From Pieces to Players

A Just Energy Transition for the People in the Groningen Gasfield Region

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Spatial Strategies for the Global Metropolis

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AI disclosure statement

During the preparation of this work the authors used OpenAI ChatGPT4 to harmonize text, improve writing style and check grammar and spelling. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Abstract

The transition from fossil fuels to renewable energies is profoundly transforming the Dutch province of Groningen - a region long shaped and heavily affected by the environmental consequences of decades-long gas extractions, most notably induced earthquakes. While gas production from the large Groningen gas field officially ceased in 2024 following years of public protest, the ongoing expansion of renewable energy infrastructure continues to alter spatial conditions and affect local livelihoods. Expert-driven, top-down planning approaches frequently marginalize local perspectives, raising critical questions of spatial justice and community agency within transition processes.

This project investigates how regional design strategies might contribute to spatial justice - understood through its three interrelated dimensions: recognitional, procedural, and distributive justice (Rocco, 2023). The research combined initial fieldwork with secondary data analysis. Quantitative analysis of socio-economic data (CBS) provided insights into regional disparities. Spatial analysis of publicly available GIS datasets mapped the spatial impacts of the energy transition. In parallel, a qualitative media analysis of 52 newspaper articles highlighted local perspectives, with a particular focus on protest movements.

This multi-layered analysis enabled the delineation of a “transition community“ - residents whose experiences of injustice have led them to self-organize and reclaim agency in shaping their environment by protesting. To support procedural justice and foster dialogue between stakeholders, the project developed a participatory “energy transition game“. The game translates complex spatial data and negotiation dynamics into an accessible tool, allowing players to discuss trade-offs, explore scenarios, and co-produce strategies for the region’s energy future.

While time constraints limited the involvement of real stakeholders in gameplay, the tool proved valuable for identifying potential conflicts, synergies, and spatial interventions. The game process demonstrated the potential of serious games as critical instruments within participatory planning, enabling residents not only to understand complex transition dynamics but also to actively shape them through negotiation with other actors, thereby promoting more just and inclusive planning processes.

Keywords

Spatial Justice, Energy Transition, Participatory Planning, Serious Games, Groningen

Content

01 INTRODUCTION

Urgency

Climate change is an undeniable reality with far-reaching environmental, economic, and social consequences. Increasingly severe extreme weather events highlight the urgency for action. To combat climate change effectively, a transition from fossil fuels to renewable energy is inevitable.

Numerous laws and agreements have established binding targets to drive the energy transition forward. The Netherlands set its own climate goals in the 2019 Climate Law, following the Paris Agreement (2015). The European Green Deal introduced even more ambitious targets, requiring the Dutch government to update its Climate Law in 2023. These high-level ambitions are inherently top-down, often overlooking the impact on individuals - particularly those in transition-affected areas. As a result, many feel left behind, unheard and unfairly burdened.

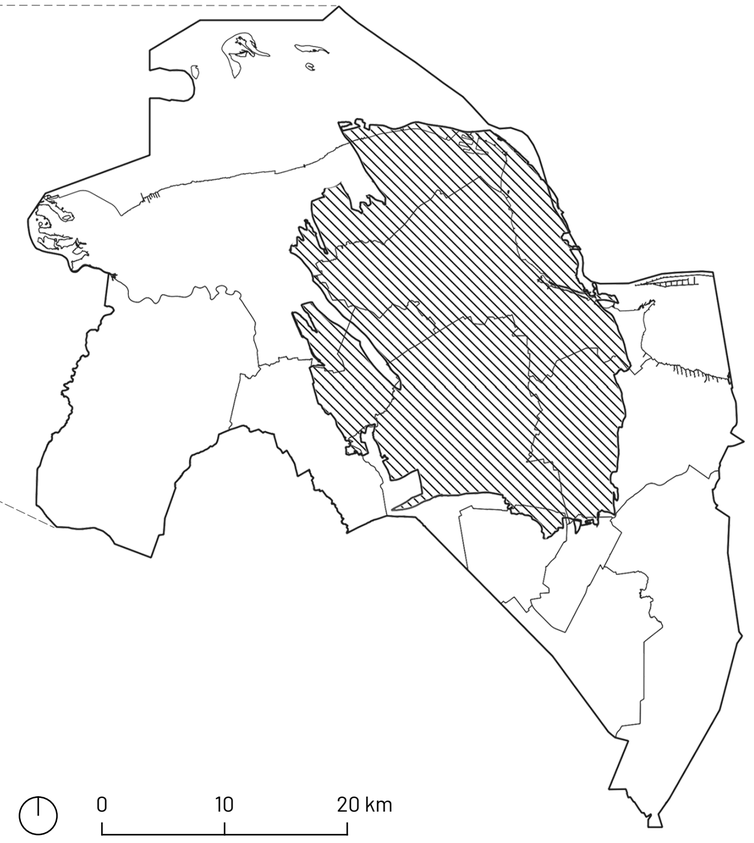
1.5° emissions
55% below 1990 levels by
35 TWh **2030**
2050 climate neutral

UNITED NATIONS	EUROPEAN UNION	THE NETHERLANDS
1992 UNFCC (United Nations Framework Convention on Climate Change)	*2001* Directive 2001/77/EC1997 on the promotion of electricity produced from renewable energy sources in the internal electricity market	*2013* Energieakkoord (Energy Agreement)
1997 Kyoto Protocol	*2009* Renewable Energy Directive 2009/28/EC (RED I)	*2013* Klimaatagenda (Climate Agenda)
	2018 Renewable Energy Directive 2018/2001 (RED II)	*2016* Energieagenda (Energy Agenda)
	2018 The European Green Deal —> European Climate Law —> Fit for 55 - Package	*2018* Law prohibiting coal in electricity production by 2030
		2019 Klimaatwet (Climate Law)
		2019 Klimaatakkoord (Climate Agreement) —> Regional Energy Strategies (RES)
		2019 Surpreme Court Ruling Urgenda v. State of the Netherlands
CURRENT GOALS	***CURRENT GOALS***	***CURRENT GOALS***
2015 Paris Agreement *to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to **limit the temperature increase to 1.5°C** above pre-industrial levels."* (United Nations, 2015)	*2021* European Climate Law ***reduce emissions** by at least **55% by 2030**, compared to 1990 levels* *reach **climate neutrality by 2050***	*2021* Regional Energy Strategies *at least **35 TWh of renewable energy produced on land by 2030**, aim for 55 TWh*
	2023 Renewable Energy Directive 2023/2413 (RED III) *by 2030 at least 42,5% of energy consumed in the EU is **renewable energy*** *—> goal for the **Netherlands: 39% by 2030***	*2023* Klimaatwet (implementing EU Law) ***reduce emissions** by at least **55% by 2030**, compared to 1990 levels* *reach **climate neutrality by 2050***

Figure 1.1 Former and current policies defining energy-transition and climate goals for the Netherlands

Location

Province of Groningen



Groningen Gasfield

Location

The Province of Groningen is located in the north-east of the Netherlands, bordered by the Wadden Sea to the north and Germany to the east. The historic distinction between the *"Stad"* - the City of Groningen which has Saxon origins and lies at the heart of the province - and the *"Ommelanden"*, the surrounding countryside of largely Frisian origin, gives the province its byname "*Stad en Ommelanden*".

Groningen Province has approximately 596,000 inhabitants, with around 40% of those living in the city of Groningen, making it one of the least densely populated provinces in the Netherlands, ranking fourth after Drenthe, Friesland, and Zeeland (CBS, 2023). Agriculture has long been the region's primary economic driver, with with around 80% of the province's land dedicated to farming.

Beneath the province lies Europe's largest gas field. Its discovery in 1959 was a major turning point for the region, transforming Groningen into the Netherlands' main energy supplier and generating hundreds of billions of euros in revenue for the Dutch state. Today, the region hosts a diverse range of energy infrastructure, including gas extraction points and pipelines, multiple wind farms and solar parks, a coal-fired power plant and two gas-fired power plants, as well as a network of high-voltage power lines that run through the landscape.

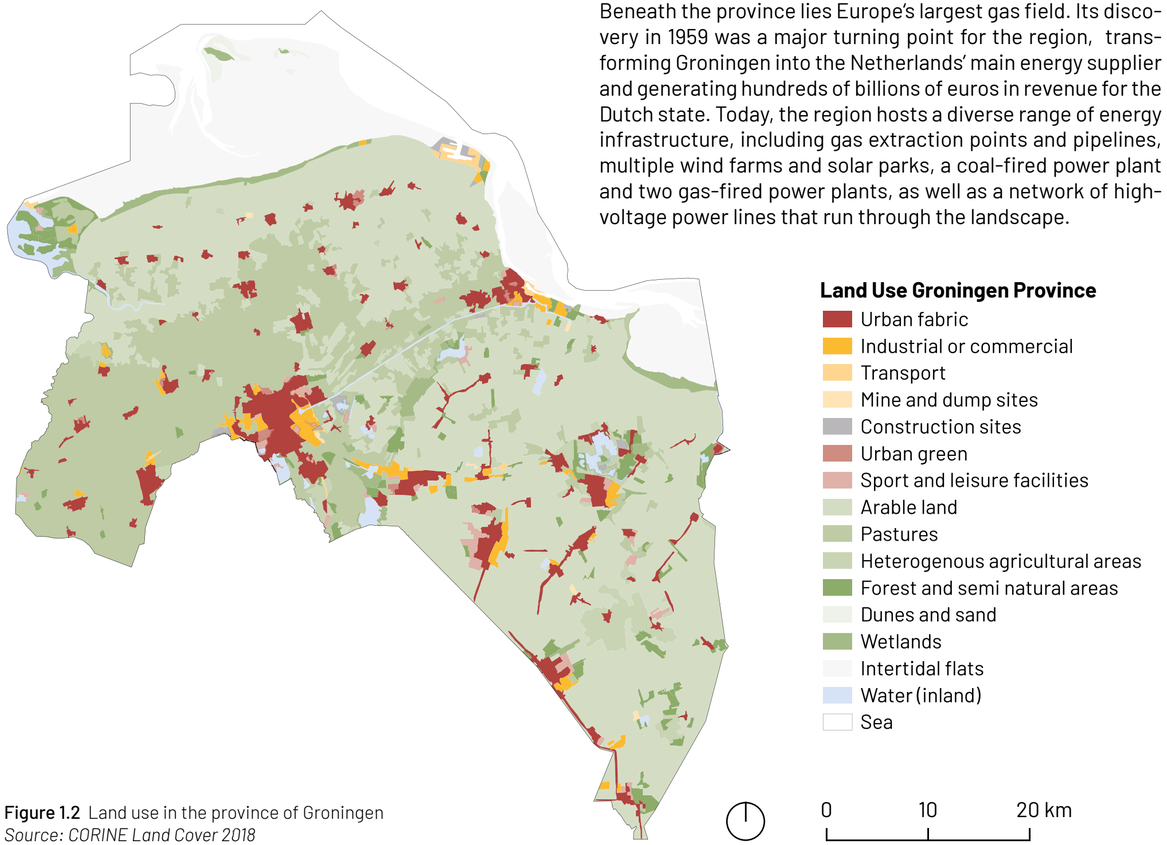


Figure 1.2 Land use in the province of Groningen
Source: CORINE Land Cover 2018

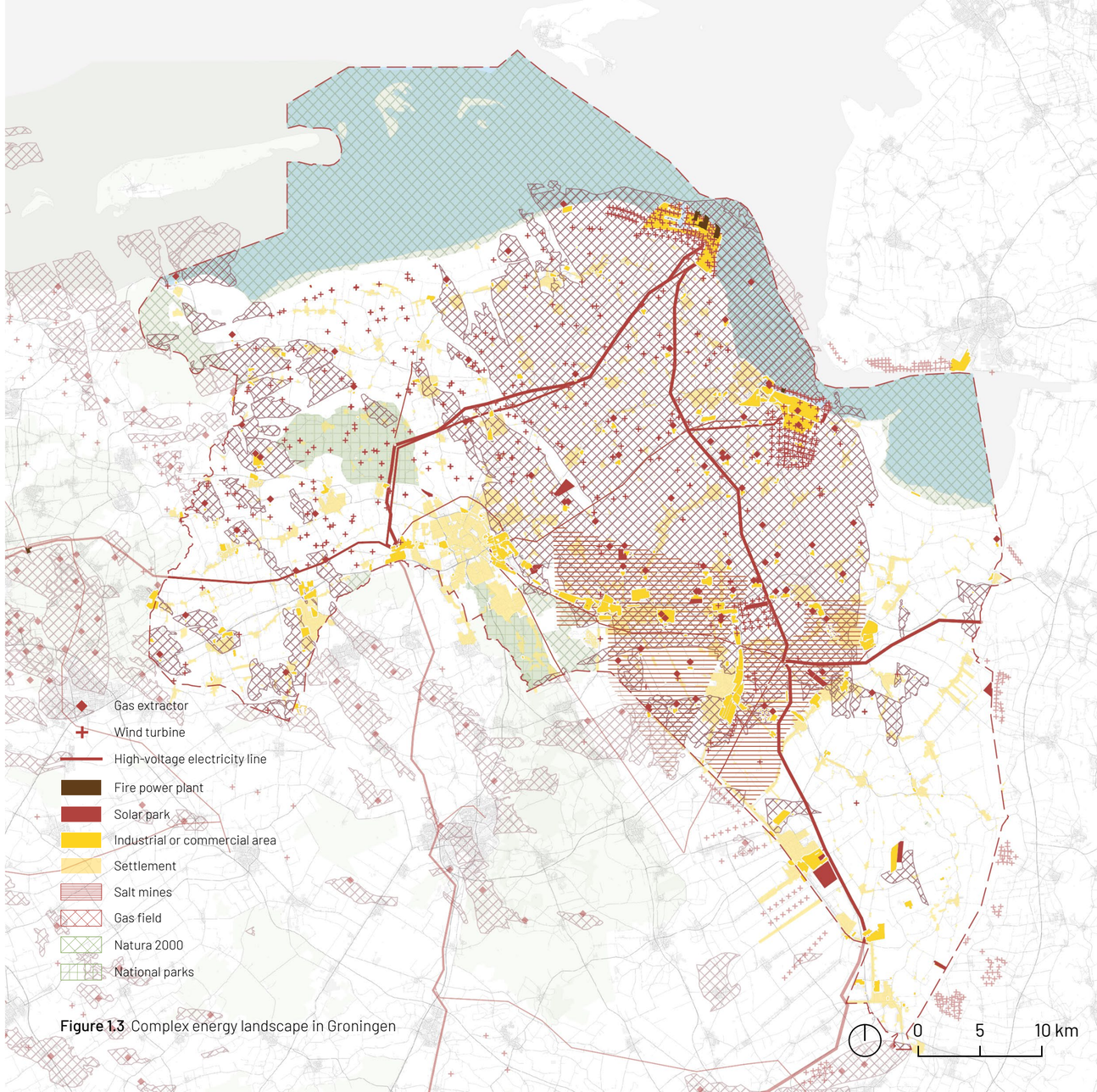
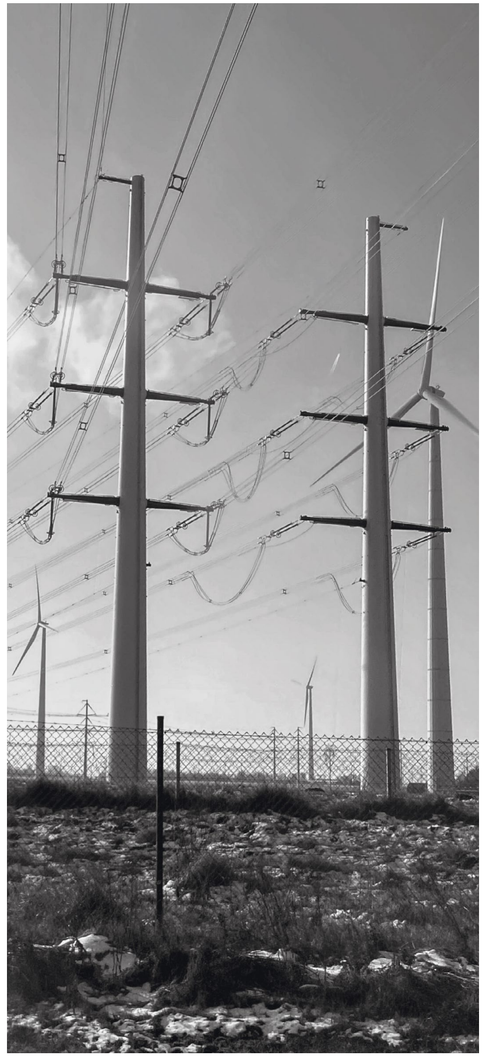


Figure 1.3 Complex energy landscape in Groningen

Energyscapes



Energyscapes

Click here (https://youtu.be/xfFjeOyG-P4) to get a glimpse of the energy landscape in Groningen.

Everything is connected

Groningen in the Network

The Groningen gas field was one of the main sources of European domestic gas supply since its discovery in 1959, producing vast quantities of natural gas. With an initial reserve of about 2,800 billion cubic meters, the Groningen gas field still ranks high among the world's largest gas fields. However, after recurrent earthquakes caused by gas extraction, the Dutch government decided to end natural gas production from the field.

Natural gas extraction in the Netherlands continued to decline in 2023, falling by a total of 34 percent. Onshore extraction decreased by 47 percent, while offshore extraction fell by 19 percent. The Groningen gas field was permanently shut down in 2024. However, much smaller gas fields in the Province of Groningen remain in operation. Dwindling domestic extraction and increasing imports mean that gas reserves are now being replenished with gas from abroad.

The closure of the Groningen gas field not only affects the Dutch domestic gas market but also has implications for the European market, which in 2013 relied on Groningen for more than 10 percent of its gas supply (GEFC). As a result, the Netherlands now imports more gas than it exports to meet its demand.

In addition to housing Europe's largest gas field, Groningen is also significant for its production of electricity from wind, solar, gas and coal. In 2016, the Province of Groningen produced 858 million kilowatt-hours (kWh) of electricity, representing 14.56 percent of the total electricity production in the Netherlands (5,892 million kWh) (CBS). In 2022, the Netherlands became a net exporter of electricity.

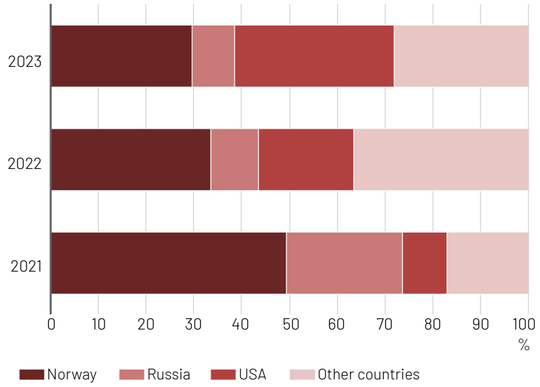


Figure 1.4 Dutch imports of natural gas by originating country
Source: CBS Data

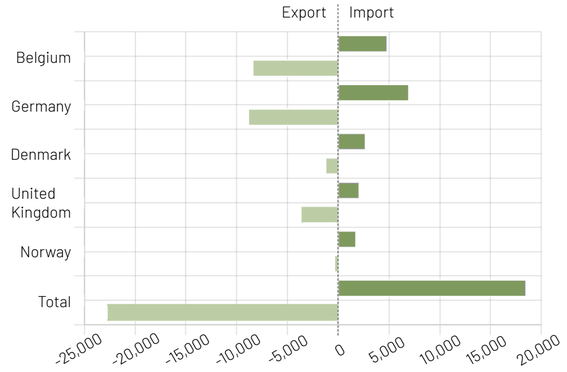
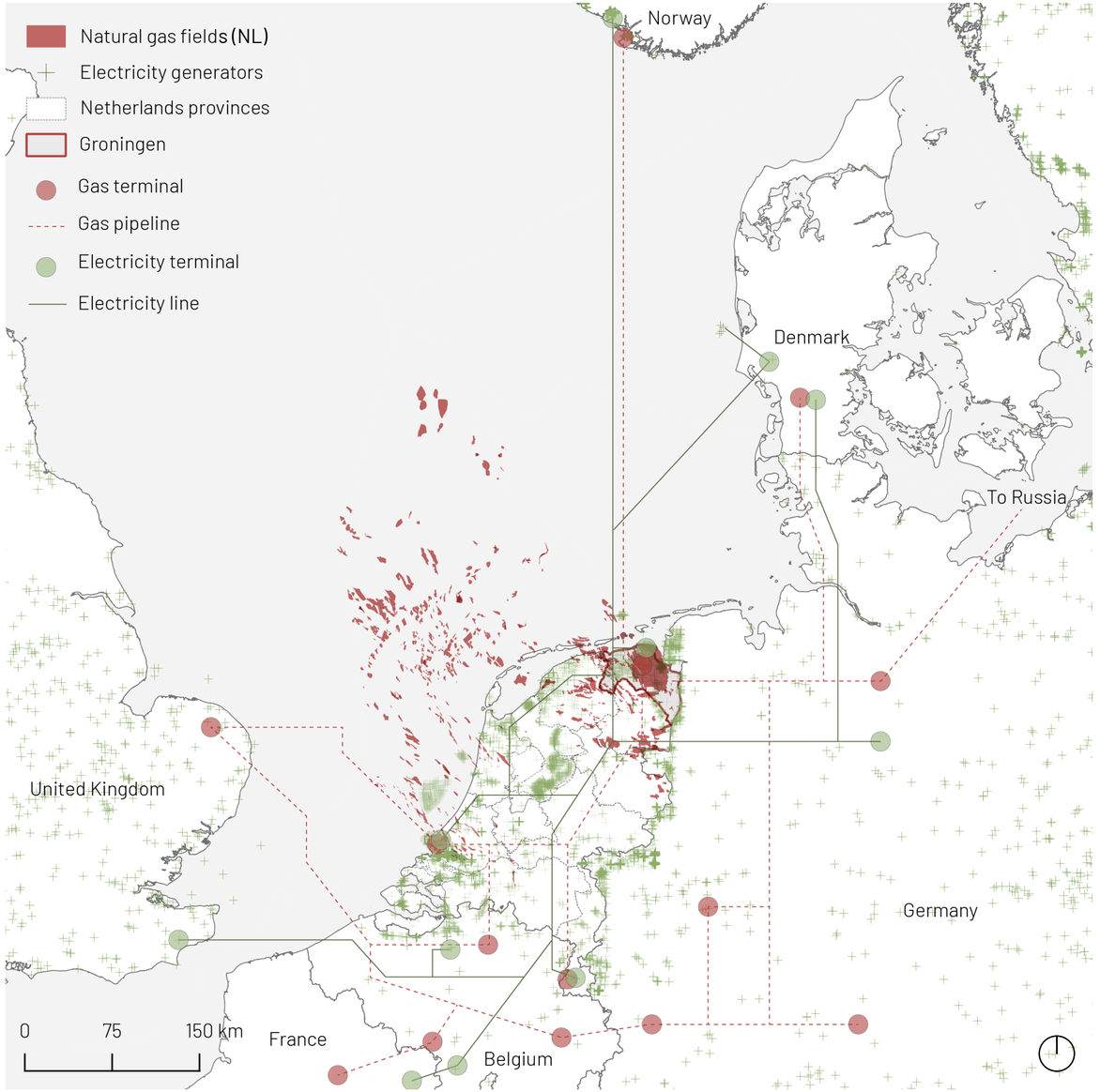


Figure 1.5 Dutch electricity import and export by country in 2022, GWh
Source: CBS Data

Figure 1.6 (right page) Groningen in the European Energy Network
Source: PDOK.nl, NLOG.nl, spectator.clingendael.org, mapsforeurope.org



Transitions

While increasingly ambitious climate targets may appear promising, they remain just that - targets and ambitions. It is highly unlikely that the Netherlands will meet its 2030 climate goals (PBL Netherlands Environmental Assessment Agency, 2024). Notably, 2024 marked the first year in which the global average temperature exceeded 1.5°C above pre-industrial levels. Falling short of these goals means that even more significant action is required. The energy transition must accelerate - bringing with it far-reaching impacts. Groningen already offers a glimpse of these effects, acting as a transition area where the spatial consequences of national ambitions become visible, directly shaping the lives and surroundings of its residents.

A Landscape Shaped by Transitions

The Groningen region has undergone profound transformations over time. Its proximity to the sea meant that, for centuries, its coastline was shaped by tides and floods. Before the first dikes were built, large parts of the province were salt marshes ("kwelderlandschap"), regularly flooded by the tides. Settlements were only possible on *terps*, artificial mounds built to provide protection from the sea. Following the construction of dikes, windmills were used to reclaim land from the sea. These innovations gradually transformed Groningen into a productive and prosperous agricultural region. To this day, the dominance of agriculture remains evident in the landscape, which is largely made up of farmland with little forest or natural wilderness.

