-to-market products) and the diffusion of these technologies (new-to-firm products).
4.3.1 Resource productivity	Resource productivity is expressed by the amount of GDP (in Purchasing Power Standard (PPS) generated per unit of direct material consumed (in kilograms)	Eurostat	(empty in 2023)	(empty in 2023)	2022	Resource productivity is a measure of the total amount of materials directly used by an economy (measured as domestic material consumption (DMC)) in relation to GDP. It provides insights into whether decoupling between the use of natural resources and economic growth is taking place. Resource productivity (GDP/DMC) is the EU sustainable development indicator for policy evaluation. Domestic material consumption (DMC) measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.
4.3.2 Air emissions by fine particulate matter (PM2.5) in Industry	Air emissions by fine particulate matter (PM2.5) in the Manufacturing sector in Tonnes	Eurostat	Value added in the Manufacturing sector - Chain linked volumes (2010), million euro	Eurostat	2021	Air pollution may be anthropogenic (human-induced) or of natural origin. Air pollution has the potential to harm both human health and the environment: particulate matter (PM), nitrogen dioxide and ground-level ozone are known to pose particular health risks. Long-term and peak exposures to these pollutants may be associated, among other impacts, with cardiovascular and respiratory diseases or an increased incidence of cancer. This indicator captures average concentration levels of fine particulate matter (PM2.5 — particles with a diameter of 2.5 micrometres or less) to which the population is exposed. The EU set an annual limit of 25 $\mu g/m^3$ for fine particulate matter in Directive 2008/50/EC27 on ambient air quality and cleaner air, while the World Health Organisation (WHO28) set a more stringent, but non-binding guideline value, whereby annual mean concentrations should not exceed 10 $\mu g/m^3$ in order to protect human health. PM2.5 is considered by the WHO as the pollutant with the highest impact on human health.
4.3.3 Development of environment-related technologies, percentage of all technologies	Number of environment-related inventions	OECD	Total number of patents	OECD	2019	The number of environment-related inventions is expressed as a percentage of all domestic inventions (in all technologies). Indicators of technology development are constructed by measuring inventive activity using patent data across a wide range of environment-related technological domains (ENVTECH), including environmental management, waterrelated adaptation, and climate change mitigation technologies. The counts used include only higher-value inventions (with patent family size ≥ 2). Data are obtained from the Patents: Technology development dataset of the OECD Environment Database.

Appendix 2: Interview

FORM OF CONSENT

Delft University of Technology
Faculteit Bouwkunde
AR2U086 R&D Studio
Q3 24/25

Consent Form for interview

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	✠	□
I understand that taking part in the study involves an interview which will be transcribed as text and translated to English.	✠	□
Use of the information in the study		
I understand that information I provide will be used as source for the studio case.	✠	□
I agree that my real name can be used for citations in this research	✠	□

Signatures

Antoine Derksen 20 -02-25

Name of participant [printed] Signature Date

For participants unable to sign their name, mark the box instead of sign

Chelsea Vermeulen 20-02-25

Researcher name [printed] Signature Date

Study contact details for further information: Chelsea Vermeulen, C.Z.Vermeulen@student.tudelft.nl

INTERVIEW SCRIPT

Energy Campus Zeeland
Main goal from the organisation is to bring the outside world inside (from practical to the classroom)
They have full time students, students who study 20 hours a week and BBL students and regular education trainings and cursussen

Energy
Zeeland is the energy plug of the Netherlands
- New interventions of going from gas to hydrogen, implementations of big solar parks and they just offered a new course about the energy transition to give students more insights about the meaning of the energytransition, decentralized energy generation, changing the energy supply .
- New jobs and implementations come from the industries, which are supported by regulations and laws of the government and then will come into the educationsystem to educate and prepare students for this new way of working (MBO)
- To see if new interventions actually work, they usually work with smaller pilots to get the opinion of the society.

Zeeland and students
- Zeeland is currently too small of a region to have its own university
- MBO students are bound to the region and want their homes close to their workplace and school
- HBO students are more flexible and are willing to travel more for their education

How to make Zeeland more attractive, so students from HBO and University will stay or return to the Zeeuwse economy?

Think about possibility in culture, recreation, accessibility and labor
- 41% of the total energy usage in the Netherlands can be found in Zeeland
- Industries play a big role
- Zeeland is now primarily known for its touristic identity

How can the identity of Zeeland change, where industry will interact with residential, recreational and touristic areas?
How to use the energy transition to change the touristic identity of Zeeland to a more innovative identity that will attract the younger students?

Main energy domains of Zeeland: Food, Water, Energy
- There is already a large educational system in Zeeland but the energy transition still remains an abstract theme
- Students don't have an industrial past which makes their attitude different compared to other generations
- Students of this generation use a lot of luxury goods (Big usage of energy as a concequence)
- This needs to remain possible, to live as comfortable
- Think about the relationship of their personal opinion and economic footprint
- Economic footprint vs. Societal demand and impact

What are the concequences of their own energy usages and what energy systems are necessary to help this community sustain their way of living?