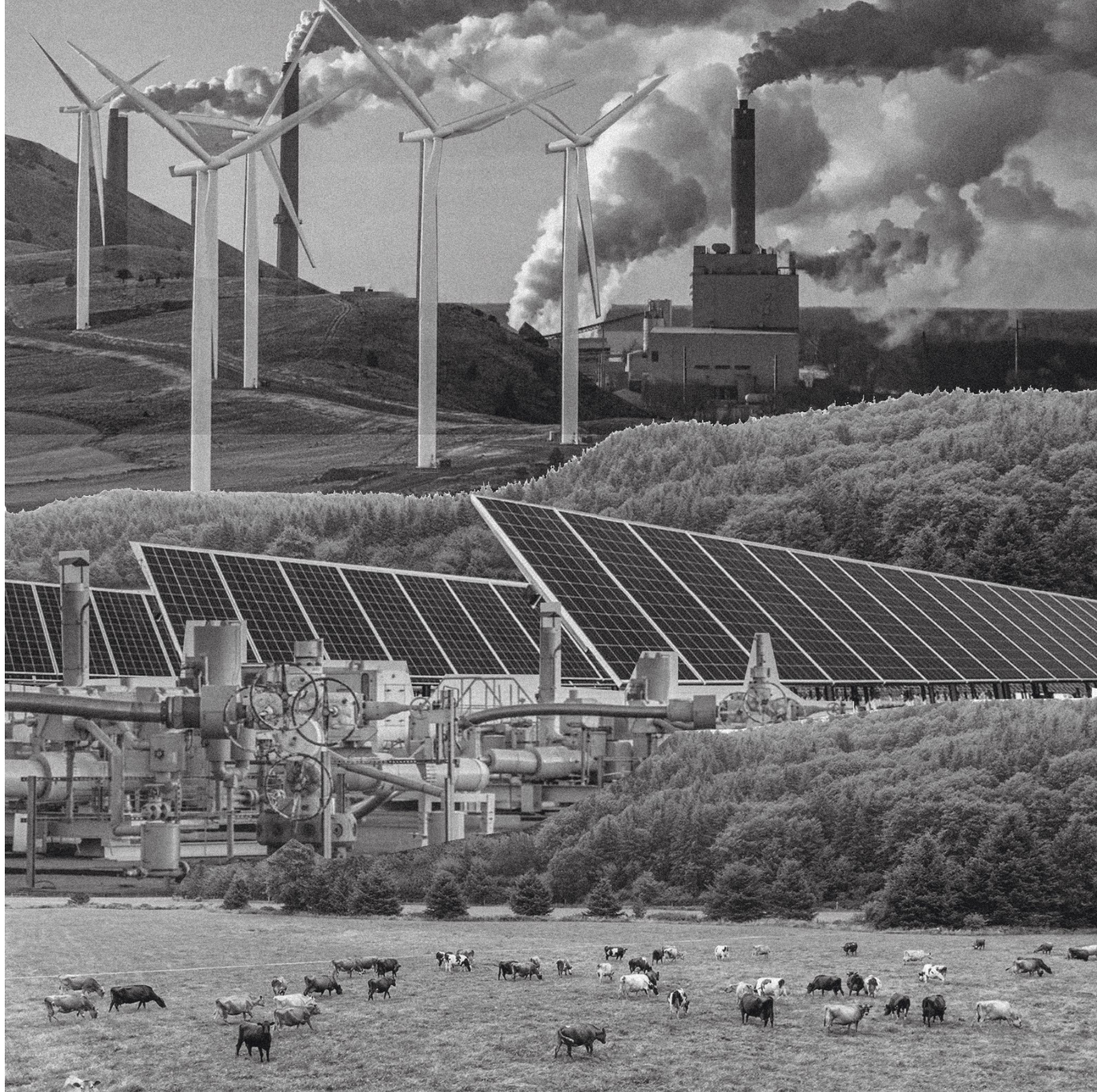
As previously described, the discovery of Europe's largest gas field in 1959 marked yet another major transformation. Groningen became the Netherlands' primary energy supplier, generating enormous revenues for the state. However, continuous gas extraction led to earthquakes, causing widespread damage and sparking public protest. This ultimately led the Dutch government to end gas extraction in 2024. While the physical infrastructure of gas extraction - small wells scattered across the landscape - remains relatively unobtrusive, the ongoing earthquakes have had, and continue to have, a profound impact on the lives of local residents.

Today, the energy transition is once again visibly reshaping Groningen. As climate goals become more ambitious and the urgency for action grows, renewable energy infrastructure has emerged across the province. At the same time, former gas extraction sites are being demolished - leaving behind empty land, as if nothing had ever happened. Wind parks and solar fields are now prominent features of the landscape. While these technologies do not pollute the environment in the same way fossil fuels do, they nonetheless affect the quality of life for local communities.

Looking ahead, even more renewable energy infrastructure will be needed to replace the fossil fuels on which the Netherlands relied for decades. The energy that once came cheaply and locally now demands new technologies, new spaces, and new negotiations - over who is affected, and how.

"I was in Eemshaven for the first time in 2004. This place has changed a lot since then."

Wind-Energy-Consultant from Bremen, interviewed in Eemshaven



Energy Transitions in Groningen

18th century

The oldest still existing windmill in the Province of Groningen dates back to 1783. Around that time the first polders were created, transforming Groningen into a prosperous agricultural landscape.

1963

In 1959, the Groningen gas field was discovered near Slochteren. Natural gas production started from 1963.

Natural Gas

1986

The first induced earthquakes were detected in 1986. They were rare at first but grew stronger and more frequent over time, causing significant damage to local households.

2009

In 2009, the first big wind farm in Groningen was constructed and put into operation. In the following years additional wind farms were developed.

2018

In 2018, large-scale protests erupted in Groningen, demanding that the government shut down natural gas extraction.

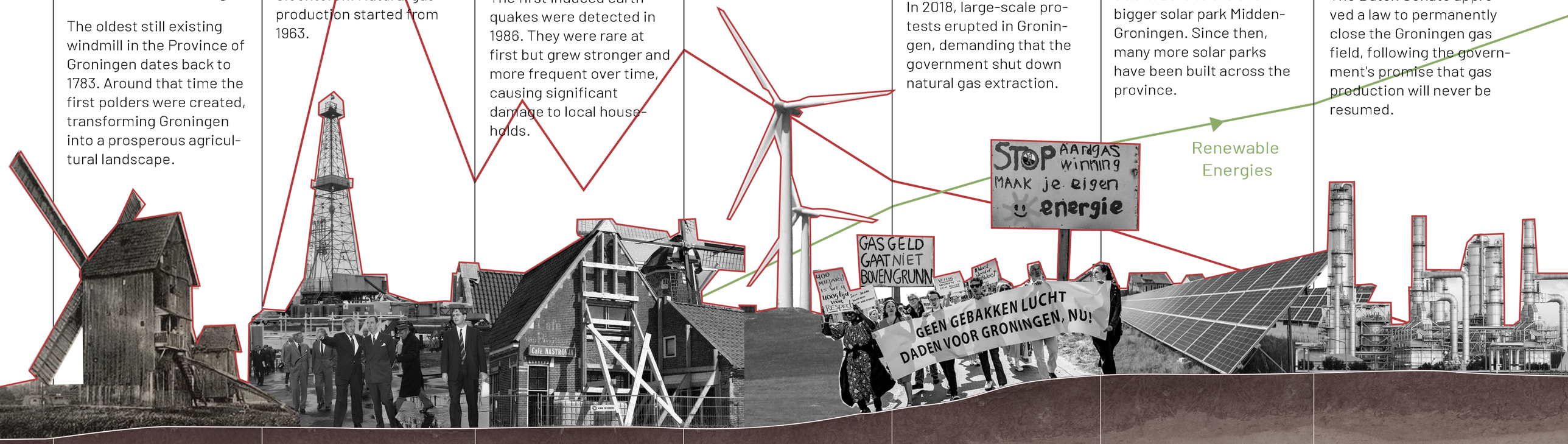
2019

The largest solar park in the Netherlands at the time was built near Delfzijl in 2017 - only to lose its title in 2019 to the even bigger solar park Midden-Groningen. Since then, many more solar parks have been built across the province.

2024

The Dutch Senate approved a law to permanently close the Groningen gas field, following the government's promise that gas production will never be resumed.

Renewable Energies



Windmills | Gas Field | Earthquakes | Wind Farms | Prostests | Solar Parks | Phasing Out

02 METHODOLOGY

Problem Statement and Research Questions

Problem Statement

The Groningen region, undergoing an energy transition from fossil fuels to renewables, plays a crucial role in energy production and distribution at both national and international levels. Although gas extraction from the Groningen gas field, Europe's largest, has been phased out after years of public protest, smaller gas fields in the region are still in production. Fossil-fuel energy infrastructure has to be replaced as the transition progresses. In their place, renewable energy infrastructures, such as wind farms and solar fields, are being developed. The port of Eemshaven remains an important energy hub in the area, as it is an important node in Europe's energy-grid, still hosting fossil fuel power plants (coal and gas) and acting as a base port for offshore wind operations. Plans are in place to expand Eemshaven and further strengthen its role as an energy hub.

However, the continuous gas extractions have severe environmental consequences, most notably induced earthquakes that cause structural damage to homes and infrastructure, negatively affecting livelihoods, health, and overall well-being, leading to population displacement and growing distrust in authorities. Simultaneously, the expansion of new energy infrastructure introduces further challenges, disrupting the cultural landscape, displacing residents, generating noise pollution, and providing limited local benefits while primarily serving the interests of the energy sector and multinational corporations.

Research Questions

This begs the question:

How can regional (design) strategies ensure socio-spatial and economic justice for local communities in the region of the Groningen gas-field, amid the phase-out of fossil energies and the expansion of renewable energies?

Sub-questions:

- What spatial changes (new and old infrastructure) are necessary for the transition from fossil to renewable energies, and where are they occurring?
- What are the impacts of the phase-out of fossil energies and the expansion of renewable energies on the environment, economy, quality of life, and well-being of local communities?
- What are former and contemporary perceptions and experiences of citizens and communities in the Groningen gas-field region regarding the impacts of energy transition?

Data Analysis

After a general introduction to the topic of energy transition in the Netherlands and an exploratory research phase, we selected Groningen as our region of interest. We visited the region for field observations and to gather initial impressions as "neutral visitors." When opportunities arose, we engaged in spontaneous street interviews. Alongside ongoing input lectures and literature review, we performed several secondary data analyses.

Quantitative Data Analysis: To understand the region's socio-economic situation, we analyzed statistical datasets from CBS (Centraal Bureau voor de Statistiek).

Spatial Data Analysis: Publicly available GIS datasets were examined, processed, overlayed and interpreted to map the spatial impacts of the energy transition.

Qualitative Data Analysis: To explore residents' perspectives - particularly those of protesters - we conducted a qualitative media analysis. Using keyword searches in Google and the database Nexis-Uni, we quickly identified a substantial number of articles. A particularly valuable source was *Dagblad van het Noorden*, a local newspaper that extensively covered regional issues and frequently featured interviews with residents. From this pool, we selected 52 articles focusing on protests related to the energy transition, prioritizing those that highlighted protesters' perspectives (for a list of the selected articles, see appendix). As most articles were in Dutch, we translated them into English using Google Translate and DeepL. We focused on articles from the past 20 years to capture the current situation and more recent developments.

The selected articles were coded using ATLAS.ti. We explored AI-based tools, such as named entity recognition, to assist in the coding process. However, all AI-generated results were manually reviewed and refined. This analysis helped identify key themes, including protesters' perceptions of the energy transition, regional conflicts, protest strategies, and active protest groups. A co-occurrence analysis allowed us to identify specific places of conflict and protest. These findings were then mapped to visually represent the results of our analysis.

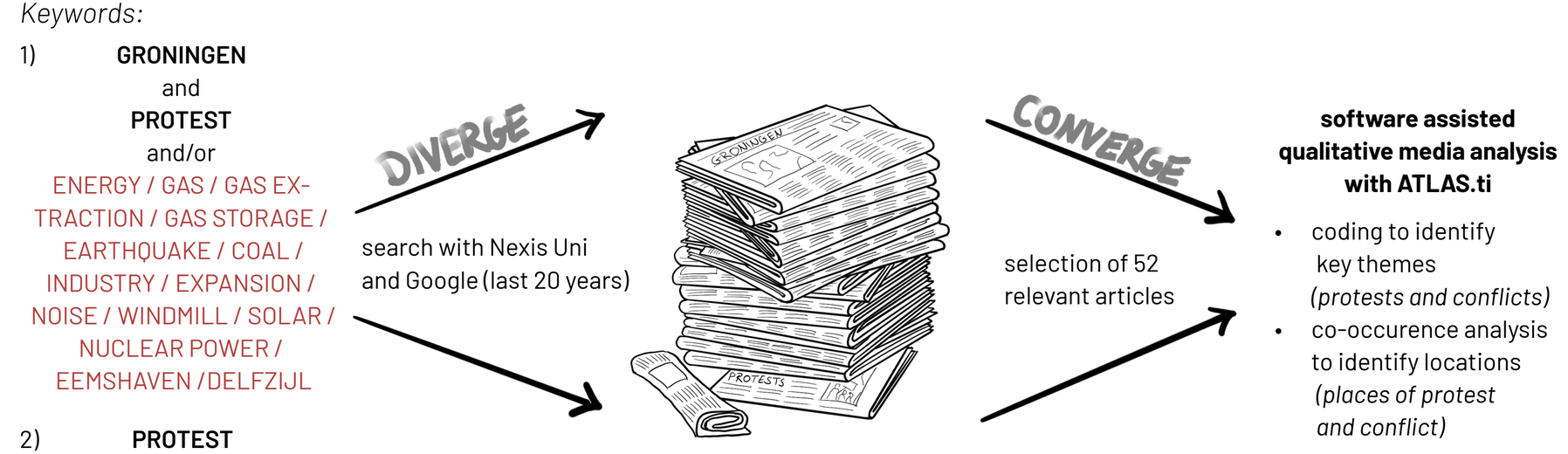


Figure 2.1 Process of the Qualitative Data Analysis

Process

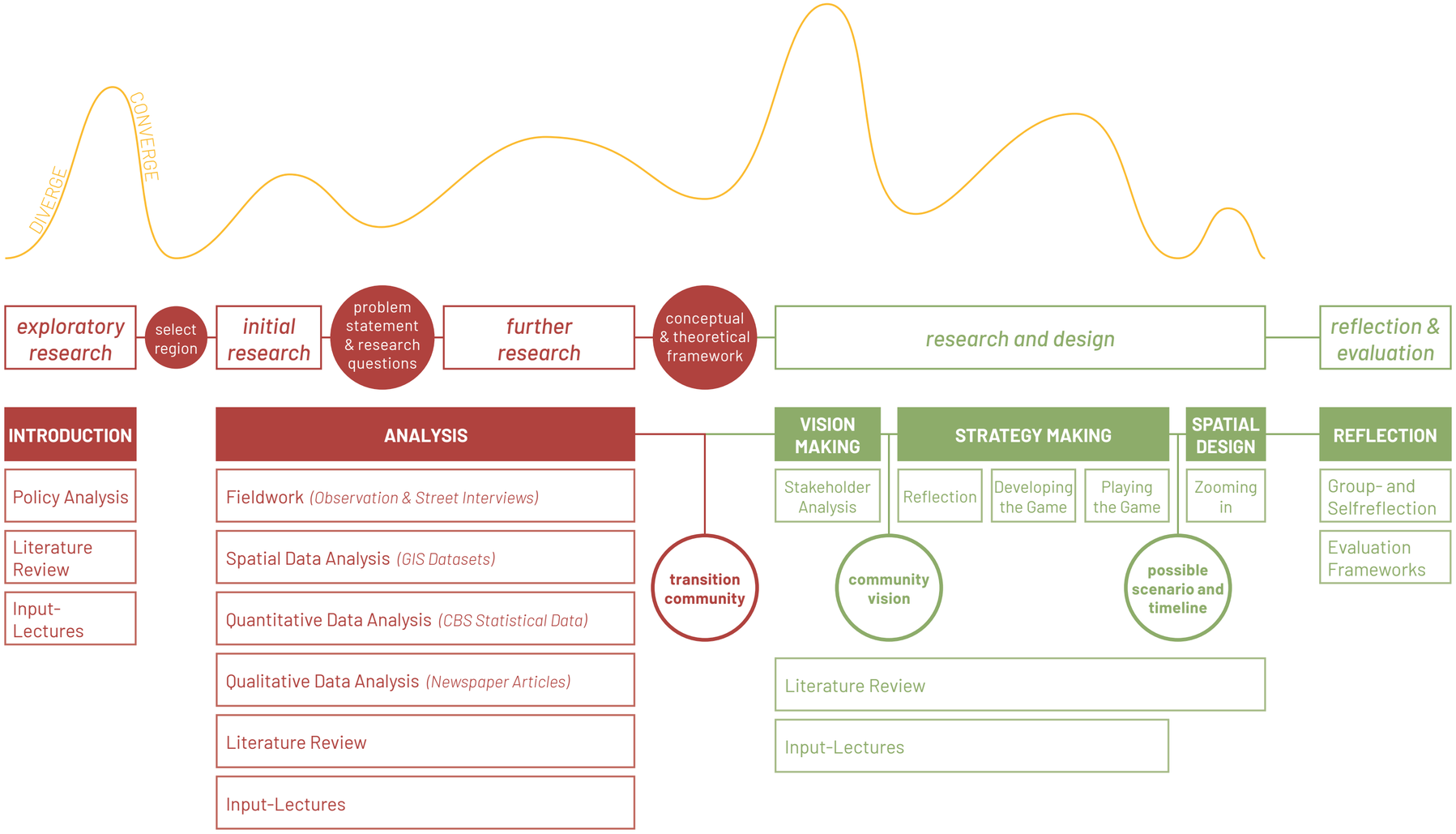


Figure 2.2 Flowchart explaining the project process

The detailed analysis allowed us to define our transition community both spatially and qualitatively. We used these findings to create a comprehensive community vision. After developing the vision, we took time to reflect on our role as planners, our understanding of the region, and our objectives. We recognized that creating a comprehensive "expert masterplan" for such a complex region within a few weeks was unrealistic, and that we see ourselves more as mediators than as expert planners. This led us to develop an "energy transition game", designed to give the community a voice in decision-making. We used the same datasets from our analysis to construct the game board, clustering the data into a hexagonal grid to simplify complex spatial patterns.

Playing the game - by simulating the different stakeholders - helped us identify potential areas of conflict and better understand the negotiation processes and trade-offs essential to a just energy transition. The game produced one possible scenario and timeline for the transition. Conflict areas identified during gameplay became focal points where we zoomed in to develop targeted spatial interventions. Finally, we discussed our key learnings from playing the game and reflected on the project as a whole, drawing on frameworks introduced in our methodology course.

Theoretical Framework

Spatial Justice

A widely recognized framework for sustainability, advanced by numerous scholars, is the concept of the three pillars of sustainable development: environmental, economic, and social sustainability (Purvis, Mao, & Robinson, 2018). Social sustainability is linked to the notion of social justice, which draws on the influential the work of John Rawls in *A Theory of Justice*. Rawls (1999) states that "*justice is the first virtue of social institutions*" (p. 3), and through his work, he offers an alternative moral framework to utilitarianism, emphasizing fairness and equity in the structure of society.

Building on this foundation, scholars such as David Harvey and Edward Soja introduced the concept of spatial justice, highlighting the spatial dimension of social justice. For this report, we adopted the definition of spatial justice proposed by the Centre for the Just City at TU Delft, which identifies three core dimensions of spatial justice: recognitional, procedural, and distributive justice (Rocco, 2023).

Triangle of Governance

When exploring spatial justice, questions of governance naturally emerge: How is (public) space organized, managed, and designed? Who owns the space, and for whom is it designed and built? Who decides what is (or is not) built?

Given the complexity of our societies, diverse governance theories have been developed to better understand these dynamics, such as the concept of multilevel governance (Marks, 1993) and the notion of polycentric governance (Ostrom, 2010), both of which explain specific, observed governance practices. Since the primary focus of this project is not on governance theory, we have chosen to limit our exploration to a basic distinction between the civil, private, and public sectors.

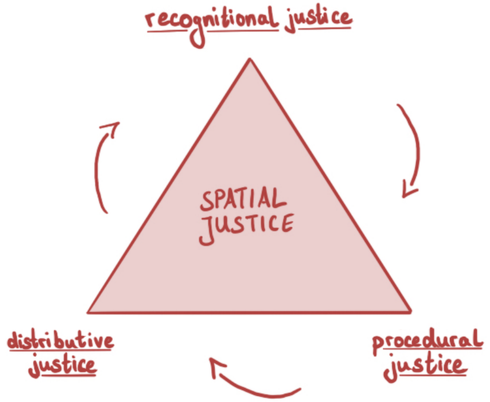


Figure 2.3 Spatial Justice Diagram, based on Rocco 2023

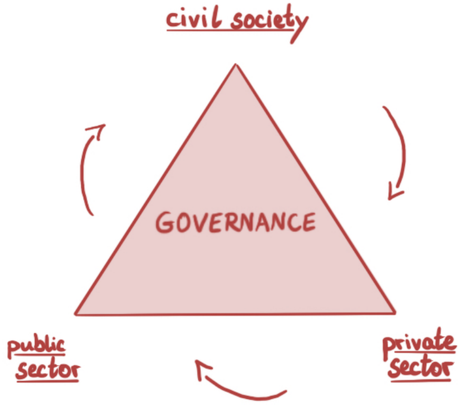


Figure 2.4 Triangle of Governance, based on Rocco 2023

Transition Theory

Since the project focuses on the energy transition, we engaged with the field of sustainability transitions research. The term transition, as defined by Loorbach, refers to "*the process of change from one system state to another via a period of nonlinear, disruptive change*" (Loorbach, 2017, p. 605). His "X-Curve" model synthesizes earlier perspectives on transitions, highlighting the dynamic interaction between processes of build-up and breakdown.

The model explains how established and optimized systemic configurations (regimes) are placed under pressure when alternatives begin to emerge. The transition process is described as "chaotic and disruptive" (Loorbach, 2017, p. 607), with elements of the old regime that resist change breaking down and phasing out, while alternatives evolve into new regimes. Understanding these two interacting dynamics - build-up and breakdown - is essential for this project, as it emphasizes the critical role of bottom-up initiatives and movements in challenging established structures and driving transformation.

Ladder of Participation

Ensuring spatial justice, particularly procedural justice, requires creating opportunities for affected communities to actively influence decisions that shape their lives and environments. Citizen participation is one way to achieve this. The "communicative turn" in planning during the mid-1990s led to a growing emphasis on participation. However, critics argue that participatory practices are sometimes used strategically to create the illusion of democratic decision-making, while ultimately reinforcing dominant neoliberal structures and power relations (Roy, 2015; Angelo & Baiocchi, 2024).

A well-known framework for evaluating the quality of participatory processes is Arnstein's "Ladder of Citizen Participation" (1969). The ladder illustrates increasing levels of citizen power, ranging from "nonparticipation" at the lowest rungs, through stages of "tokenism," to actual "degrees of citizen power" at the top. While reaching the highest rungs may be challenging within the constraints of current neoliberal systems, sincere participatory processes should strive to avoid the pitfalls of nonparticipation and tokenism.

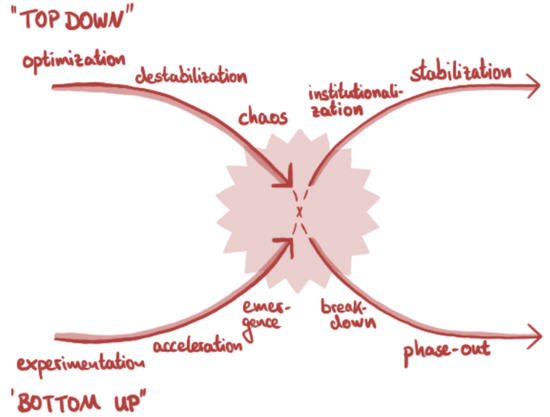


Figure 2.5 Transition X-Curve, based on Hebinck 2022

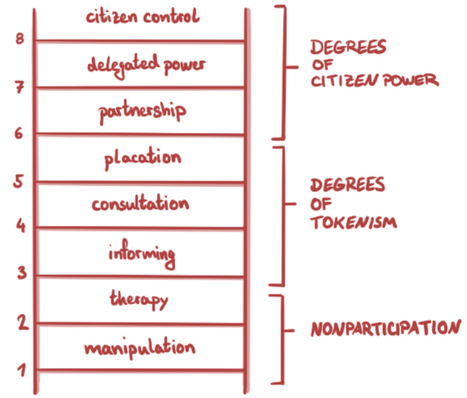


Figure 2.6 Ladder of Citizen Participation, based on Arnstein 1969

Conceptual Framework

Just Energy Transition Windmill

To address our challenges by integrating diverse theoretical resources, we have developed the Energy Transition Windmill framework. At its core lies the principle of Just Energy Transition, which serves as the ultimate goal of our project. Surrounding this central concept are three interdependent blades - People, Prosperity, and Planet - representing the key dimensions necessary for achieving a just energy transition. Each blade consists of two layers: outer layers defining specific targets and inner layers outlining concrete strategies to achieve them.

People: Advancing Spatial Justice

The People dimension focuses on spatial justice, encompassing distributive justice, procedural justice, and recognitional justice. To realise spatial justice, effective stakeholder collaboration among civil society, public sectors, and private enterprises is essential, ensuring that diverse voices are included in decision-making and that benefits and burdens are equitably shared.

Prosperity: Building a Circular Economy

The Prosperity dimension emphasises the transition to a circular economy, which involves sustainable production, equitable distribution, and responsible consumption. Achieving this transformation requires multi-level coordination across local, national, and international scales, facilitating synergies between different governance levels and economic actors.

Planet: Strengthening Climate Resilience

The Planet dimension highlights the necessity of climate resilience, which encompasses absorptive capacity, transformative capacity, and adaptive capacity. Ensuring resilience demands phase-based alignment across the short, medium, and long term, allowing for adaptive strategies that respond to evolving environmental and socio-economic conditions.

Crucially, these three blades are neither static nor isolated; they are deeply interconnected and mutually reinforcing. Just energy transition can only be achieved when all three dimensions - People, Prosperity, and Planet - advance simultaneously, ensuring a holistic approach that balances social equity, economic viability, and environmental sustainability.

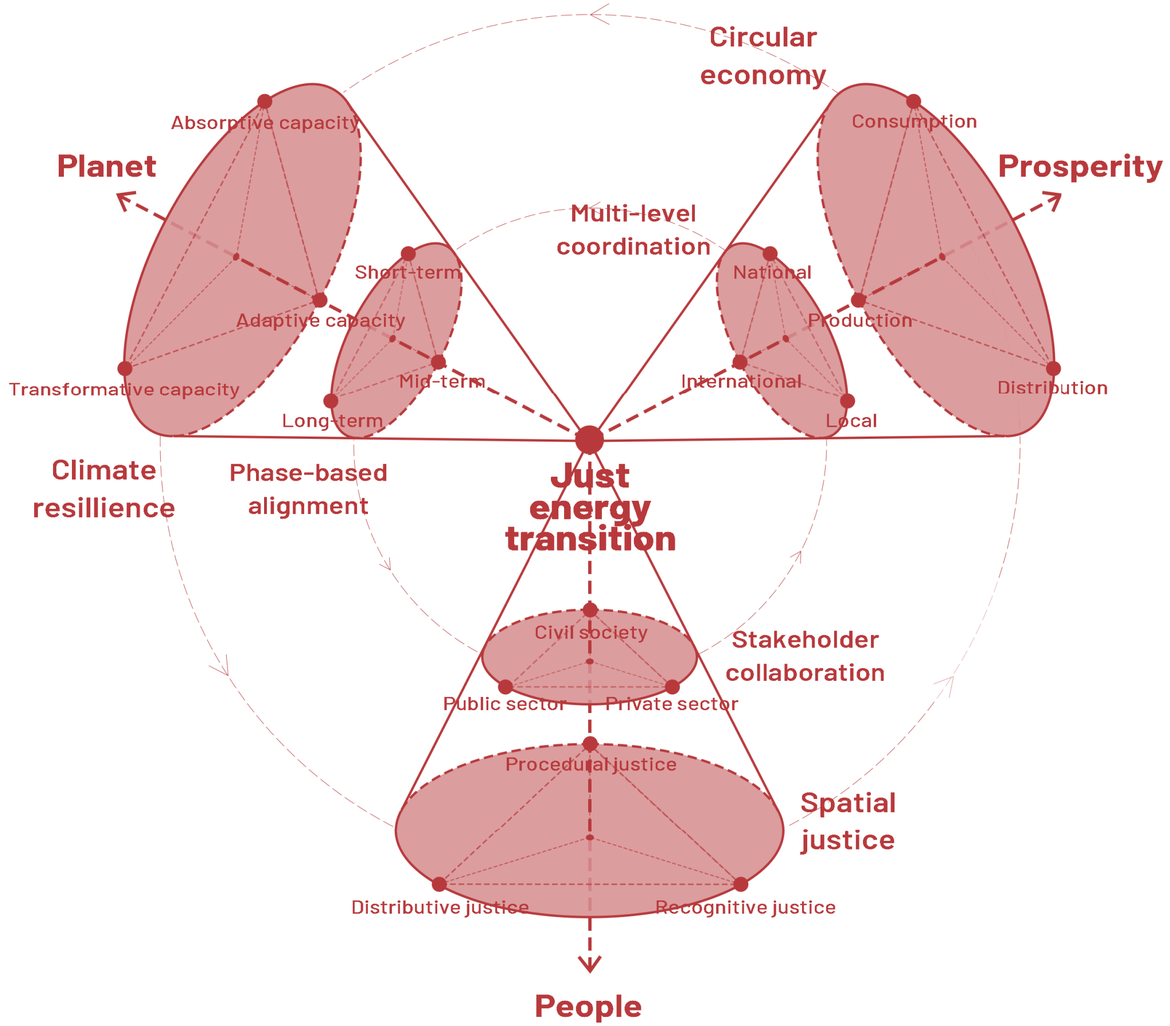


Figure 2.7 The "Just Energy Transition Windmill" framework

03 BURDENS

Energy Trap

Although Groningen has significantly contributed to the national energy supply and generated substantial profits over the past sixty years, local economy and residents have not received proportional benefits from energy production. By contrast, to some extend, Groningen has fallen into an energy trap, characterised by unstable economic growth, shrinking population, low levels of well-being and even energy poverty.

Unstable Economic Growth

Owing to substantial energy production, Groningen's GDP per capita was relatively higher than the national average before 2014. However, its growth rate was highly unstable and generally lower than the national level. After 2014, Groningen's economy experienced a significant setback due to the phase-out of natural gas extraction.

1.6%

average annual GDP growth rate from 2013 to 2022

12th

rank among 12 provinces in the Netherlands

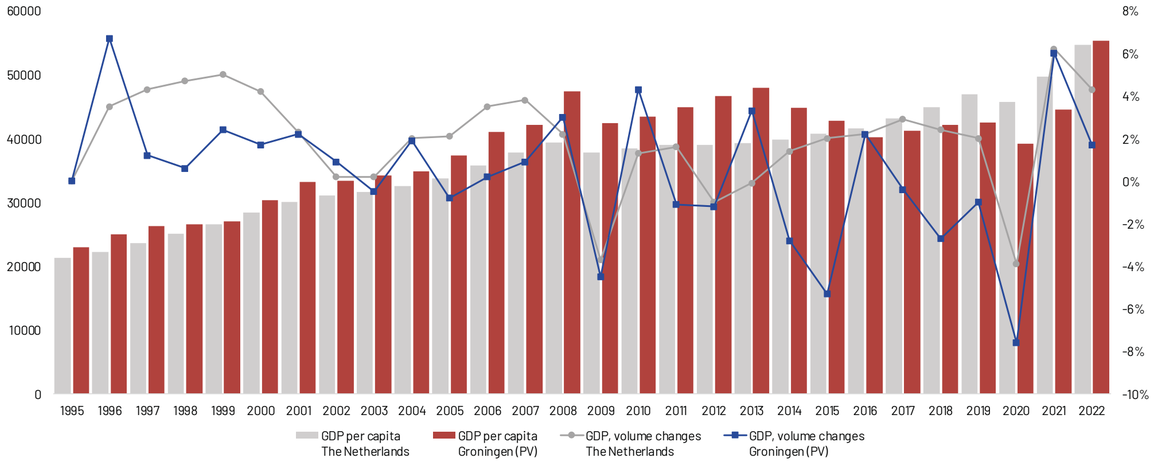


Figure 3.1 GDP of Groningen and the Netherlands from 1995
Source: CBS Data

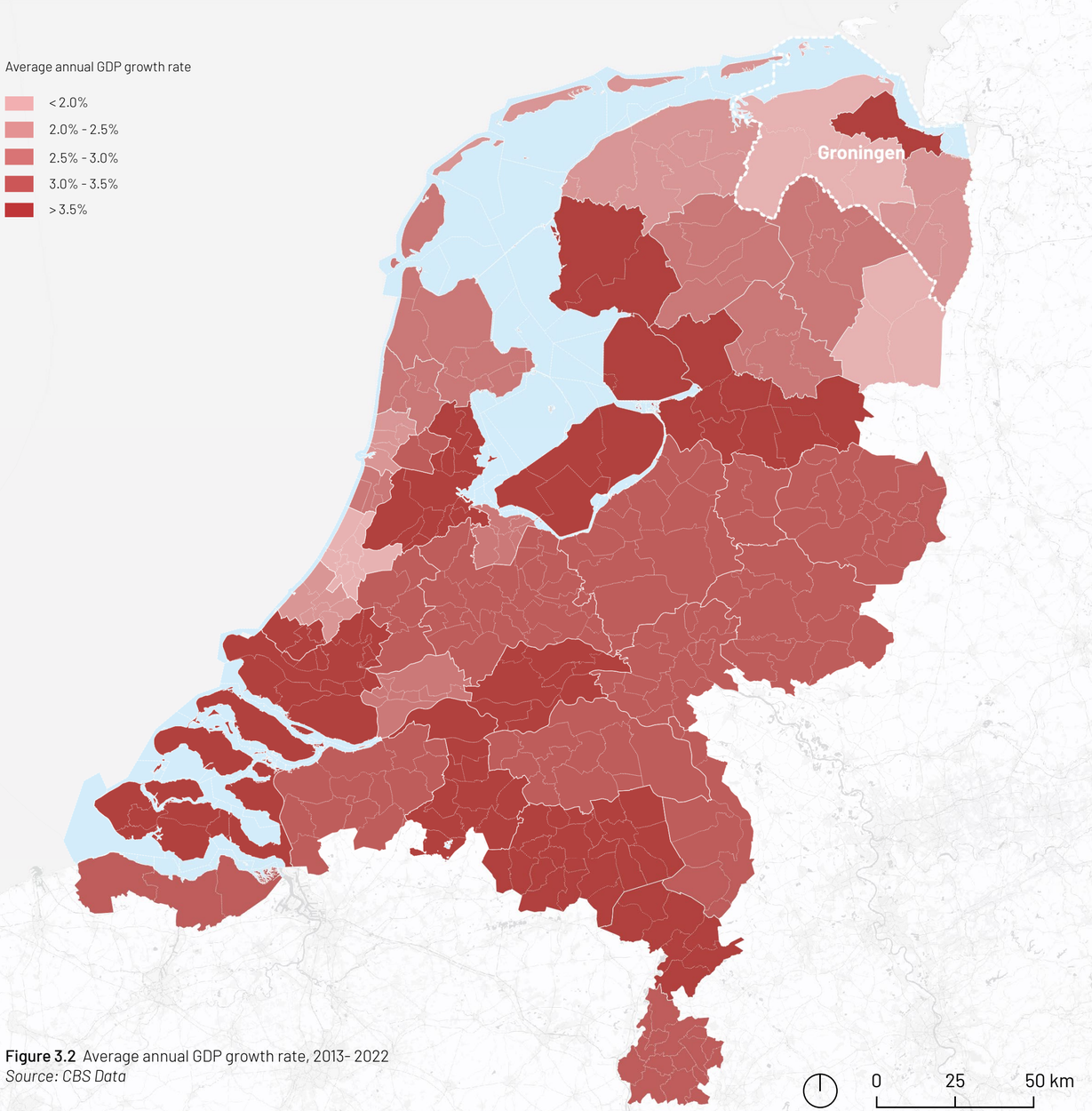


Figure 3.2 Average annual GDP growth rate, 2013- 2022
Source: CBS Data

Energy Trap

Shrinking Population

For a long period, Groningen's population density has remained significantly lower than the national average. Additionally, in recent years, its population growth rate has also lagged behind the national level.

Zooming in, it is revealed that most areas of Groningen have experienced population decline over the past decade, while the city of Groningen has accounted for the majority of the province's overall population growth.

As a result, Groningen continues to have a relatively small population and is experiencing a loss of demographic dynamism compared to other regions.

0.16%

average annual population growth rate from 2013 to 2022

10th

rank among 12 provinces in the Netherlands

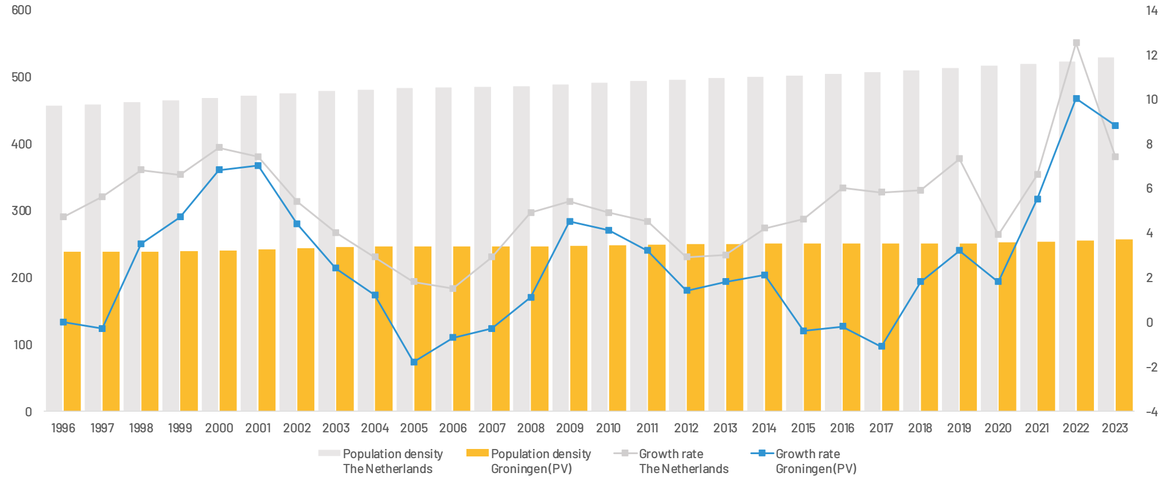


Figure 3.3 Population growth of Groningen and the Netherlands from 1996
Source: CBS Data

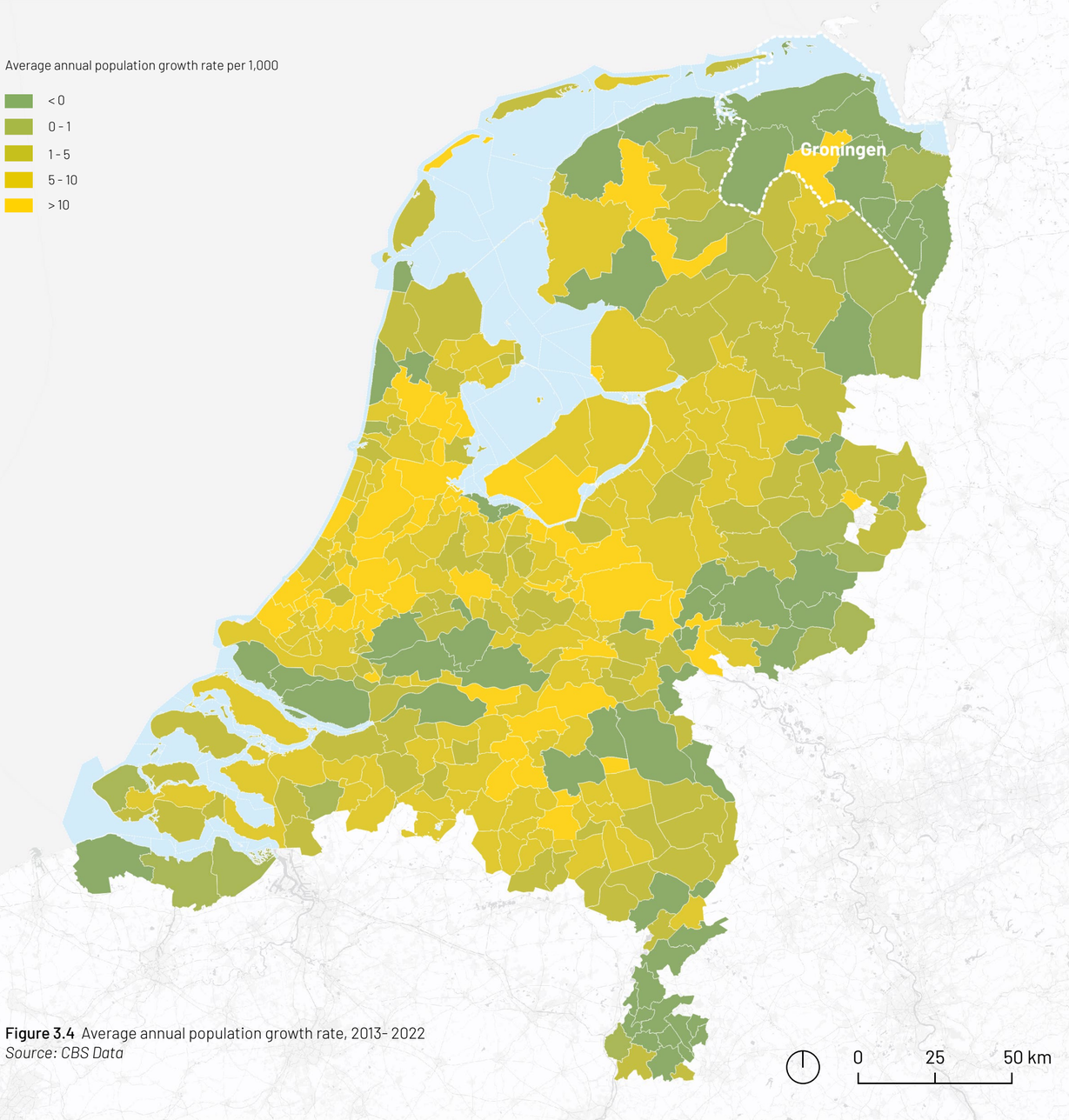


Figure 3.4 Average annual population growth rate, 2013- 2022
Source: CBS Data

Energy Trap

Poor Well-being

As GDP and population are relatively narrow indicators at the regional scale, it is important to consider the broader question: what is the quality of life for residents in Groningen?

Well-being is a broad concept that reflects the overall quality of life. It is assessed though eight dimensions: subjective well-being, material well-being, health, labour and leisure time, housing, society, safety and the environment.

In terms of well-being scores, Groningen lags behind the national average. Zooming in further, three municipalities in the province rank the lowest in the country. This status further elaborates the limited benefits local residents receive from energy production.

0.66

Well-being indicator in 2023

10th

rank among 12 provinces in the Netherlands

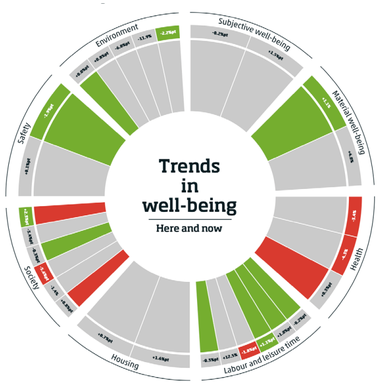
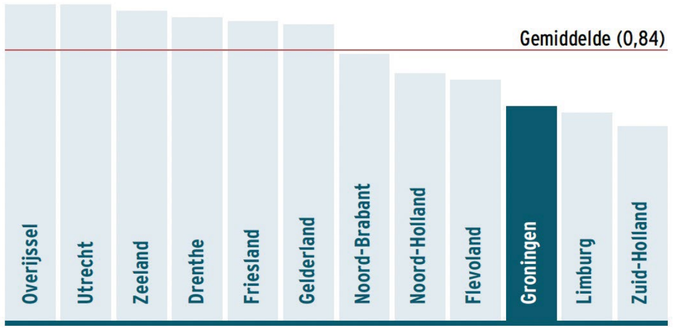


Figure 3.5 Trends in well-being, here and now
Source: CBS Data



Ranking van Groningen (2022): de plaats die Groningen inneemt op de welvaartsranglijst van de 12 Nederlandse Provincies.

Figure 3.6 The rank of Groningen's well-being among provinces
Source: Monitor 2024 Nationaal Programma Groningen

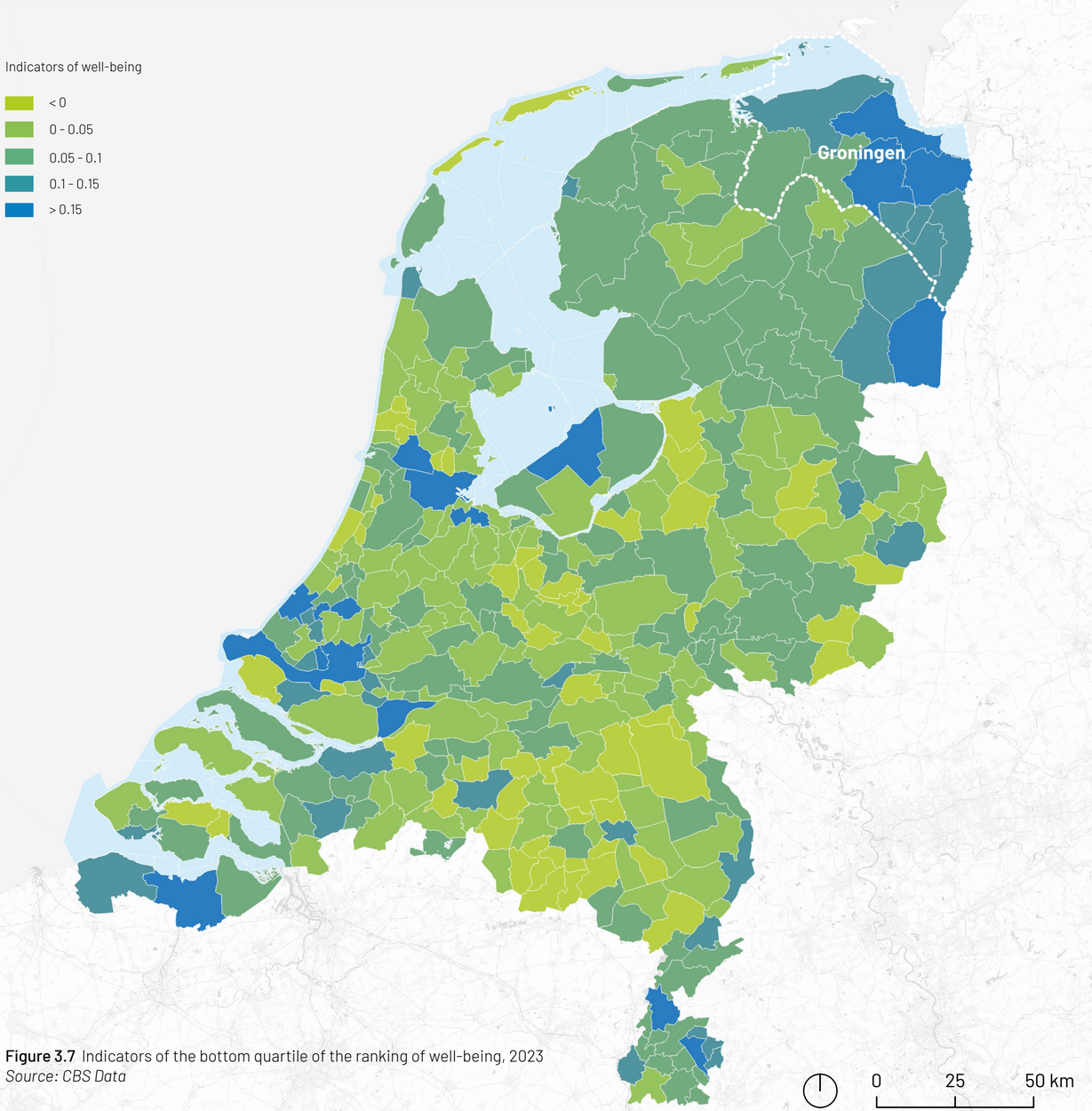


Figure 3.7 Indicators of the bottom quartile of the ranking of well-being, 2023
Source: CBS Data

Energy Trap

Paradoxical Energy Poverty

Even more paradoxically, despite being a main energy hub that has made significant contributions to the national energy sector, Goningen is experiencing severe energy poverty.

The primary indicator of energy poverty is LIHE (low income and high energy costs), which access the affordability of energy for households.

According to recent data, Groningen exhibits the highest proportion of energy poverty in the Netherlands, with more than 7 percent of households affected in most municipalities (Mulder, Longa and Straver, 2023).