- Think about the Borssele example of the nuclear plants, where these plants are necessary to fund the way we are living right now.
- General education vs. Practical education

The main accents or topics of education are changing

Its the job of the educational sector to ensure students think about sustainable living and how to create a sustainable society

"This generation is much more flexible compared to the older generations"

A lot of the influence is from top down institutions like the Rijksoverheid who wants to create more awareness among the people about the energy transition by:
- Informationcampagnes
- New laws like waste seperation

We need a combination of government institutions, companies, economic opportunities, education, citizen initiatives

"What kind of offer are we as a society willing to bring to continue our way of living?"

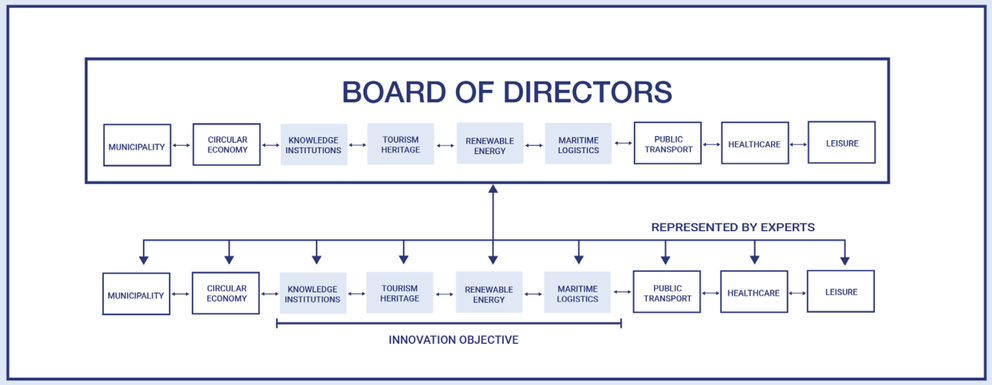
Appendix 3: Spatial Planning Policies

Policy	Cultural Heritage and Spatial Quality	Mobility	Knowledge-Education	Economy-Industry	Energy	Others
NOVEX Zeeland - North Sea Port District (Ghent - Terneuzen - Vlissingen port)	• Coastal zone for recreation • Space demand for forest, nature, and green-blue network	Improving connections • Road (Rotterdam, Zierikzee, Goes, Vlissingen port, Terneuzen, Ghent) • Railway (to Antwerp)improving international connections	Zeeland's economic and industrial transitions (e.g., energy transition, circular economy) create demand for skilled workers. This could lead to new educational programs in sustainability, energy, and logistics	New opportunities for business sectors: hydrogen production, offshore wind energy, and circular industries	• Expansion and/ or optimizing industrial lands • Energy storage in Vlissingen and Terneuzeun • Energy plant development in Vlissingen	Challenge with connectivity and accessibility could affect ability to commute to educational institutions.
National Delta Program			The Southwest Delta as an international paragon of a sustainable, highly innovative and circular agricultural sector and food chain		• Energy from water (tidal, wave) • Wind turbines along the edges of delta waters • Aquathermy as an alternative heat source • Landing of power cable from offshore wind energy areas.	
Nota Ruimte (is still being constructed, but will eventually be a binding vision in line with the omgevingswet)					solar panels on roof get priority to 'safe' landscapeslarge-scale offshore energy generation	
Ruimte voor Economie	Mixed use development: integrating work, education, and residential functions in a way that supports economic vitality	• Accessible and well-connected business districts, particularly campuses and industrial clusters • Innovation clusters are well served by public transit, making them accessible to students and professionals • Efficient mobility for logistics and supply chains, with an emphasis on multimodal transport to reduce emissions	• Emphasizes the need for knowledge clusters and innovation districts, such as campuses that bring together universities, research institutions, and industrie • The transition to a circular and climate-neutral economy requires new skills, pushing for stronger connections between education and industry		Energy transition goals will require significant space for wind farms, solar energy, hydrogen production, and battery storage	
NOVI: Nationale omgevings visie (Leading policy untill Nota Ruimte is finished)	• Preserving the core qualities and collective values of the coastal while also developing the coastal zone on the other. • Unique landscape qualities are strengthened and protected.	• By 2030 most vehicles electrical, and by 2050 all transport emission free • Strategic corridors placed along water canals • The focus is on optimal (inter) national accessibility of cities and the economic core area • MIRT		• The central government invests, facilitates with knowledge and research and sets requirements for the utilisation of circular raw materials and is committed to reducing raw material use by 50 per cent by 2030 • Physical and environmental space must remain available for port and industrial area • Utilize energy hubs	• Wind turbine parks in the North Sea, the balance between energy production at sea and other spatial needs on sea (fishing, ecosystems etc) are investigated in Programma Noordzee 2022-2027 • Making the energy infrastructure suitable for renewable energy sources and reserving space for them	Cities develop sustainably through a coherent approach to living, working, mobility, health, safety and environmental quality: using an integrated urbanisation strategy
National Rural Area Programme	• Preserving Natura 2000 and its extension/ buffer area • Guidelines for balancing rural development with nature conservation, including spatial strategies for agriculture, water, and climate adaptation	• Low emission transportation	Universities and research institutes are expected to play a role in advancing sustainable farming, water management, and energy transition	Industrial growth is not a primary focus, industries linked to rural development, such as sustainable food production and bio-based materials, are mentioned.		