>7%

Energy poverty rate in 2022

12th

rank among 12 provinces in the Netherlands

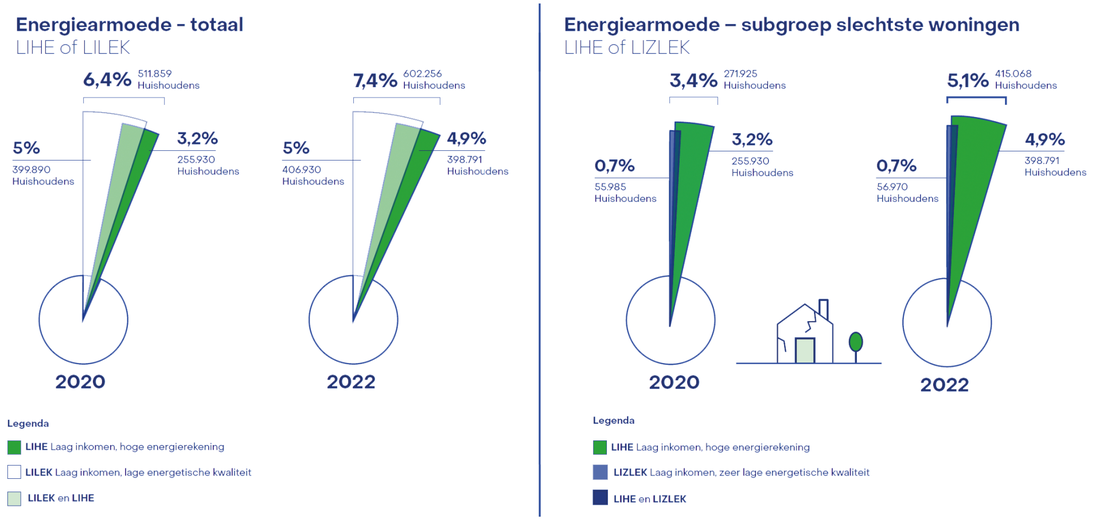


Figure 3.8 The extent of energy poverty in 2020 and 2022 in the Netherlands
Source: TNO, Energiearmoede in Nederland 2022

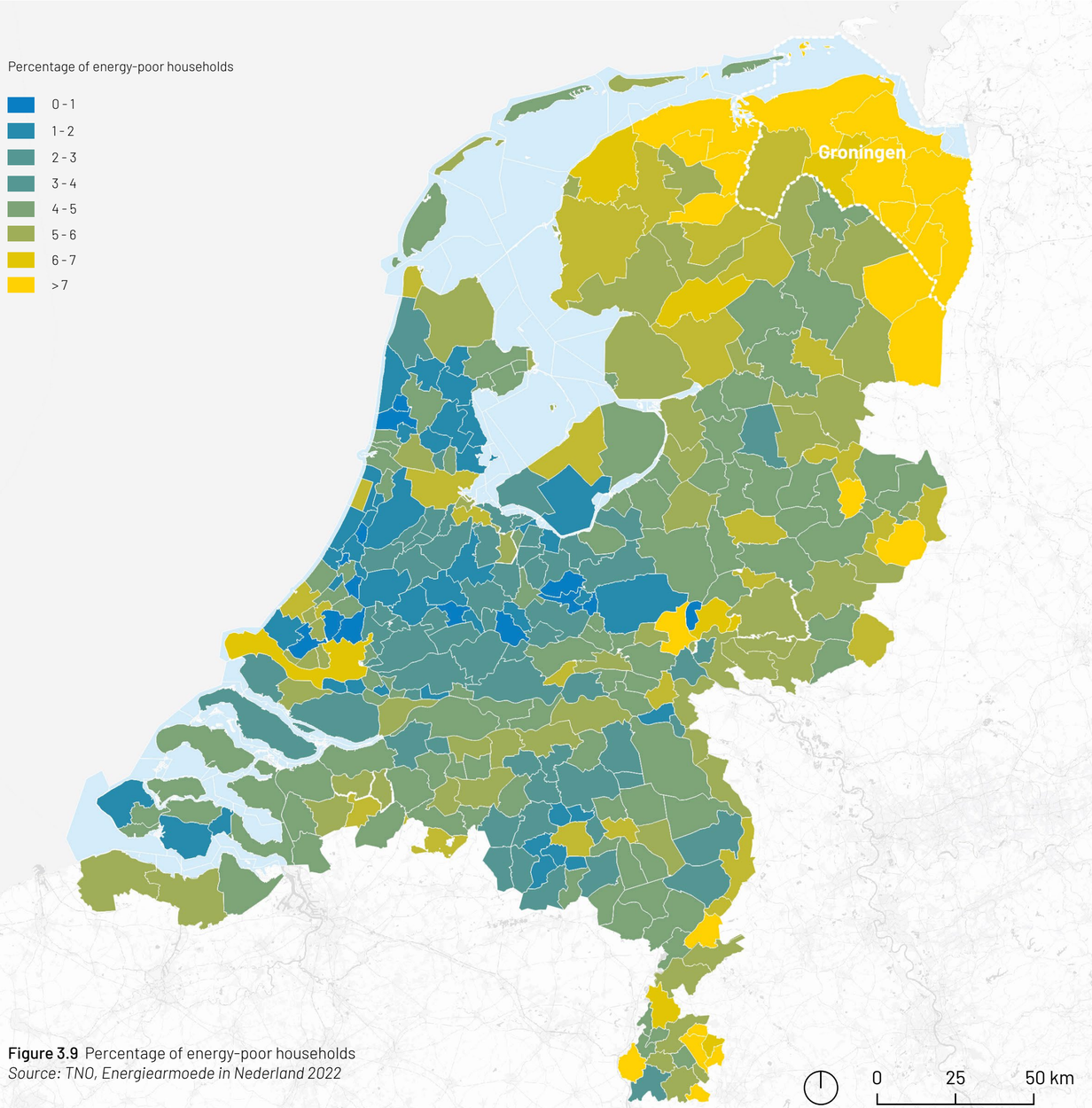


Figure 3.9 Percentage of energy-poor households
Source: TNO, Energiearmoede in Nederland 2022

Gasquakes

Earthquakes Due to Gas Extraction

Groningen has not only gained limited benefits from energy production, but has also suffered much from its adverse consequences, including the earthquakes.

In the Groningen gas field, minor earthquakes began to occur in 1986. Since then, the number and magnitude of these earthquakes have increased, particularly after 2001 and continuing until 2014 (Vlek, 2019).

Although the frequency of earthquakes has gradually declined since 2014 due to the phasing out of gas extraction, their impacts have already been deeply embedded in the region and are likely to persist for an extended period.

1986
year of the first earthquakes

3km
average depth of the earthquakes

3.6
maximum magnitude of earthquake

1710
number of earthquakes since 1991

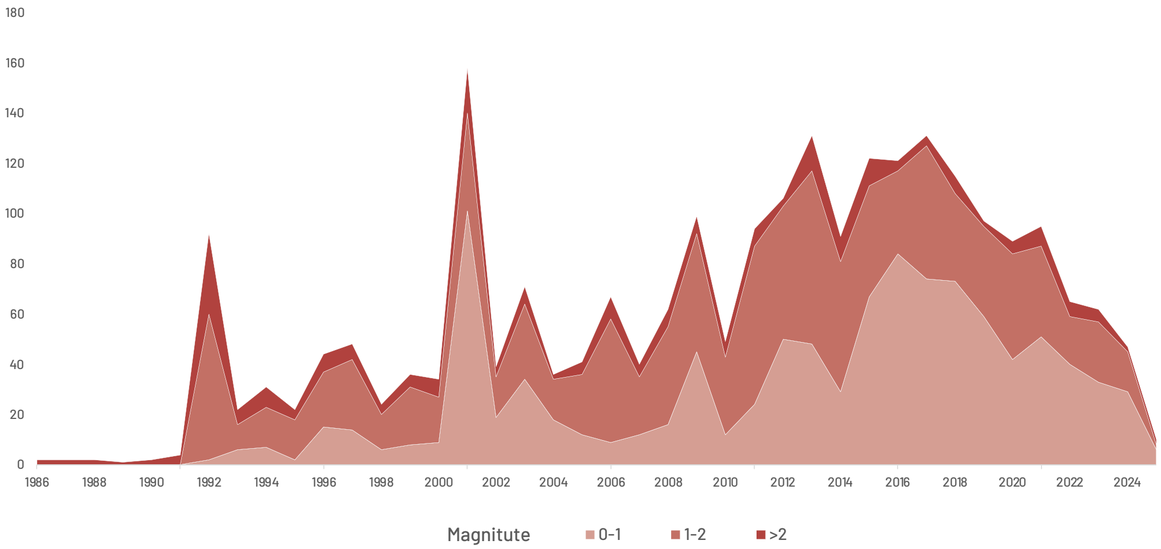


Figure 3.10 Frequency of earthquakes in the Nearthlands after 1986
Source: KNMI Data Platform

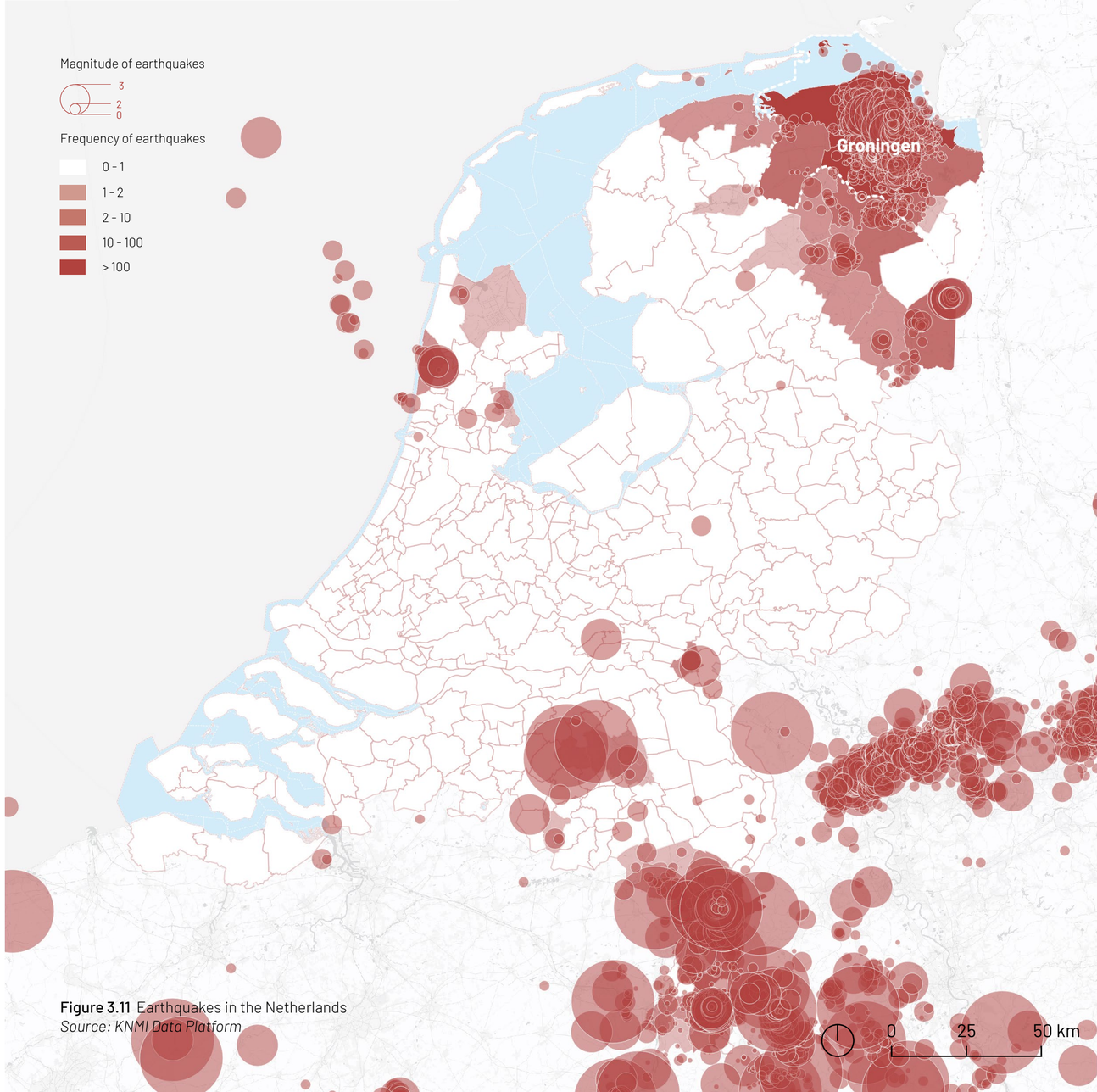


Figure 3.11 Earthquakes in the Netherlands
Source: KNMI Data Platform

Gasquakes

Earthquakes Due to Gas Extraction

The shallow depth of the earthquakes (around 3 km), the soft and water-saturated soil, and the long-term repetitiveness of seismic activity have together caused severe damage and safety risks in Groningen — a region never designed to withstand earthquakes.

According to Vlek (2019), over 400,000 residents live in areas officially recognised as damaged, with around 170,000 people personally affected. Of these, 68,000 have suffered repeated damage, and over half of them reportedly no longer feel safe in their own homes, reflecting the deep social and psychological impacts of energy extraction in the region.

400k
people recognised as damaged

170k
people personally affected by building damages

68k
victims of multiple earthquakes

34k
people feel no longer safe due to earthquakes

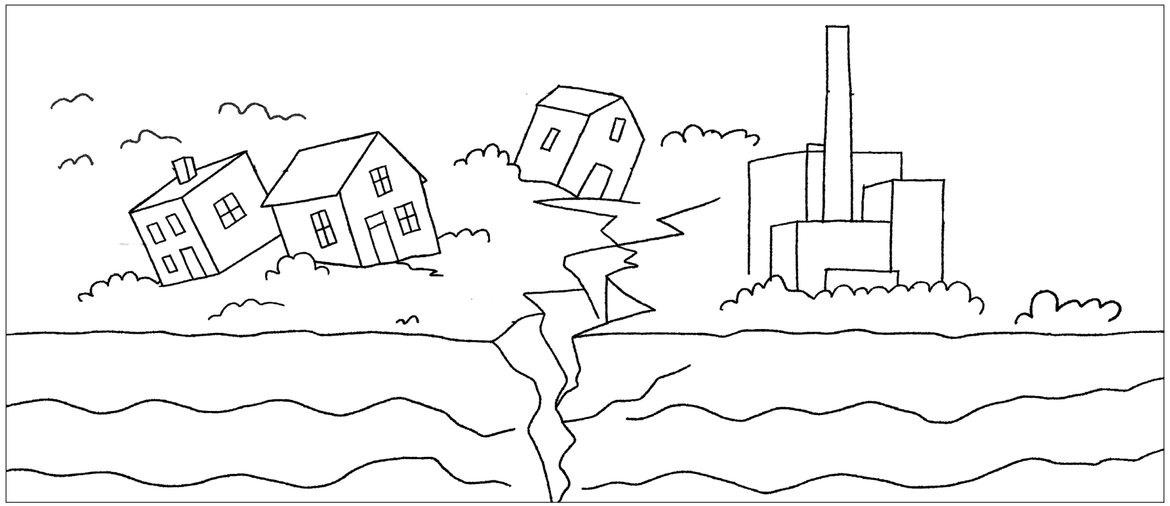


Figure 3.12 Sketch of Gasquakes

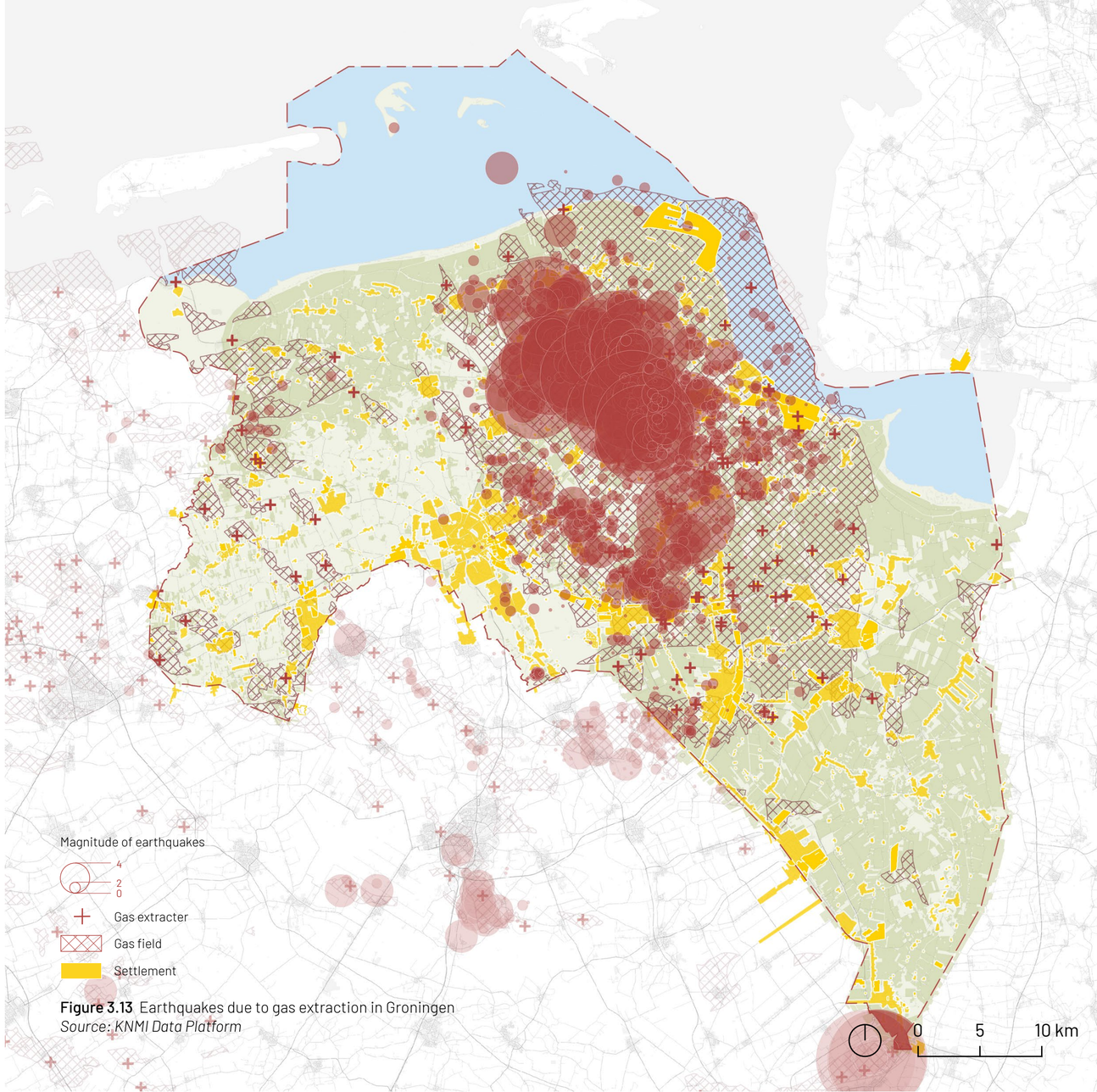


Figure 3.13 Earthquakes due to gas extraction in Groningen
Source: KNMI Data Platform

Turbine Trouble

Disturbances by Renewable Energies

With the ongoing energy transition from fossil fuels to renewable energy sources, the risks of earthquakes and other related threats have gradually been mitigated. However, the rapid expansion of renewable energy infrastructure has also introduced new environmental and social challenges.

Wind turbines, for instance, have become notorious for generating noise pollution, posing threats to bird populations, and altering local landscapes. Similarly, large-scale solar parks may lead to habitat loss and negative ecological impacts.

Moreover, the increasing demand for electricity production and distribution requires the expansion of high-voltage transmission lines, which not only occupy significant land areas but also pose potential health risks to nearby residents and further disrupt the visual and ecological quality of the landscape.

248

wind turbines higher than 60m

300km

380 kV high-voltage electricity transmission line

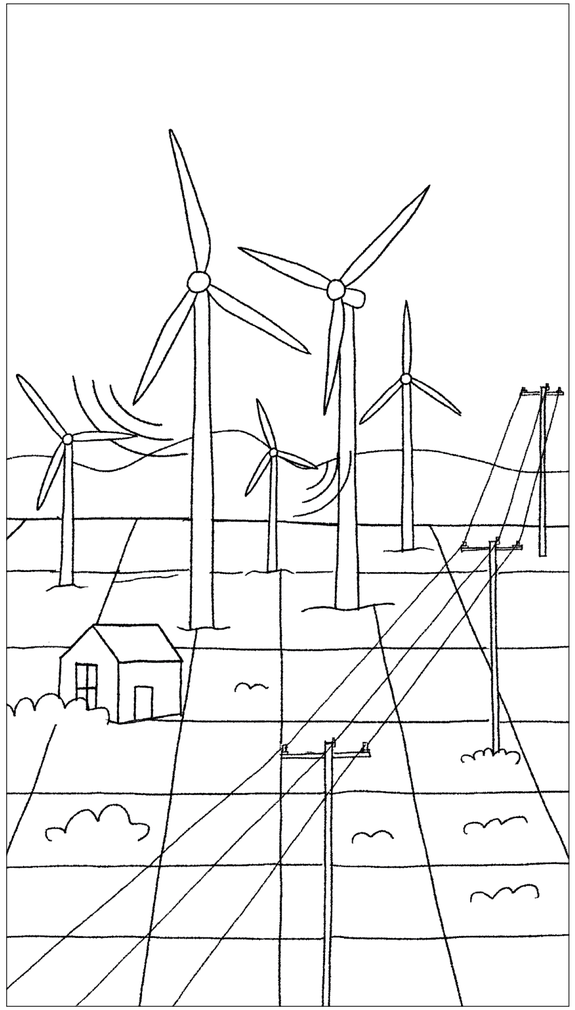


Figure 3.14 Sketch of Turbine Touble

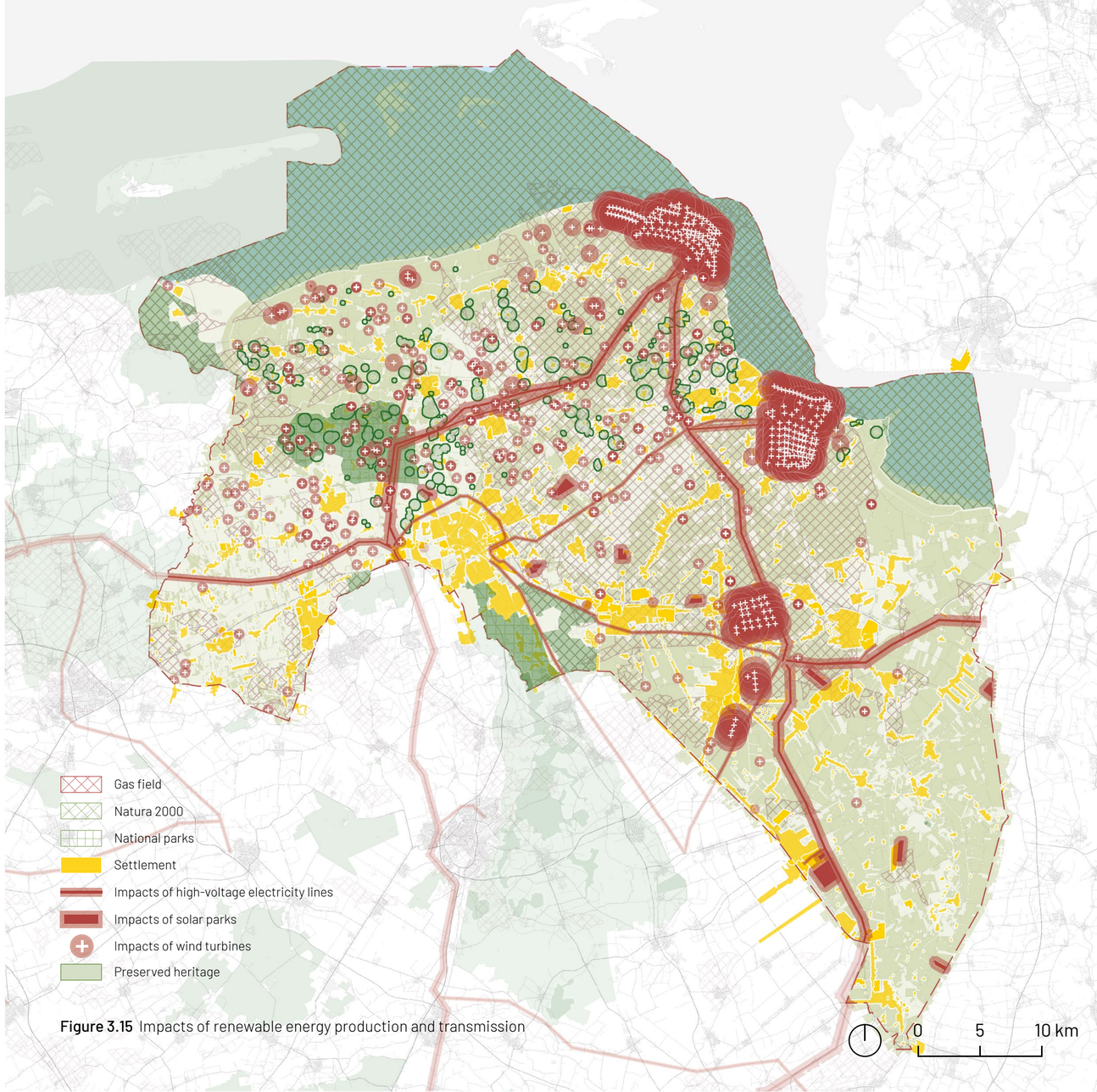


Figure 3.15 Impacts of renewable energy production and transmission

Climate Crisis

Flood Risk Due to Climate and Soil

Gas extraction in Groningen has caused significant land subsidence, with shifts of up to 37 cm, creating major challenges for water management. The lowering of the land surface has worsened flood risks, with approximately 87.6 km^2 of the region now at the highest level of flood vulnerability.

Local Waterboard, responsible for managing water levels, has been particularly impacted. To prevent flooding in lower-lying areas, new pumping stations were installed, significantly increasing operational costs (Porada, Boelens and Vos, 2024).

87.6km^2

area of the highest flood risk

37cm

maximum soil subsidence due to gas extraction

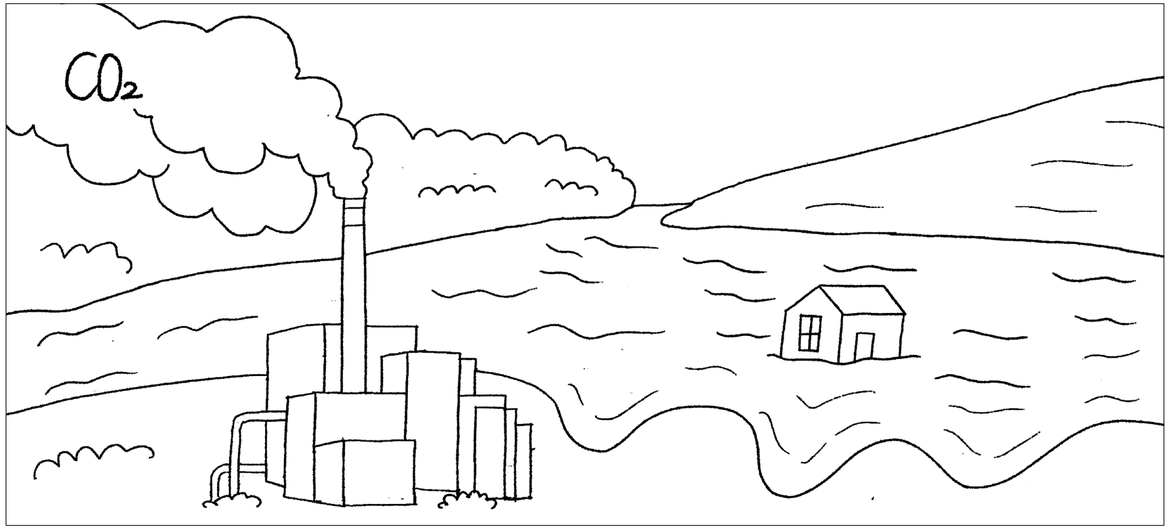


Figure 3.16 Sketch of Climate Crisis

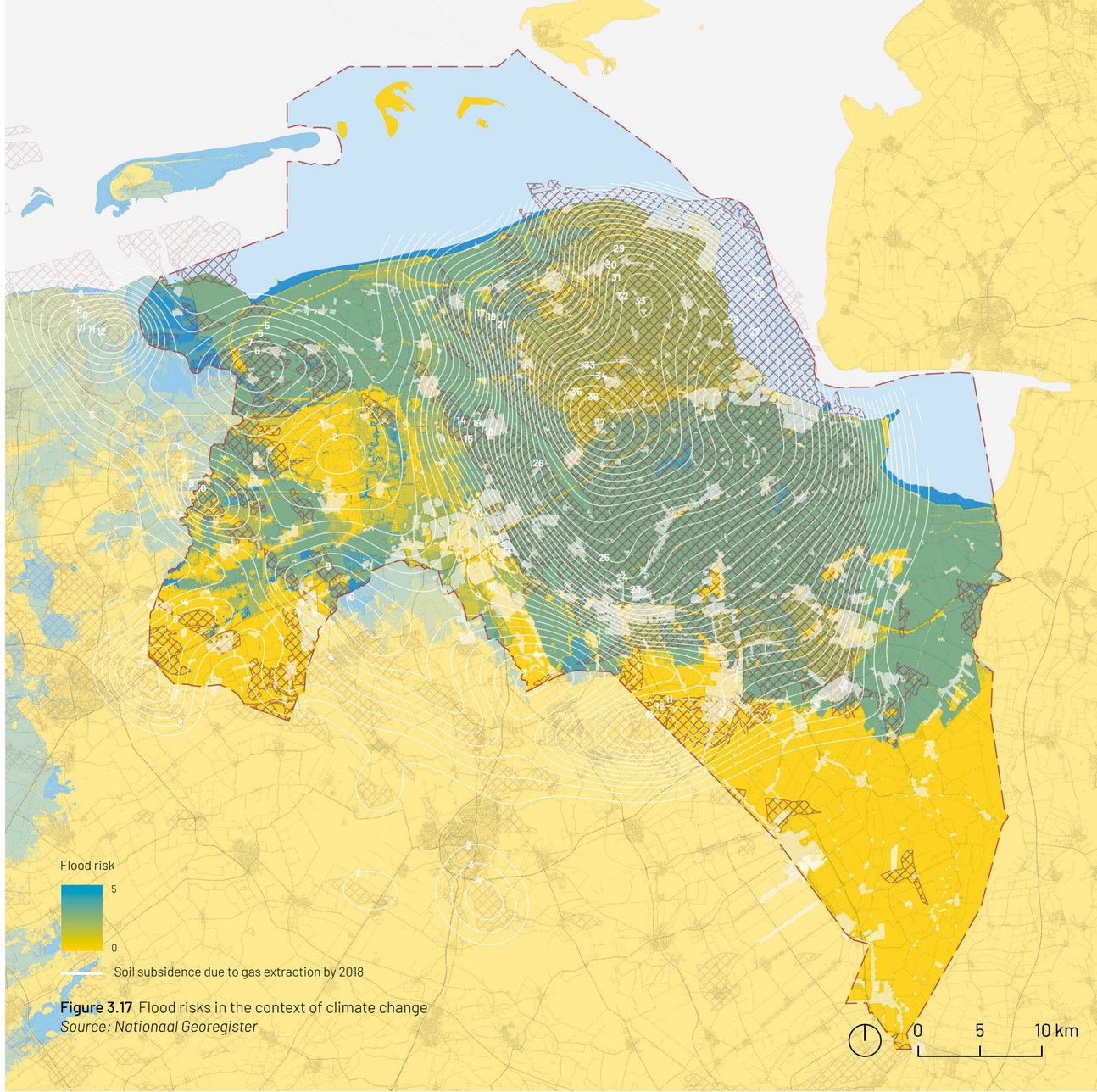


Figure 3.17 Flood risks in the context of climate change
Source: Nationaal Georegister

Too Many Burdens!

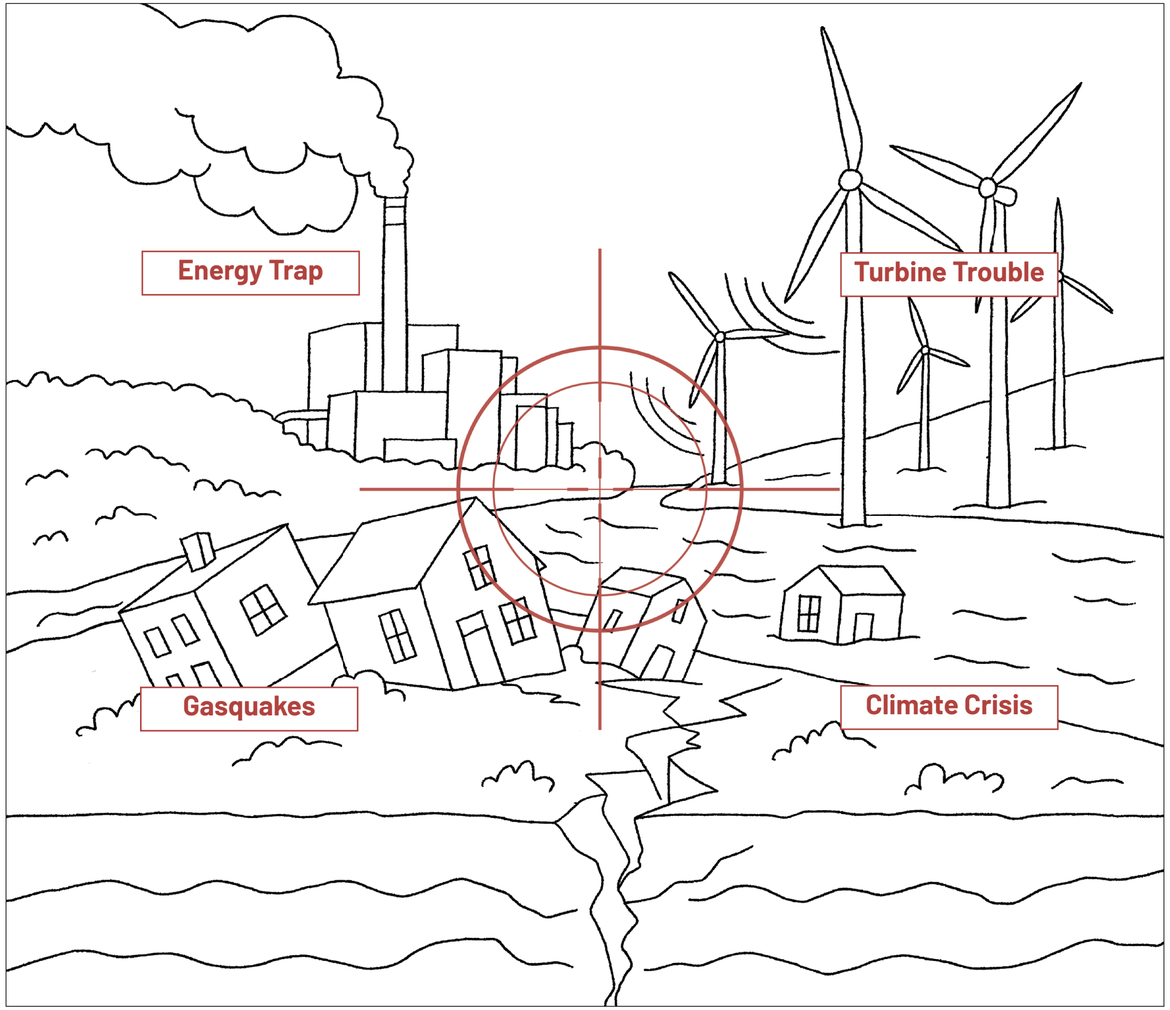


Figure 3.18 Sketch of the "cacophony of burdens"

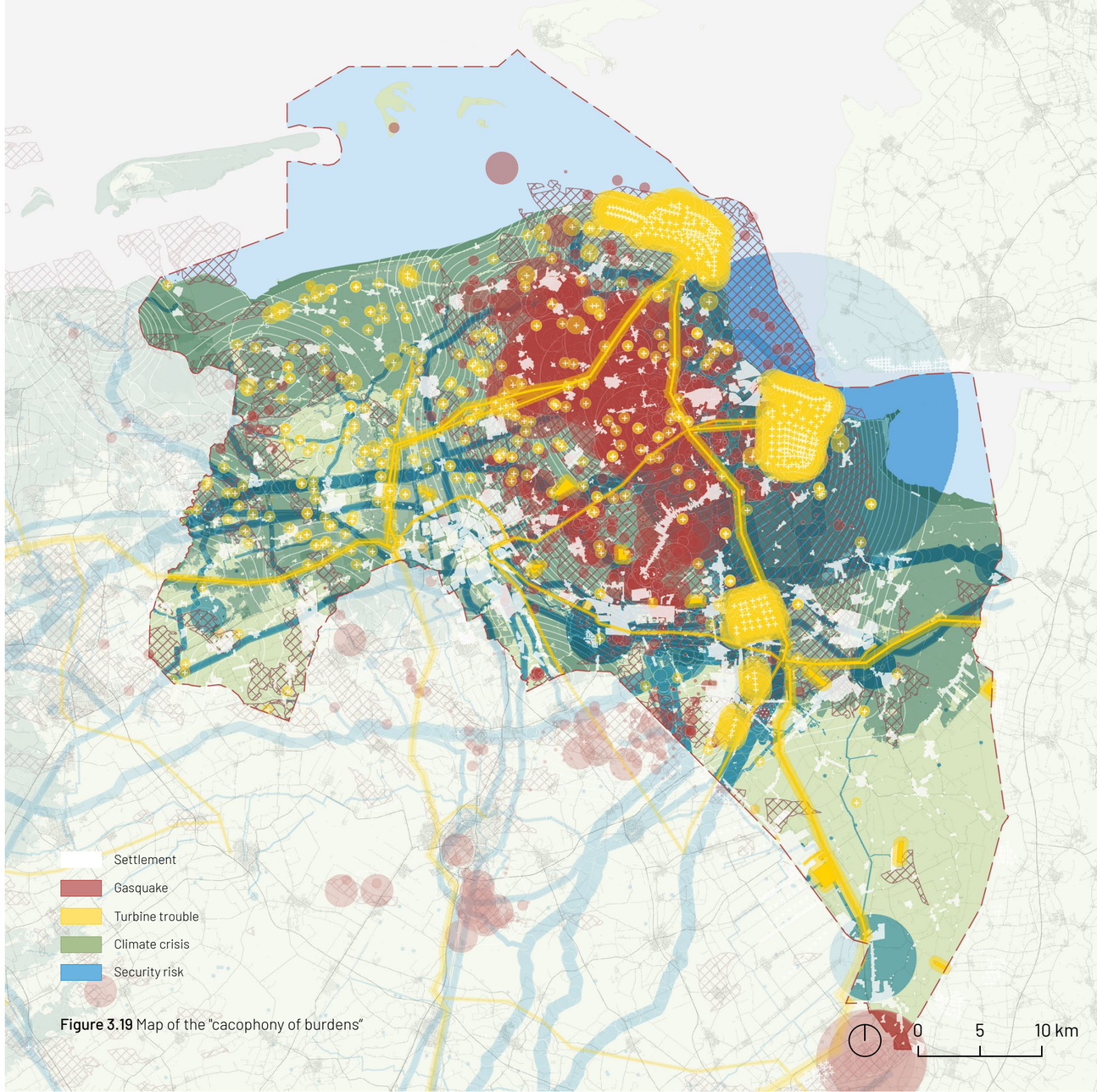


Figure 3.19 Map of the "cacophony of burdens"

04 COMMUNITY

Exploiting Groningen

Natural gas extraction in Groningen has been highly profitable. The Groningen gas field was operated by the Nederlandse Aardolie Maatschappij (NAM) - a private company equally owned by Shell and ExxonMobil - from 1963 until 2024, when the Dutch government decided to halt extraction. However, NAM continues to extract gas from smaller fields in the region.

Between 1963 and 2020, NAM earned €65 billion from Groningen gas extraction (15% of total revenues), while the Dutch government received €364 billion (85%) (Shell, n.d.). A significant share of the governments revenue was spent on social benefits, national debt interest, healthcare, and education (Banning, 2009). In 1995, the Fonds Economische Structuurversterking (FES) was created to allocate part of the gas revenues to infrastructure, education, and innovation. By 2006, €15.9 billion had been invested. However, only 1% of regional FES investments went to the northern Netherlands (Groningen, Drenthe, Friesland), despite housing 10% of the population (IOO, 2006). In contrast, 88% of the funds were directed to the western provinces (Noord-Holland, Zuid-Holland, Utrecht, Zeeland), where only 47% of the population lived (IOO, 2006). The FES was dissolved in 2011, and gas revenues returned to the general budget.

In 2019, the National Program Groningen was established to improve the region's future. With €1.15 billion in initial funding, it invests in infrastructure, the economy, education, employment, and sustainability (Nationaal Programma Groningen, n.d.). Additionally, the Dutch government and NAM have paid around €2.5 billion in compensation for damage caused by gas extraction (Instituut Mijnbouwschade Groningen [IMG], 2025).

Comparing these financial commitments with the overall revenue generated from exploiting the Groningen gas field reveals that the economic benefits of gas extraction are not distributed evenly across the country. At the same time, the burdens of extraction - particularly the damage caused by induced earthquakes - are borne almost exclusively by the local communities in Groningen.

Figure 4.1 Natural gas revenue, compensation payments and funds

Figure 4.2 Prins Bernhard (left) visiting Slochteren gas field
Source: Verhoeff, B. / Anefo. (1976, May 11). Prins Bernhard bezoekt NAM, Groninger gasveld (en booreiland), Prins Bernhard op gasveld in Slochteren [Photograph]. Nationaal Archief. http://hdl.handle.net/10648/ac83587e-d0b4-102d-bcf8-003048976d84 (CC0)

Protests

Trust in (local) governments and institutions, 2022

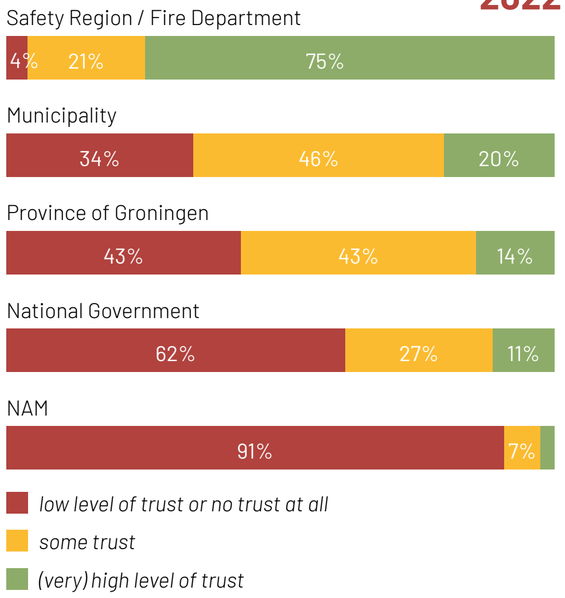
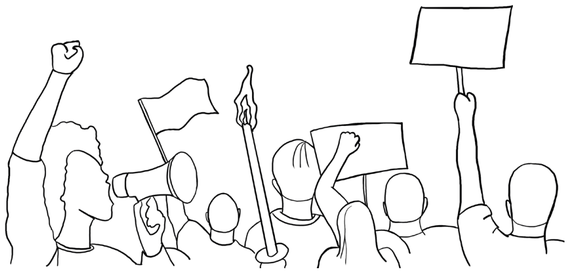


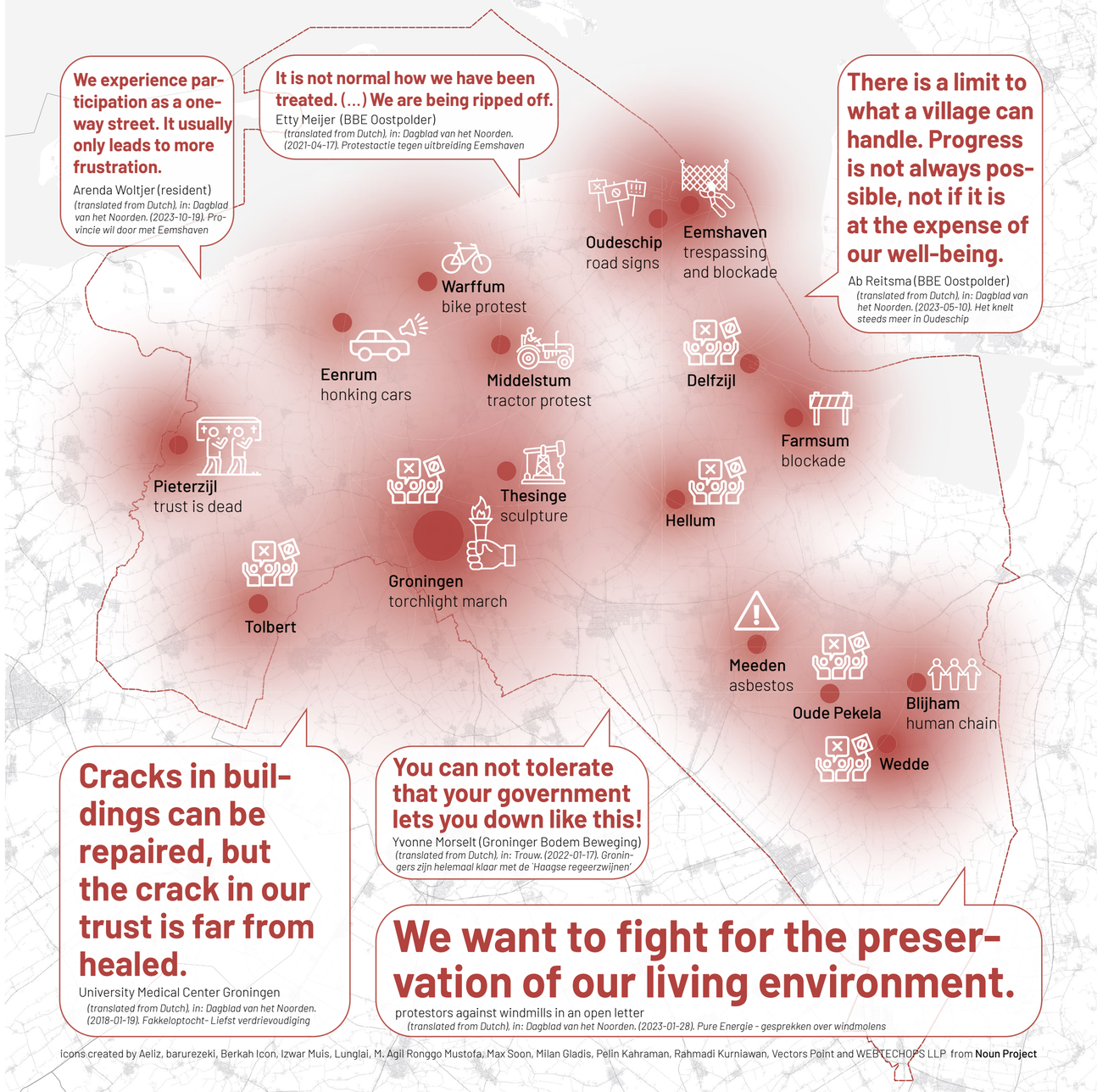
Figure 4.2 Trust in (local) governments and institutions, 2022
Source: Adapted from Sociaal Planbureau Gronigen, 2023. Translated from Dutch; colors changed; bars rearranged; additional bars omitted

The multiple burdens placed on local communities by the energy transition have resulted in frustration and anger. The persistent experience of being unfairly treated has contributed to a significant decline in trust in government institutions. In 2022, only 38% of Groningers reported some or high trust in the national government, and a mere 9% expressed trust in NAM (Sociaal Planbureau Groningen, 2023). These experiences of injustice have driven residents to self-organize and reclaim agency over their living environment through protest. The qualitative media analysis revealed both the diversity of protest locations and the various forms of protest employed.

Figure 4.3 Places of protest identified in the media analysis

Figure 4.4 (right page) Protests in the province of Groningen, as identified in the media analysis, illustrated with protesters' quotes





Conflicts

As shown by both the quantitative and spatial data analyses, the burdens of the energy transition for local residents are diverse and numerous. The qualitative media analysis confirms this picture. While gas extraction and the resulting earthquake damage are mentioned most frequently, other forms of fossil energy infrastructure, as well as the expansion of renewable energy projects, have also sparked conflicts and triggered repeated protests. Although many support climate action in principle, a strong "Not In My Backyard" (NIMBY) sentiment persists. In addition, a more recent conflict has emerged around the now-vacant gas extraction sites. Following the end of gas production from the large Groningen gas field, local residents have expressed frustration over these sites being merely demolished and forgotten about.

Mapping the results of the qualitative media analysis helps visualize where these conflicts are most concentrated. Overlaying the conflict map with the protest heat map reveals another pattern: protests often do not occur directly at the conflict site but instead in nearby towns or cities — locations where company or government representatives responsible for the developments are based.

Figure 4.5 Posters againts industry expansion in Oudeschip

- earthquake damage
- gas extraction
- planned gas storage
- vacant extraction site
- coal fire power plant
- planned nuclear power plant
- high voltage substation
- planned industry expansion
- bankrupt industry (job loss)
- (planned) wind park
- planned solar park
- high voltage power line
- affected village/town (specifically named)

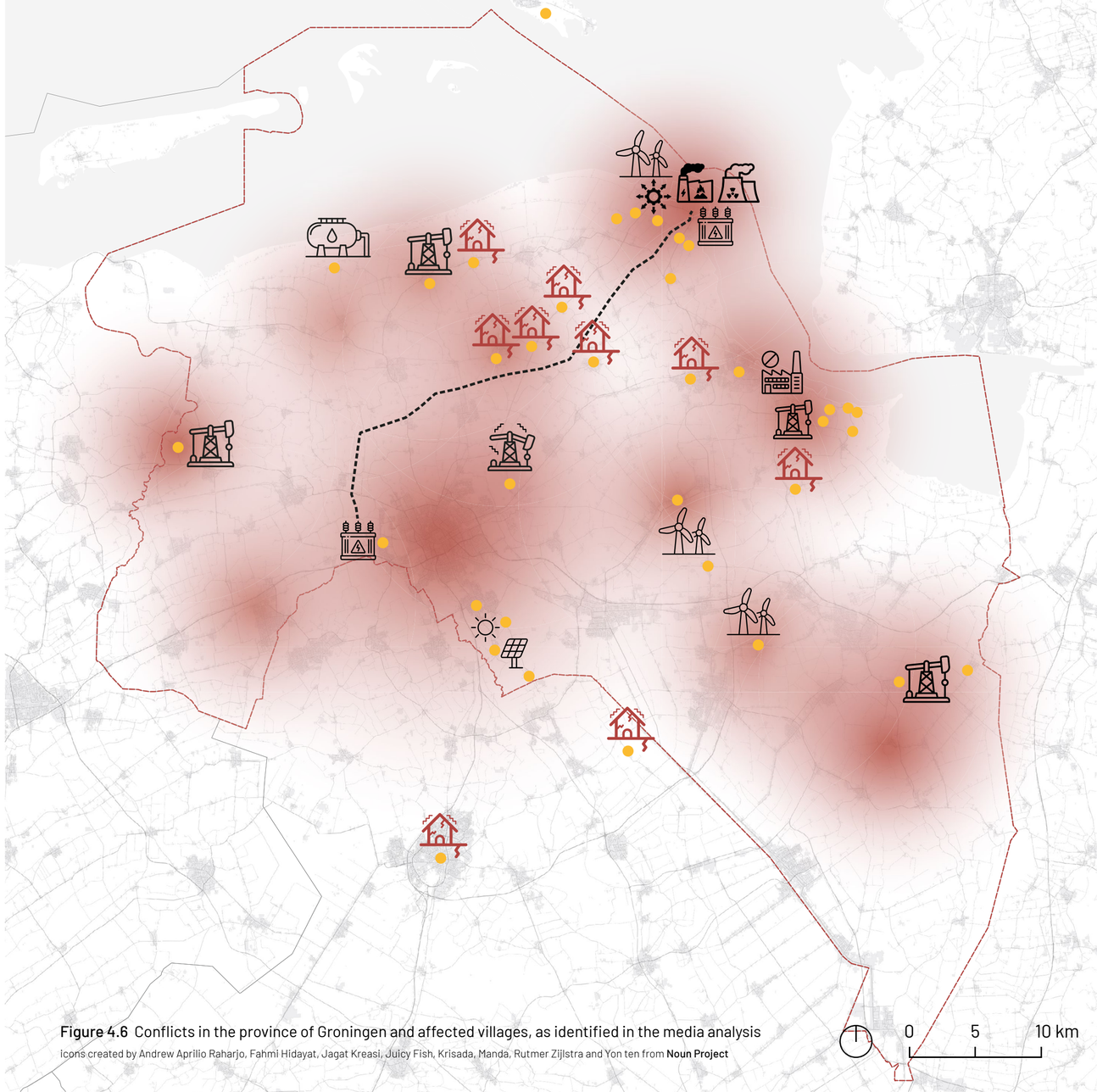


Figure 4.6 Conflicts in the province of Groningen and affected villages, as identified in the media analysis

icons created by Andrew Aprilio Raharjo, Fahmi Hidayat, Jagat Kreasi, Juicy Fish, Krisada, Manda, Rutmer Zijlstra and Yon ten from **Noun Project**

Protest Groups

Many different protest groups were mentioned in the analyzed newspaper articles. Examining their specific demands and mission statements provided deeper insight into how protesters perceive the energy transition and what they seek to achieve. Categorizing the groups according to their scale of operations helped structure the findings and revealed a clear pattern. While international groups formulated broad and general goals - often using the specific conflicts in Groningen as a proxy for wider agendas - local groups articulated highly concrete demands tailored to their specific needs.