Appendix 4: New Governance System - Knowledge Clusters

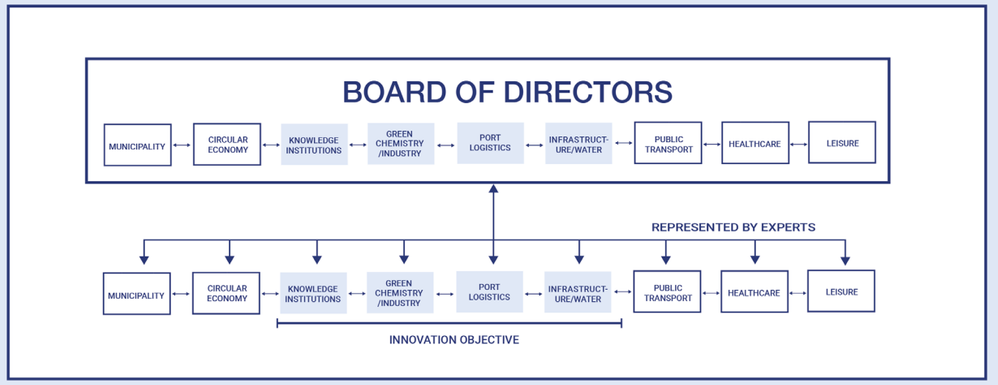
KNOWLEDGE CLUSTER MIDDELBURG/VLISSINGEN

This cluster drives Zeeland's energy transition and coastal economy through offshore wind, maritime trade, and heritage-driven tourism



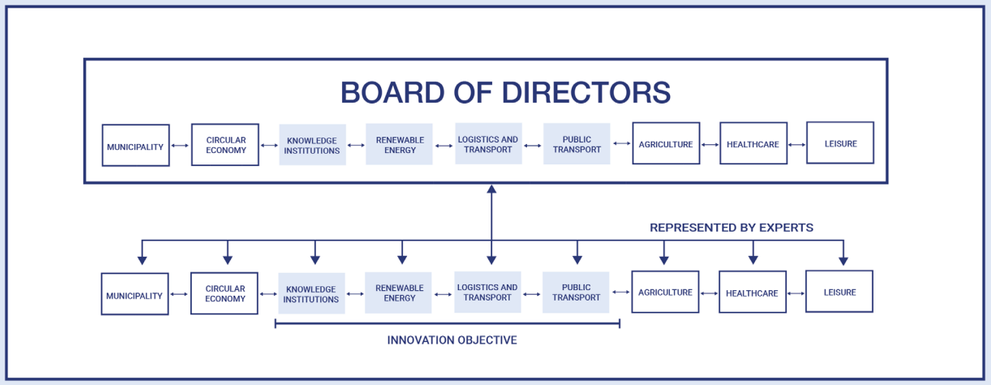
KNOWLEDGE CLUSTER TERNEUZEN

Terneuzen leads in green industry and infrastructure innovation, blending chemistry, canal networks, and technical education



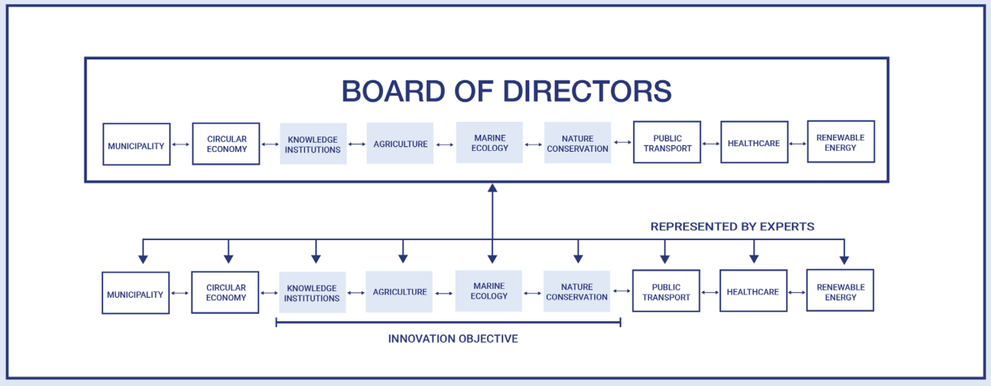
KNOWLEDGE CLUSTER GOES

Goes serves as Zeeland's logistics and mobility hub, connecting regional mobility, education and all knowledge clusters



KNOWLEDGE CLUSTER ZIERIKZEE

Zierikzee specializes in circular innovation in agriculture and ecological maintenance in Zeeland's delta landscape



KNOWLEDGE CLUSTER BRESKENS

Breskens strengthens Zeeland's coastal innovation position by integrating a new pioneering energy infrastructure through the Battery Island