Greenpeace

"We believe that a green, sustainable world is necessary, better and achievable. For that change, we need to break the current status quo. We expose major environmental problems and promote sustainable solutions through scientific research, lobbying, demonstrations and peaceful and inventive confrontations.

Clean climate - Safe oceans - Strong forests - Ban toxic substances - Sustainable agriculture"

Source: Greenpeace, n.d. (translated from Dutch)

Groninger Bodem Beweging

"The GBB stands up for the interests of people disadvantaged by gas extraction in the Groningen gas field.
The main interests are:

1. **Safety**
2. Good and proper **damage settlement and compensation**
3. Compensating additional **material damage**
4. Compensating **intangible damage**
5. Preserving our **cultural and historical heritage**
6. Helping create a **new future perspective** for the region"

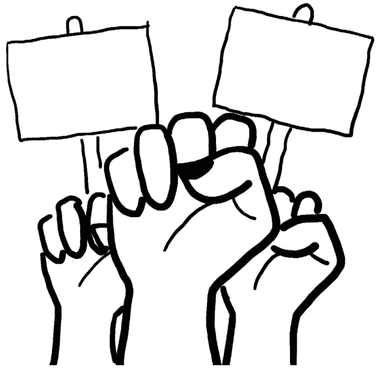
Source: Groninger Bodem Beweging, n.d. (translated from Dutch)

Bewoners Belangen Eerst Oostpolder

"BBE is the advocate for local residents (...). We want clarity in advance about the balance between advantages and disadvantages. BBE wants concrete and binding agreements on four points.

1. Establish a **working group "Nuisance Reduction"** working together with the (existing) industry. (...)
2. Establish an **Environmental Fund** in line with the Code of Conduct on Acceptance & Participation Wind Energy on Land. (...) The amount of the mandatory contribution is **2% of the revenue / 50% of the annual property tax** (...)
3. **Prevent and/or mitigate nuisance** from new initiatives as much as possible (...). Physical **blocking off lights** facing surrounding residents, application of **sound-absorbing materials** in company buildings [and] **a green-blue zone** of at least 400 metres from residential areas. (...)
4. Set up a scheme that gives residents the **financial opportunity to move to a comparable home elsewhere.** (...)"

Source: Bewoners Belangen Eerst Oostpolder, n.d. (translated from Dutch)



INTERNTL.

Climate Justice Now!
codeROOD
Extinction Rebellion
Rhythms of Resistance

Greenpeace
Eendracht Maakt Kracht (EMK vissers)
Wij Stoppen Steenkool
GroenFront!

NATIONAL

Milieudefensie
Comité Schone Lucht
Handel Anders!
Nederlandse Akkerbouw Vakbond
Nederlandse Melkveehouders Vakbond

Natuur & Milieu
Natuurmonumenten
Urgenda
Federatie Nederlandse Vakbeweging (FNV)

REGIONAL

Groninger Bodem Beweging
Groningen in Opstand
Het Groninger Landschap
Natuur en Milieu-federatie Groningen
LTO Noord

Groninger Gasberaad
Schokkend Groningen
Waddenverniging
Bürgerinitiative Saubere Luft Ostfriesland e.V.

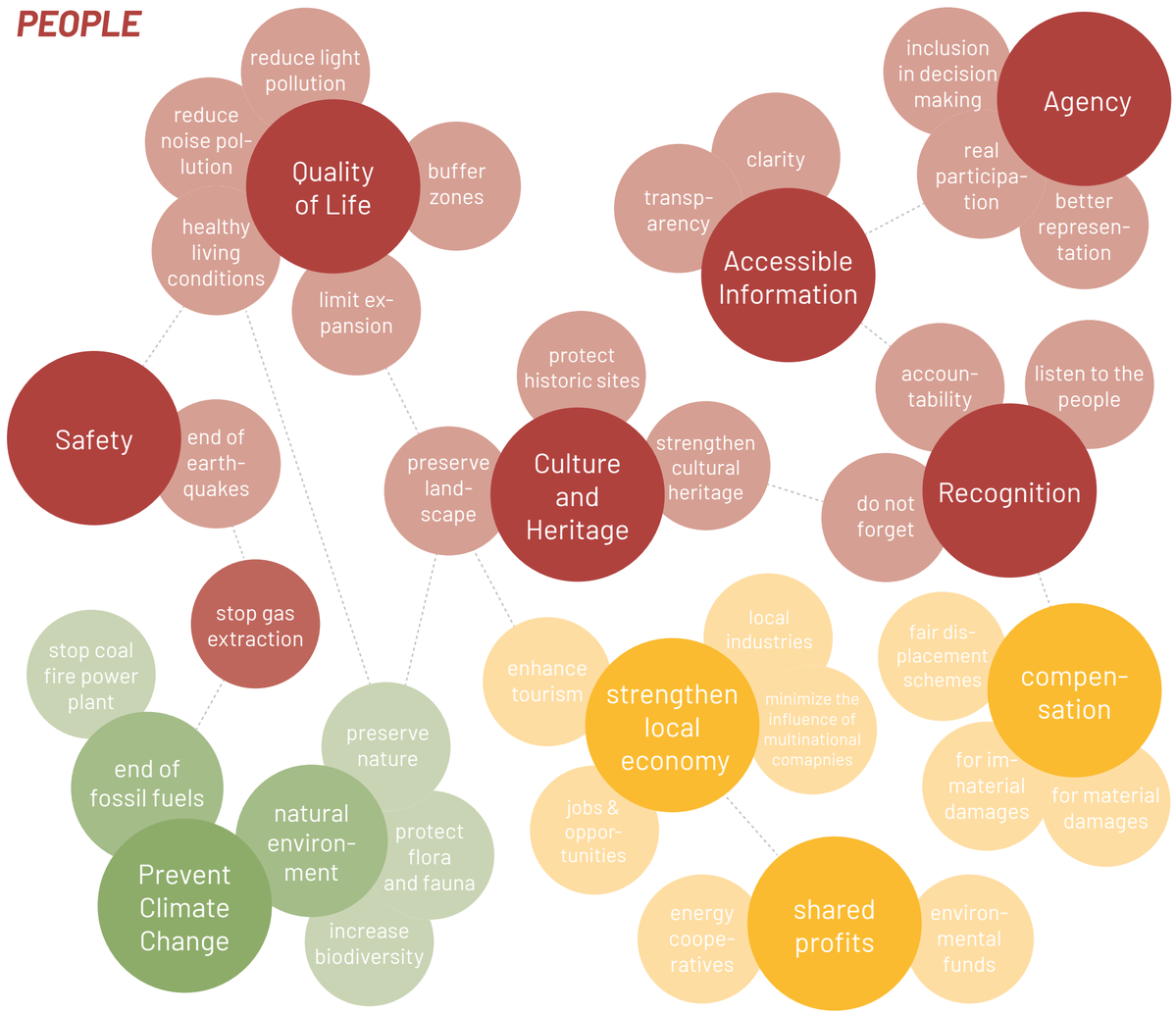
LOCAL

Plaatselijk Belang Glimmen
Dorpsbelangen Pieterburen
Stichting Landelijk Gebied Haren
Duurzam Haren
Actiegroep Handen af van de Groote Polder
Warffum Alert

Dorpsbelangen
Bewoners Belangen Eerst OOSTPOLDER
Dorpsbelangen Onnen
Tegenwind N33
Actiegroep 'Nee NAM, niet boren in Blijham'

Figure 4.7 Protest groups in the province of Groningen, as identified in the media analysis, sorted by scale of operations

What does the Community want?



COMMON GOAL: SPATIAL JUSTICE		
distributive justice	**recognitional justice**	**procedural justice**
fair distribution of burdens and benefits, compensation	accountability, identity, culture and heritage	agency, real participation, transparency

Necessary Transition	**Conflicting Visions: Conservatives vs. Pioneers**	
end of fossil energies	quality of life	prosperity
expansion of renewable energies	preserving the landscape	(economic) growth
preserving and restoring the natural environment	culture and heritage	innovation

Figure 4.8 Translating community needs and demands (left page) into community visions (right page)

05 COMMUNITY VISION

A Just Energy Transition

Common Vision: A Green and Just Future

After a successful and just transition from fossil fuels to renewable energy, residents are satisfied and trust in the private and public sector is restored. Gas extraction has been permanently halted, leading to a decline - and eventual cessation - of induced earthquakes. This transition was an unavoidable part of the sustainable development of the region and crucial for preserving and restoring the natural habitat that supports us humans (ecosystem services).

Procedural Justice

Alongside the energy transition, a democratic renewal has taken place. Local residents now have a genuine voice in decision-making, actively shaping their future. With agency over their land, homes, and livelihoods, the region is no longer exploited for external profit but thrives as a place of opportunity for its people.

Recognitional Justice

The government and private companies acknowledge past injustices and have rebuilt trust through transparency and accountability. The protest movement is recognized as a success story of how the people empowered themselves to achieve spatial justice. Art and culture play an important role in preserving this history, ensuring that the struggles and voices of the past remain heard. Former gas extraction and the protests are an integral part of the region's cultural DNA.

Distributive Justice

The burdens and the benefits of energy production are equitably distributed. Rightful compensation is provided for current and past burdens and regional profits are distributed among residents, ensuring that prosperity is shared by the community.

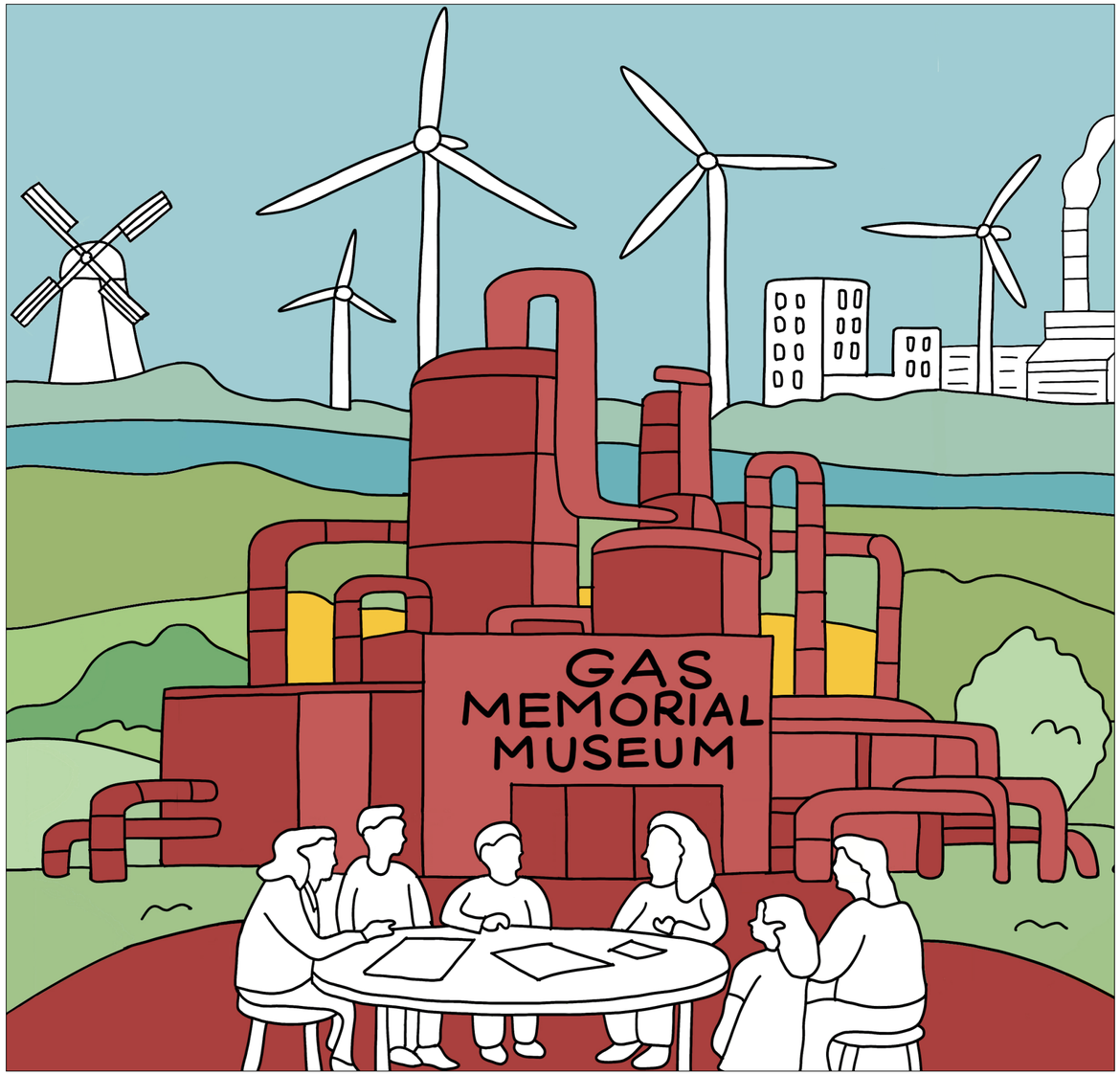


Figure 5.1 Common vision

Not in My Backyard!

Sub-Vision: Conservatives

The NIMBYs advocate for a local, decentralized energy transition that prioritizes quality of life over large-scale economic expansion. Groningen produces enough energy for local needs but does not generate a large surplus for others. A low energy demand reduces the need for extensive energy infrastructure. Most energy comes from decentralized sources like rooftop solar panels. Larger energy projects are concentrated and carefully sited to avoid disruption. Some outdated wind farms have been dismantled and replaced with smaller, decentralized landscape-integrated solutions, while major power lines have been placed underground to preserve scenic views.

Industrial clusters have shrunk, now operating under strict regulations on noise, air, and light pollution. The province's seven distinct landscapes are protected and enhanced with bike and walking paths, supporting ecological agriculture and biodiversity. Historical sites benefit from a cultural fund, enabling restoration efforts and cultural events. Tourism drives the local economy, attracting visitors looking for historical landscapes, clean air, and tranquillity.

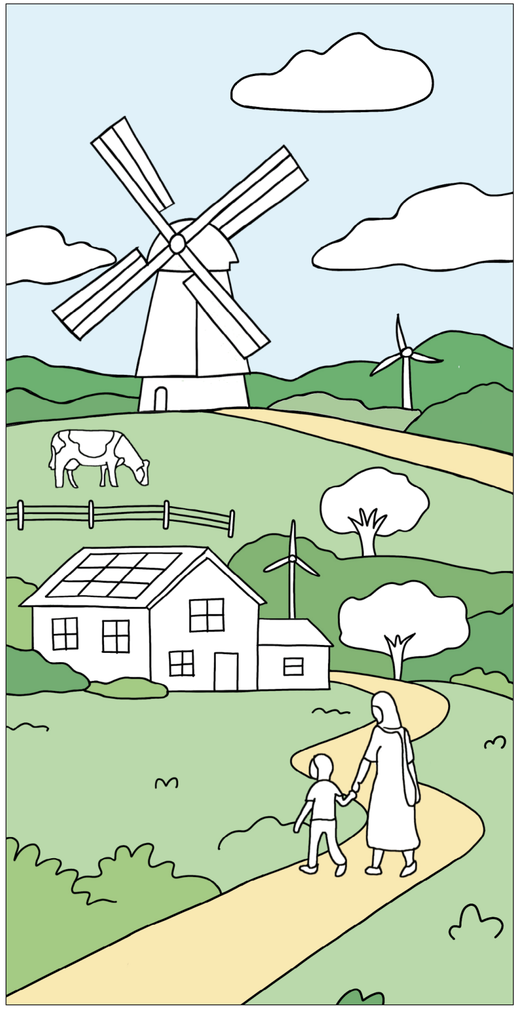


Figure 5.2 Sub-vision for conservatives

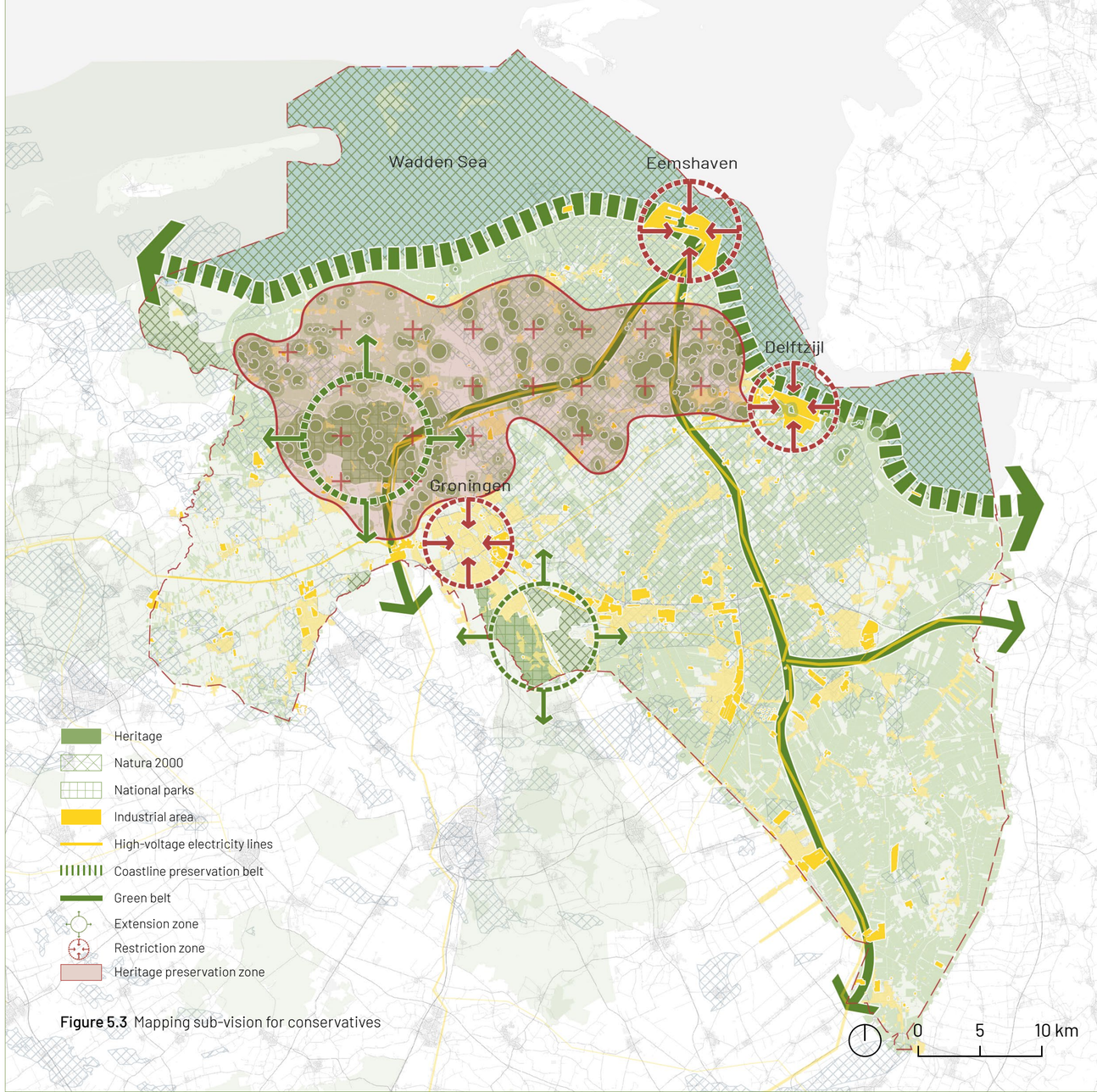


Figure 5.3 Mapping sub-vision for conservatives

Change as an Opportunity

Sub-Vision: Conservatives

The Pioneers see the energy transition as an opportunity for economic growth, innovation and shared prosperity. In their vision the region generates power for the rest of the country and its neighbours, embracing its role as a central hub in Europe's energy network.

Eemshaven serves as the main base port for offshore wind operations. The landscape has become a modern energyscape, dominated by wind turbines, solar parks, and power lines. Electrolysers produce green hydrogen, supporting climate-neutral industries and attracting new companies. Much of the energy infrastructure belongs to residents through cooperatives, ensuring shared profits.

Groningen's economic boom has brought young people to the region seeking opportunity, while new educational and research institutions have turned the region into a hub of innovation. A thriving circular economy has emerged, promoting sustainable industries. Circular hubs foster both economic activity and social cohesion, as people come together to repair, share, and collaborate.

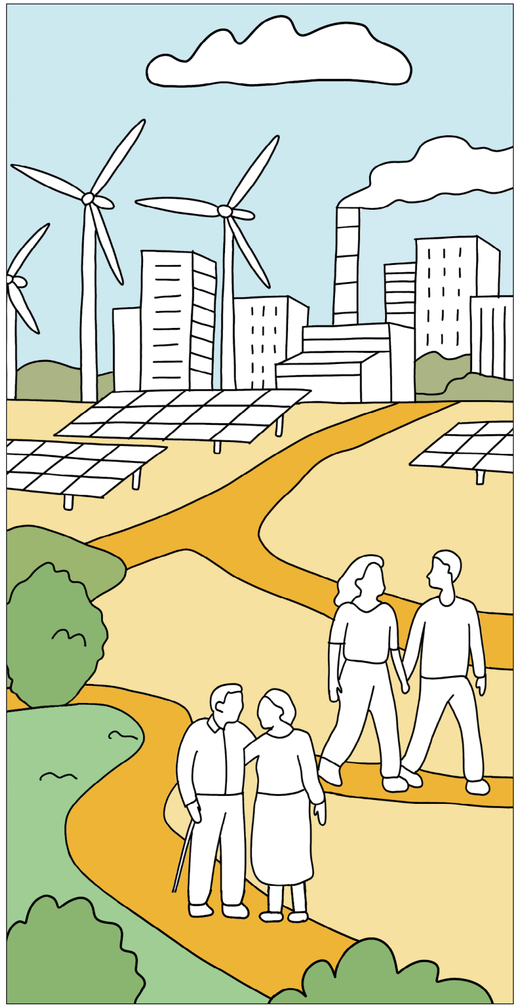


Figure 5.4 Sub-vision for pioneers

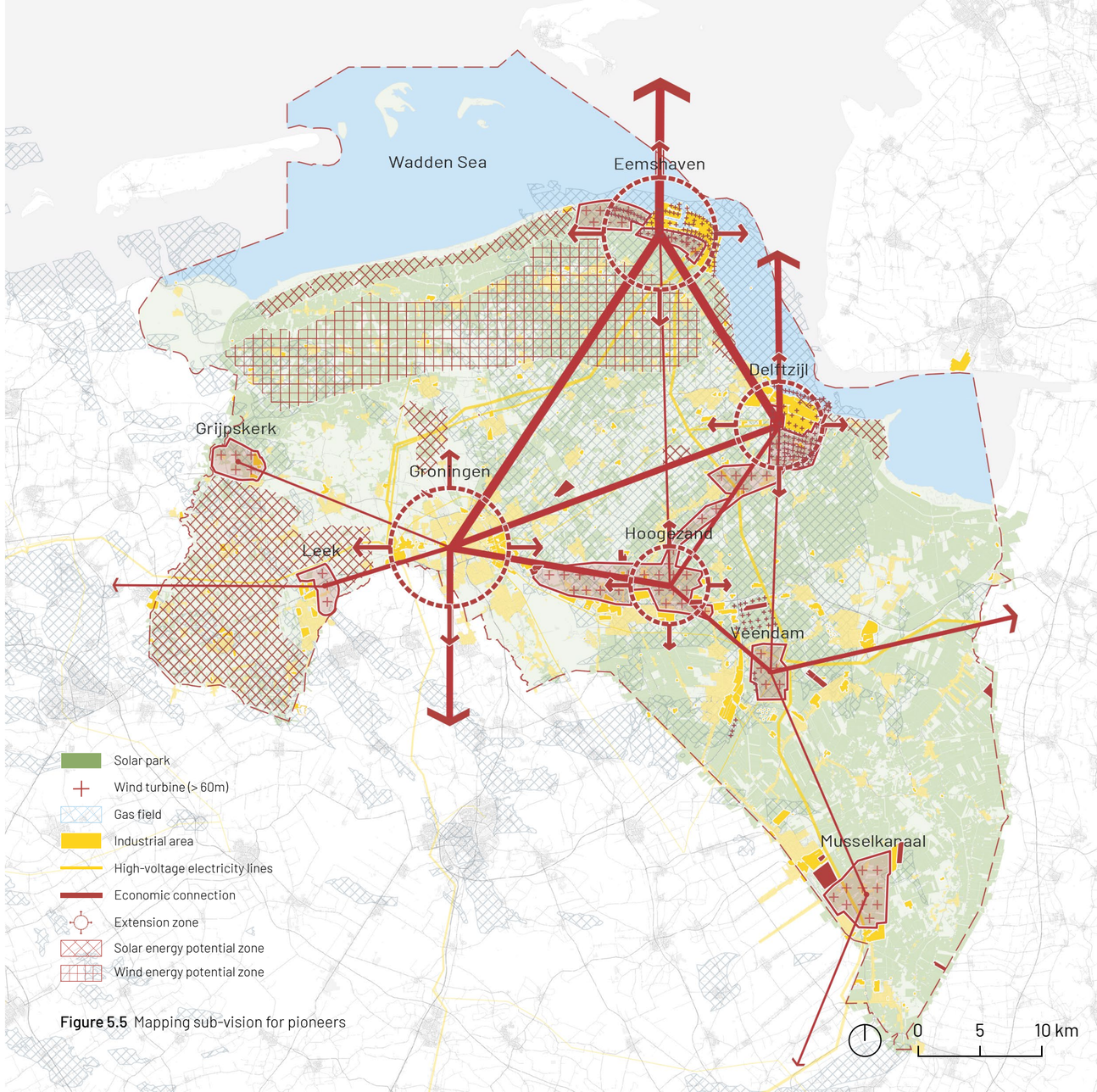
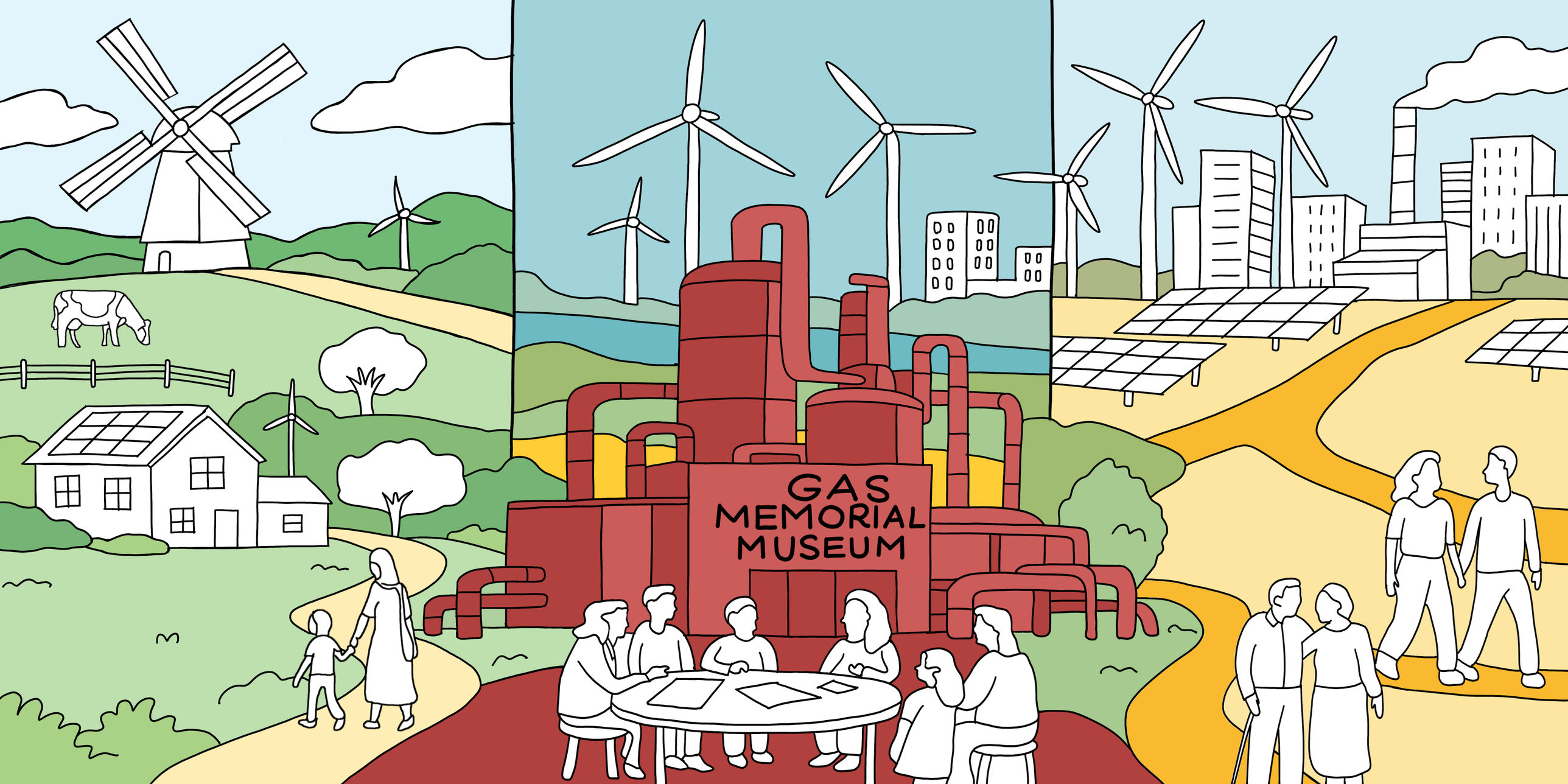


Figure 5.5 Mapping sub-vision for pioneers


GAS
MEMORIAL
MUSEUM

06

THE RULEBOOK

The Game as a Tool

Negotiating the Burdens and Needs

A game is introduced as a participatory planning tool to create a just energy transition for 2050, with an aim to engage all the relevant stakeholders and address the conflicting needs. This way, it becomes a tool for procedural justice while envisioning a strategy which delivers distributive justice. Two clear conflicts were identified from the analysis - the first, between the private energy sector and citizens defined the transition community and the second arose within the two transition communities as their spatial needs conflicted. The game identifies the players and provides conditions to every player to express their needs and negotiate, and is played till all players reach a defined satisfaction score.

The elements of the energy transition infrastructure are hence expanded - from earlier being limited to solely energy infrastructure, e.g., the energy grid, power plants, and storage facilities, they now encompass the relevant socio-ecological infrastructure which is valued by the community.

The planner here acts as the mediator - taking the responsibility to resolve disparate conflicts and enabling the stakeholders to arrive at the conclusions, rather that developing the vision themselves. This comes with acknowledging that they do not know the best solution but can deploy the needed methods for participatory planning and can further develop the conclusions on ground.

Figure 6.1 Present transition trend - elements of energy transition comprising solely of energy infrastructure

Figure 6.2 Envisioned transition trend - elements of energy transition inclusive of socio-ecological infrastructure

icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Stakeholder Analysis

Understanding the Power Distribution, Interests and Relationships

From the analysis, stakeholders from the civil society, private and public sector who would be important for the strategy were identified. They were placed at the local, provincial, national and international scales. To understand their role and inter-relationships, analyses of their relations and power-intersts were made, to enable a fair participation process.

Mapping the synergies versus the conflicts between the different stakeholders was relevant to understand where the needs could compliment each other while where they would benefit from bargaining and negotiations.

Plotting the stakeholders on a power-interest matrix showed the power and agency each stakeholder held to create change versus how high there interest was for the change. The stakeholders in the public and private sector held high power, while those who had the highest interest, the directly effected community, held very low power, signalling a power-shift which was needed to facilitate fair participation. The plotting helped understand which stakeholders need to be empowered, kept engaged, kept informed and who needed to be convinced.

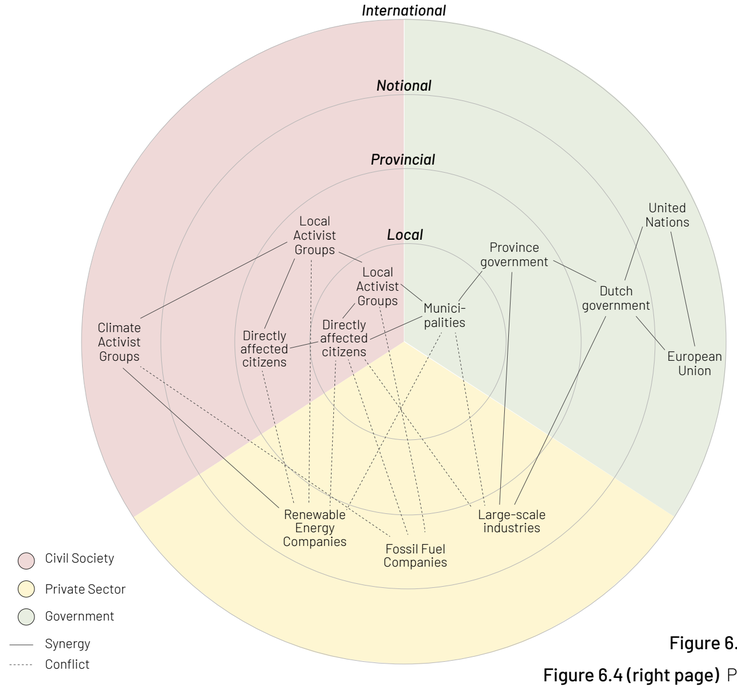
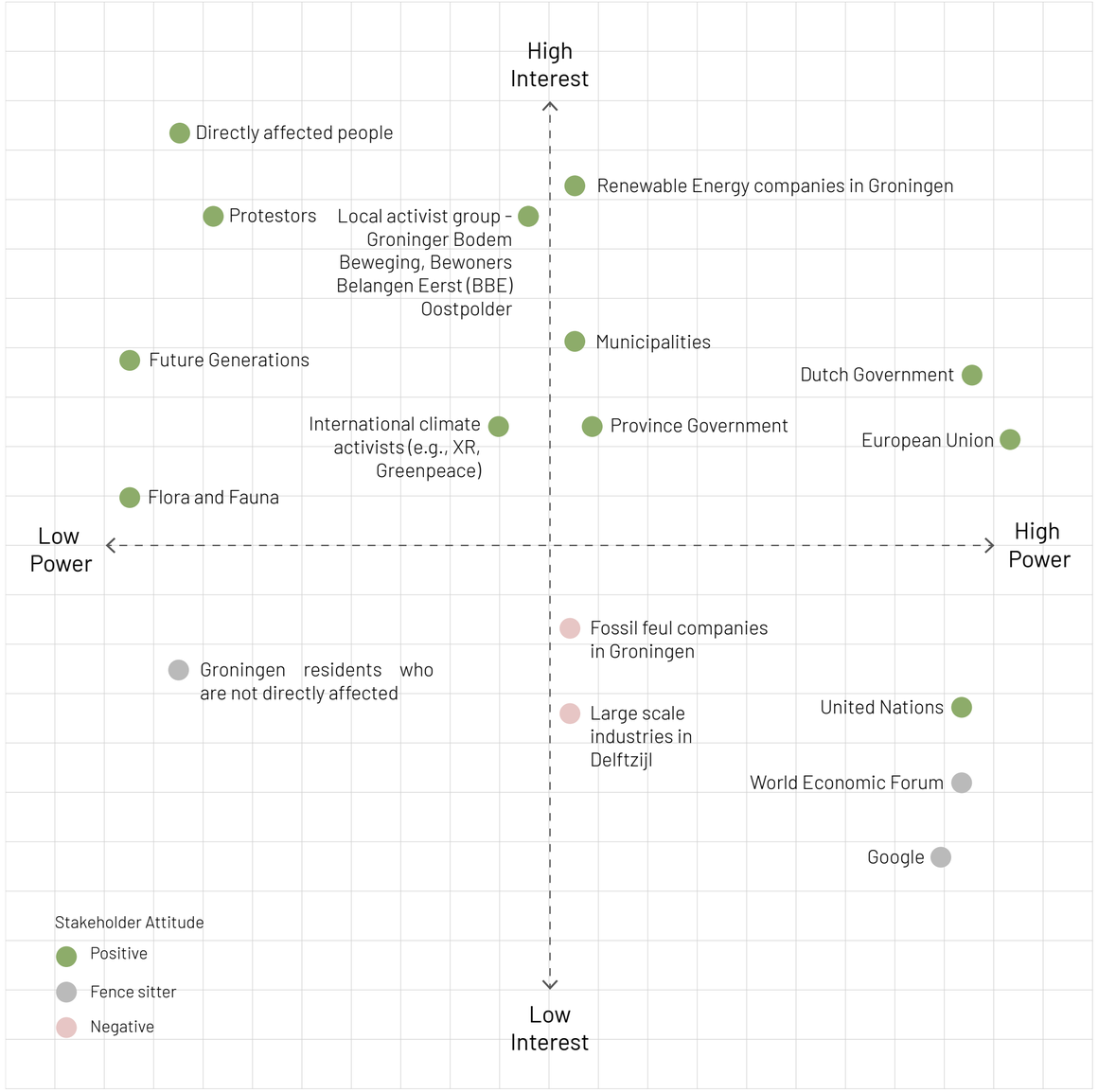


Figure 6.3 Conflict and synergy analysis

Figure 6.4 (right page) Power-interest-attitude analysis



The Players

The stakeholder analysis was important to identify the main player groups of the game under the three broad categories of the civil society, private and public sector. The civil society comprises of the group of pioneer citizens, the conservative citizens and the environmental activists. The renewable and fossil energy companies for the private sector groups, and the public sector is represented by the multiscale government. We selected to play with three civil sector players to give them more power in the game and to represent the diverse sub-groups with different needs within the community.

Although this specefic turn of the game chooses these stakeholders, in future they can vary depending on the situation at hand, influencing the dynamics and the outcomes of the game.

The groups show a similarity in interests, their satisfaction criteria and their present satisfaction levels. The satisfaction criteria shows the specific demands which the groups want to be fulfilled.

The game includes a score bar ranging from -5 to +5 to evaluate the satisfaction of each player. In the beginning, the scores are set according to how their needs are met currently, and that sets the base for the game to begin. The aim is to reach equitable satisfaction for each player

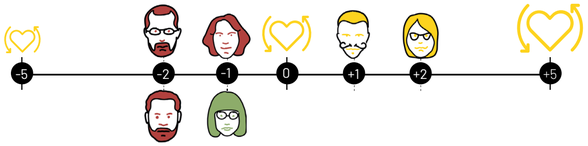


Figure 6.5 The satisfaction scorebar, and the starting positioning of the players in 2025

heart-icon created by Kukuh Wachyu Bias from **Noun Project**

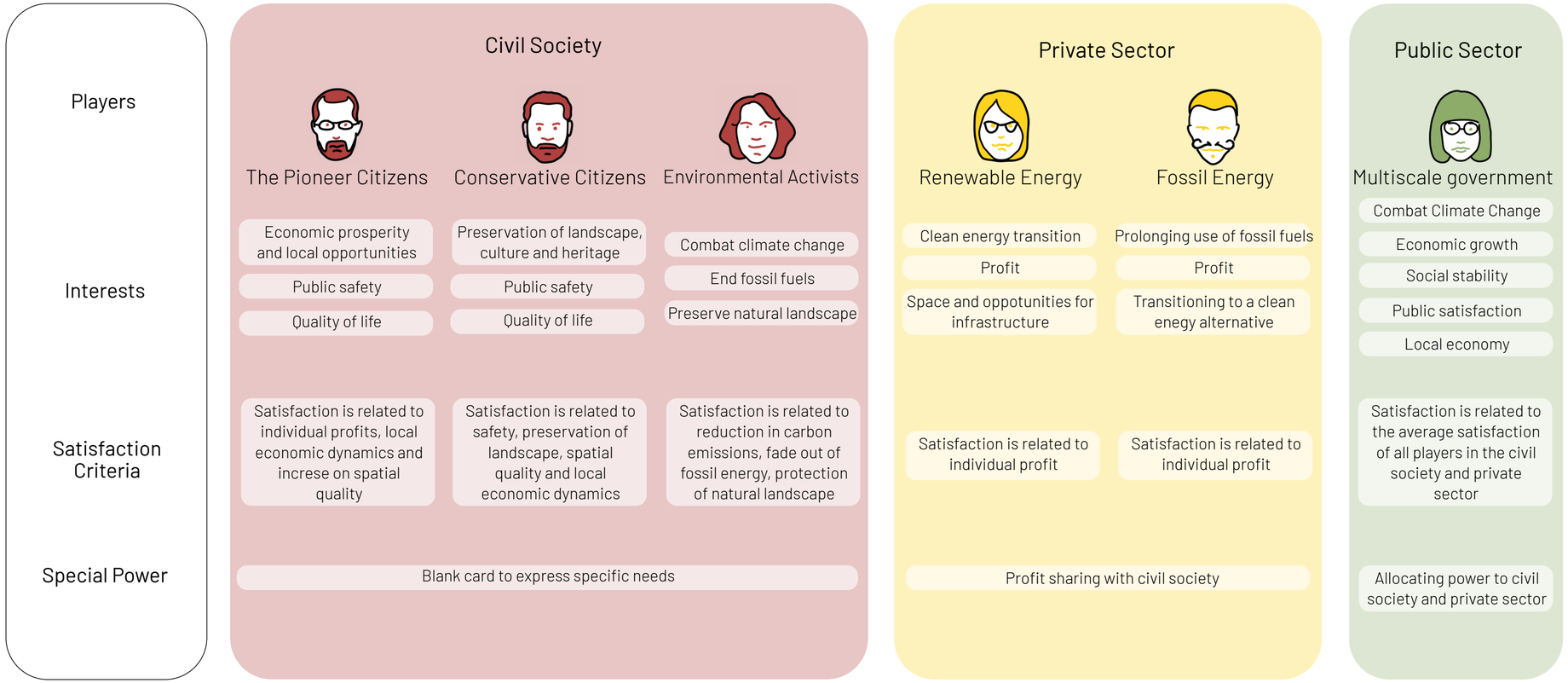
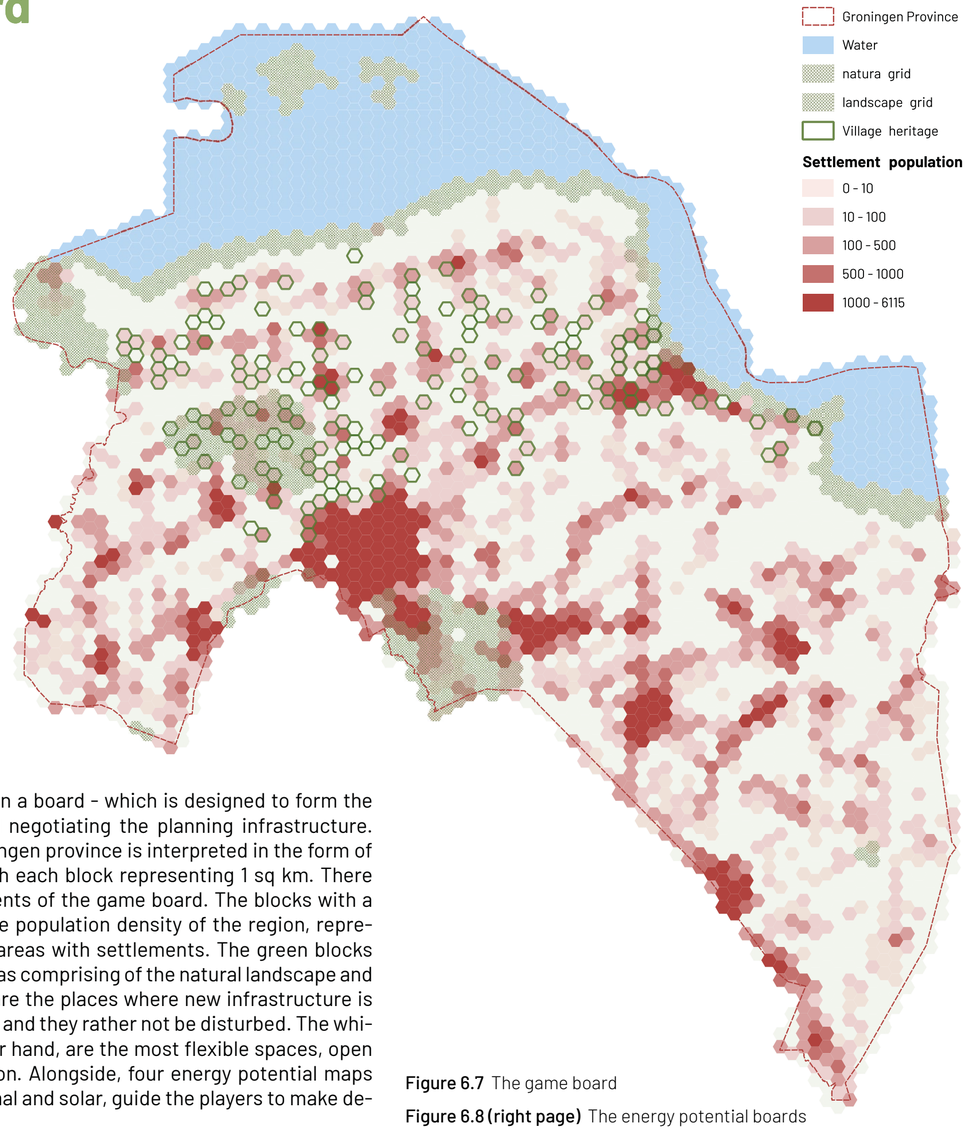


Figure 6.6 The players and their game mechanics

The Board

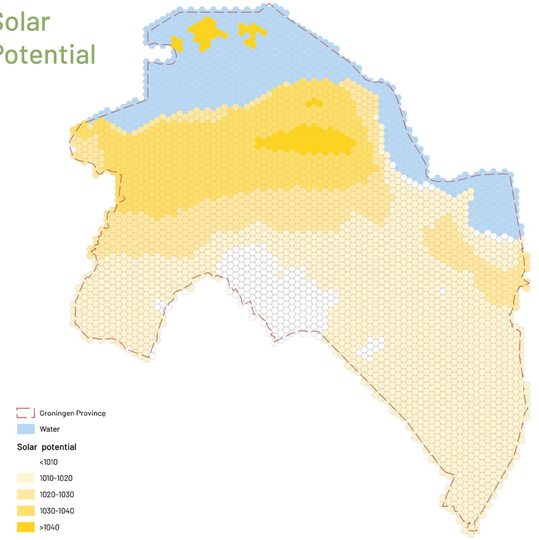


The game is played on a board - which is designed to form the base for placing and negotiating the planning infrastructure. The map of the Groningen province is interpreted in the form of a hexagonal grid, with each block representing 1 sq km. There are three main elements of the game board. The blocks with a red gradient show the population density of the region, representing the existing areas with settlements. The green blocks are the protected areas comprising of the natural landscape and terp villages. These are the places where new infrastructure is challenging to place - and they rather not be disturbed. The white blocks on the other hand, are the most flexible spaces, open for spatial intervention. Alongside, four energy potential maps - wind, sun, geothermal and solar, guide the players to make decisions.

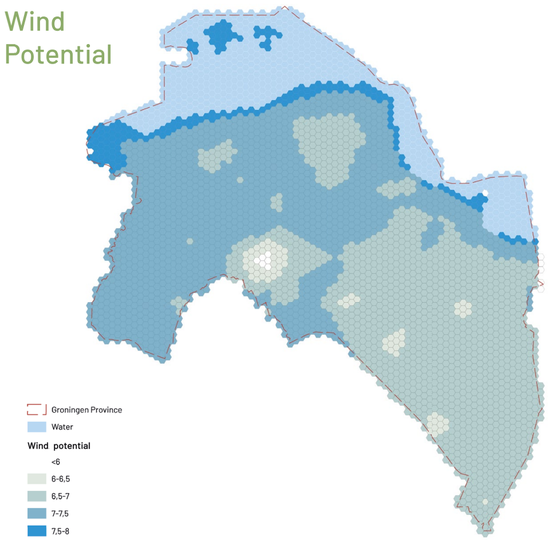
Figure 6.7 The game board

Figure 6.8 (right page) The energy potential boards

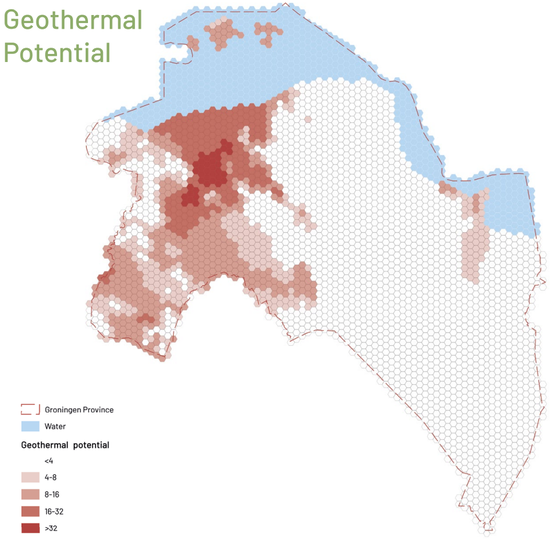
Solar Potential



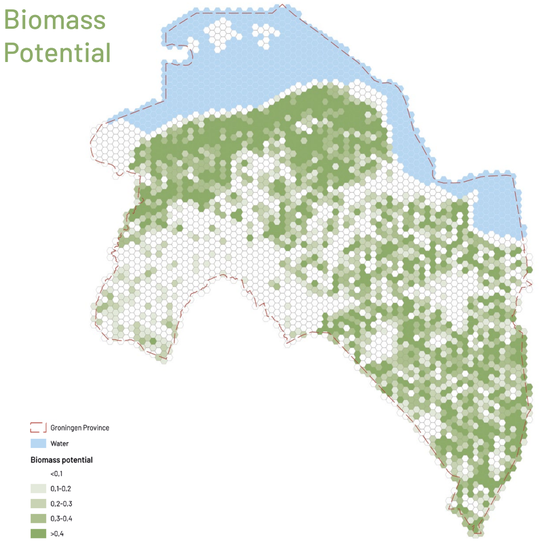
Wind Potential



Geothermal Potential



Biomass Potential



Game Pins

The Planning and Negotiating Infrastructure

The game pins are the elements which translate the needs of different players in the strategy. Players use them to express how they want to shape their environment.

The categories and the component of each pin within the categories are derived from the premise that we need to fulfil the energy demands while satisfying the needs of the community and adding economic value to the province. They represent the needs derived from the community analysis, along with the energy goals that are required to be met. There are hence three major categories of the pins - the energy infrastructure, nature and agriculture, and socio-economic infrastructure.

While the game as a whole facilitates procedural justice, the game pins specifically are the element of the strategy which translate the logic of distributive justice within the process of playing the game, making the planning process more democratic. As the game unfolds and a player places their proposal, the other players are open to state their opinion and propose alternative pins, which could result in a different spatial permutation, or in a new policy.
All pins are open to be used by all players to negotiate, except the blank pin, which is created particularly for the civil society, to give their needs more expression and power in the planning process.

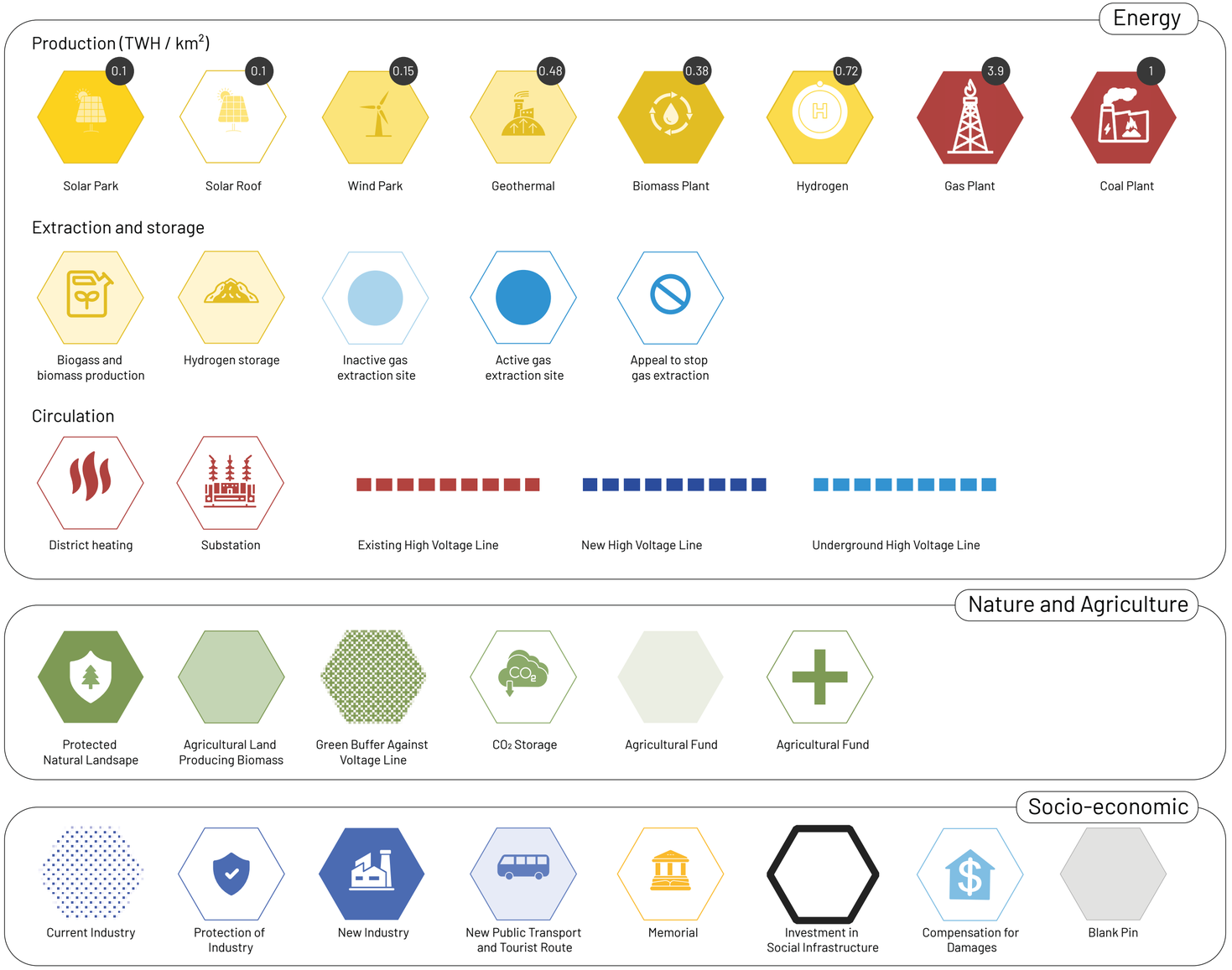


Figure 6.9 (right page) The game pins

icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Game Evaluation

The game is played in three rounds - with each round having a set of goals to be met in order for the round to be completed. For each round, targets have to be met for energy production (in TWH), reduction in greenhouse gas emissions (in percentage) and a shift in satisfaction score towards it being more equitable among the players (in points). The three criterea for evaluation stem from the analysis and the conceotual framework of the just energy transition which show a need for energy production, reduction in greenhouse gas emissions and an upset civil society.

As each round proceeds, the players express their needs using the game pins and their special powers. Negotiations among the players take place, and the final output which satisfies all three evaluation critera becomes the base for the next round.

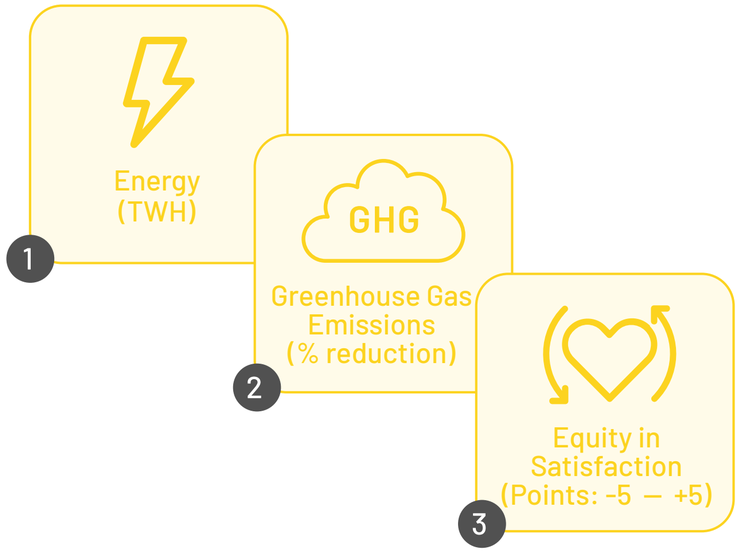


Figure 6.10 The evaluation cards
icons created by Joe Pictos, Circlon Tech and Kukuh Wachyu Bias from **Noun Project**

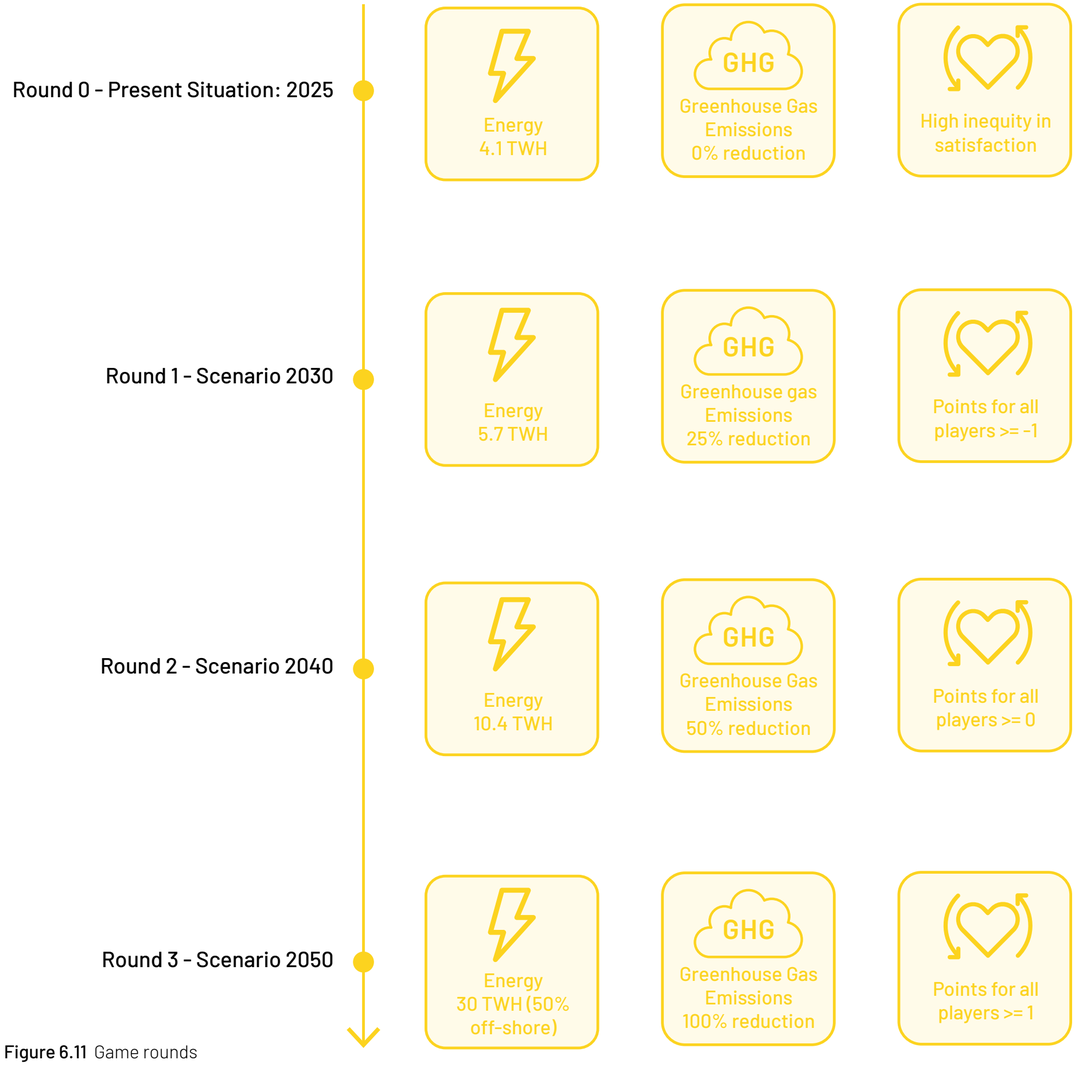


Figure 6.11 Game rounds

07

THE GAME

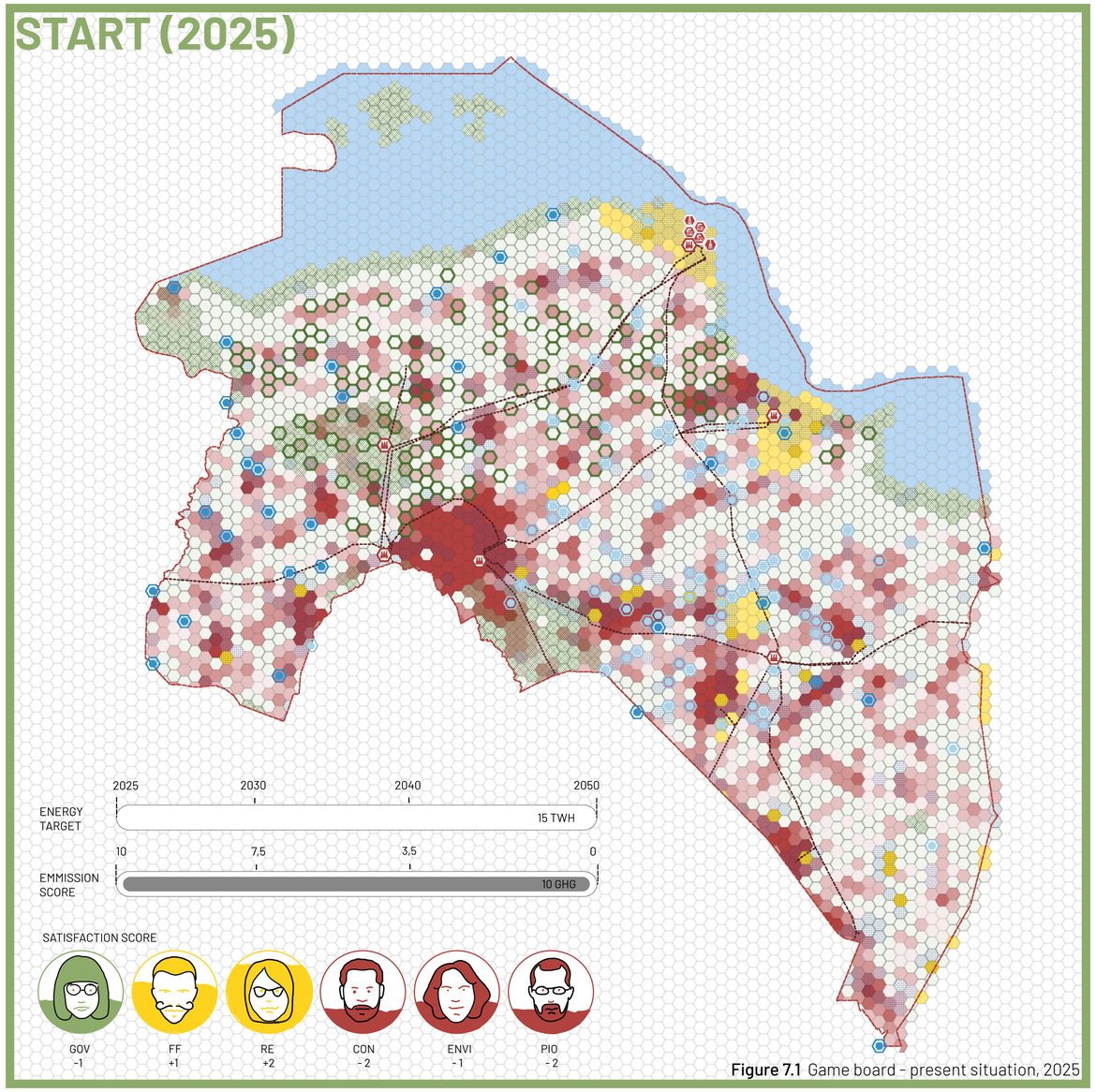


Figure 7.1 Game board - present situation, 2025

Policy Packages

After each round of agreement, a policy and action plan is developed to address the needs and concerns of our community and to ensure committed, lasting development for prosperity, safety, and justice across all scales. A set of policy packages has been created, each with corresponding actions designed to respond to the challenges of the energy transition in a structured and accountable way.

1. Climate action

Addresses the critical importance of climate change within the region, focusing on building climate resilience, particularly in coastal areas. It ensures the reduction of greenhouse gas emissions and emphasizes the restoration of landscapes and communities impacted by fossil fuel extraction.

2. Safety and security

Recognizes the burdens the region has endured and commits to restoring and compensating the people affected by the energy sector. It aims to rebuild trust in the government by addressing the safety and well-being of residents throughout the energy transition.

3. Cultural heritage and landscape

Recognizes the injustice and pressure placed on citizens by large energy infrastructure, accounting for the loss of identity and quality of life, and providing funds for the restoration of both the landscape and culture.

4. Democratic deliberation

Ensures that residents living near energy infrastructure are actively and meaningfully involved in decision-making and policy shaping.

5. Prosperous province

Embraces the need for sustainable regional growth and proudly supports initiatives that strengthen its economy, enhance livability, and secure a thriving future for its communities.

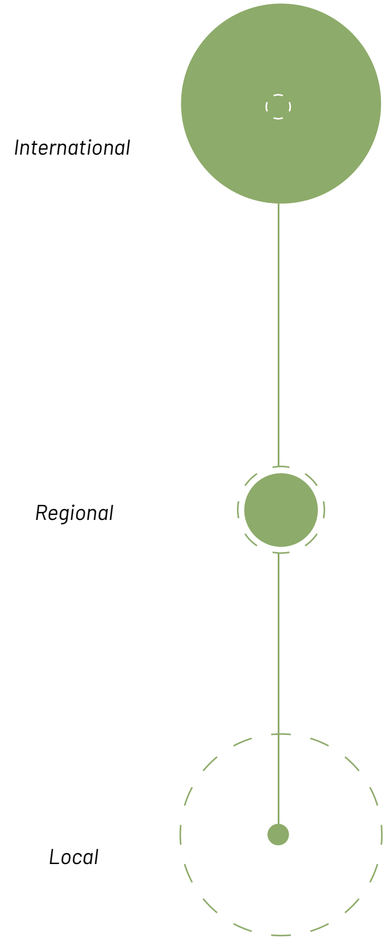


Figure 7.2 Scale versus needs

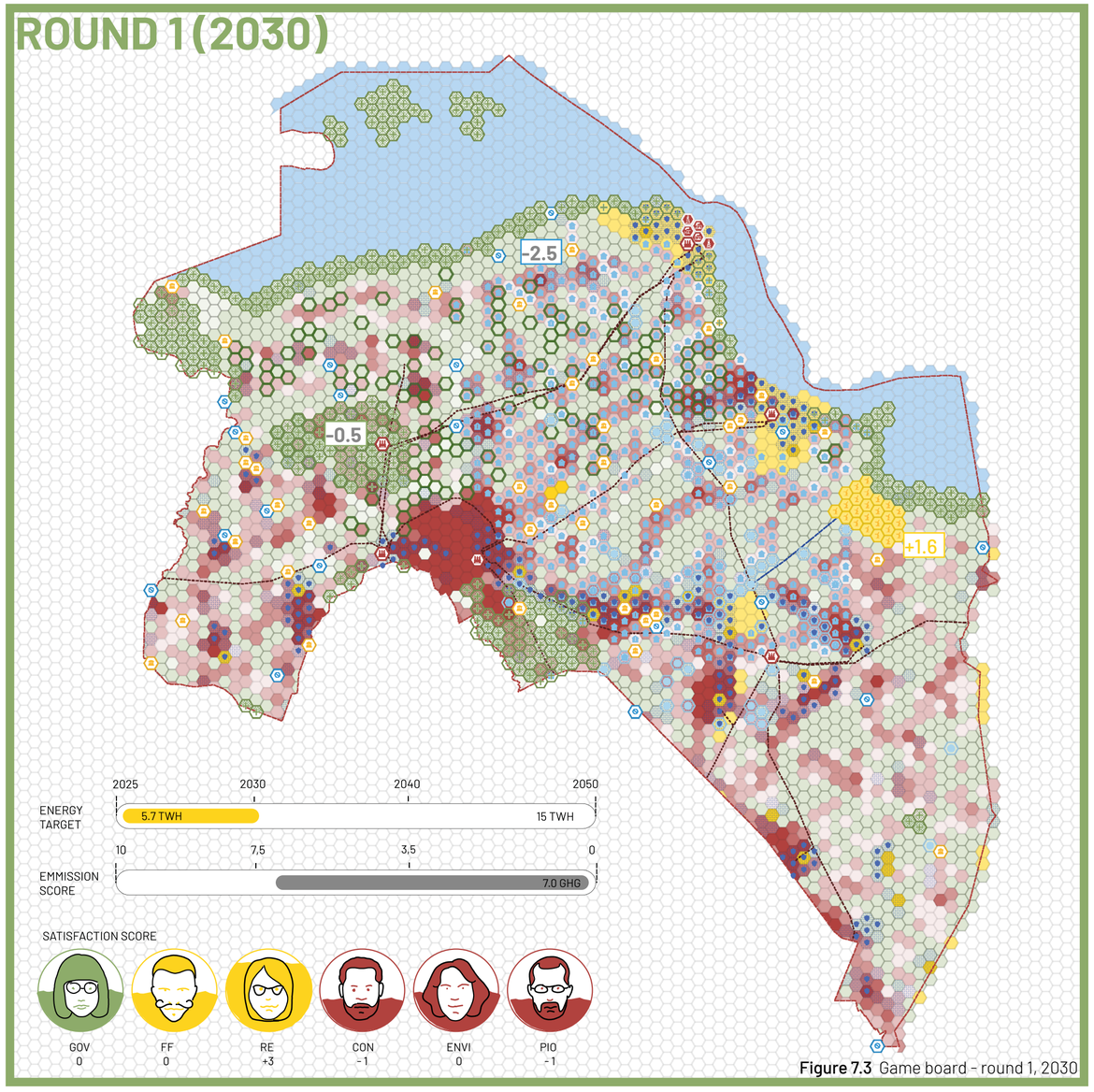


Figure 7.3 Game board - round 1, 2030

BARGAINING

Values and Demands

Synergies and Conflicts

Proposal 1

Safety, recognition and compensation

Stop gas extraction, compensate us for the loss!

Loss of Property Value

Fossil Fuel Business

Trust in Government

Compensation and Landscape restoration

Climate Action

Reaction tab

-1

Proposal 2

Satisfation of civil society

GHG Environmental Quality and Climate

New Budget! Funds for culture, landscape protection and agriculture!

Profit for agriculture industry

Financial support for environment and culture

Restoration of landscape

Climate Action

Reaction tab

+1 +1 +1

Proposal 3

Profit from Energy Production

I propose new solar and wind parks!

Renewable energy production

Landscape and land value

Regular compensation for land acquisation

Reaction tab

icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

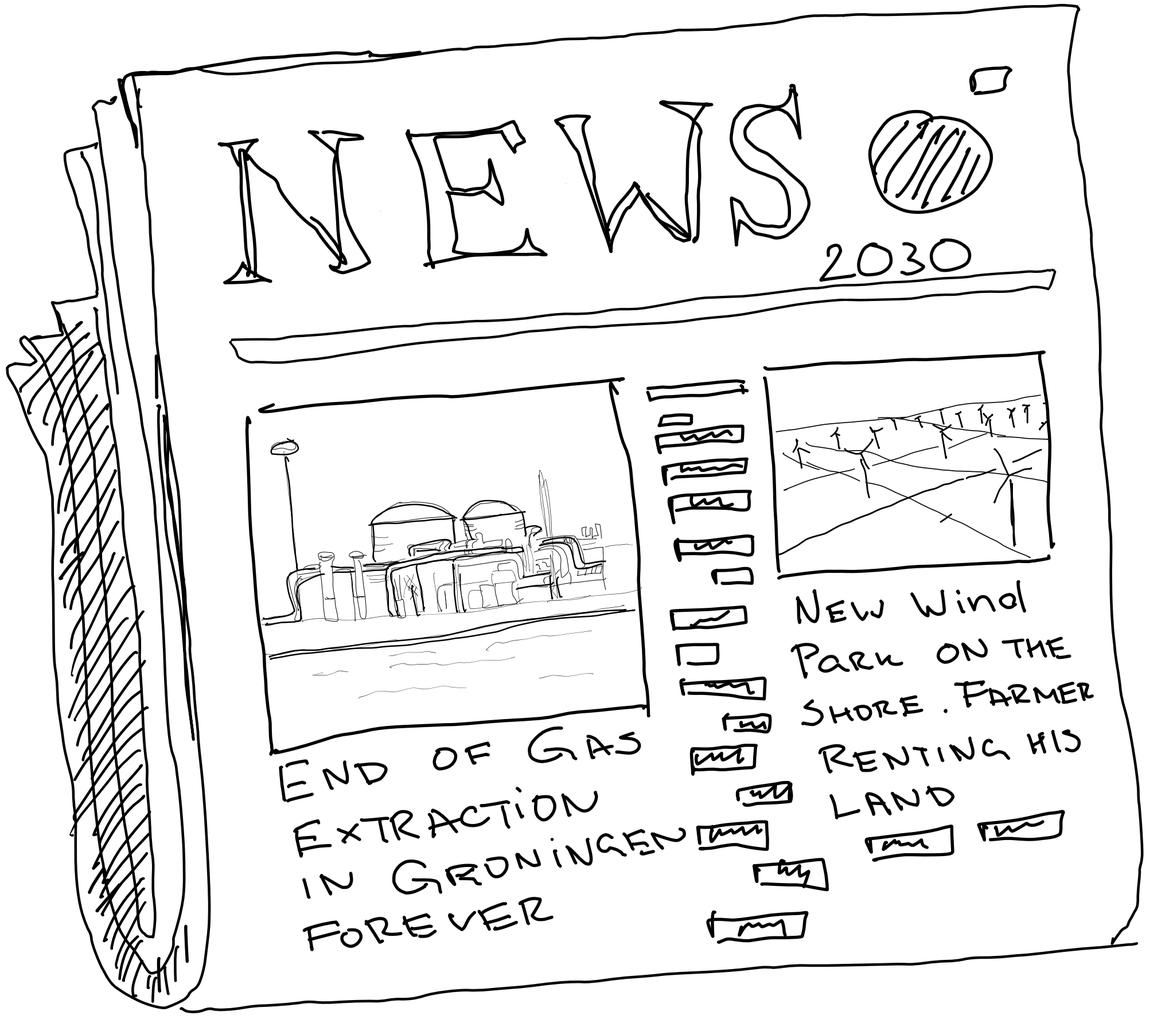


Figure 7.4 Groningen news, 2030

Action Plan for Groningen 2030

Policy Bulletin

March 22, 2025

The Province of Groningen is committed to a fair, sustainable future by ending gas extraction and addressing its long-term impacts. This policy bulletin outlines key actions in climate policy, safety, cultural landscape, and democratic participation to support a just and inclusive transition.

1. Climate action

1.1. Commit to the complete cessation of gas extraction, including operations from smaller fields, as a necessary step toward a sustainable and safe future.

2. Safety and security

2.1. Ensure fair and timely compensation for both material damage and psychological distress resulting from unsafe conditions related to energy infrastructure.
2.2. Invest in the restoration and reinforcement of damaged physical infrastructure.
2.3. Protect the financial stability of households and local industries during the energy transition, shielding them from rising energy costs and safeguarding regional employment.

3.Cultural heritage and landscape

3.1. Preserve visible signs of human intervention in the landscape—such as gas extraction sites—as part of Groningen's industrial heritage, recognizing their historical significance.
3.2. Actively restore ecosystems affected by past energy projects, aiming to return the landscape to a healthy and sustainable condition.
3.3. Safeguard protected landscapes from new energy developments; minimize or eliminate any serious disruptions that endanger communities, ecosystems, or the broader biosphere.
3.4. Ensure that new energy projects are based on fair agreements between the profit sector and civil society, delivering clear and tangible benefits to local citizens—comparable to, or exceeding, those of current land uses (e.g., agriculture).

4. Democratic deliberation

4.1. Engage local residents in participatory planning processes, making their voices a core part of regional decision-making.
4.2. Establish inclusive spaces and platforms to support both existing and new initiatives, encouraging open dialogue and collaboration between communities, governments, and private stakeholders.

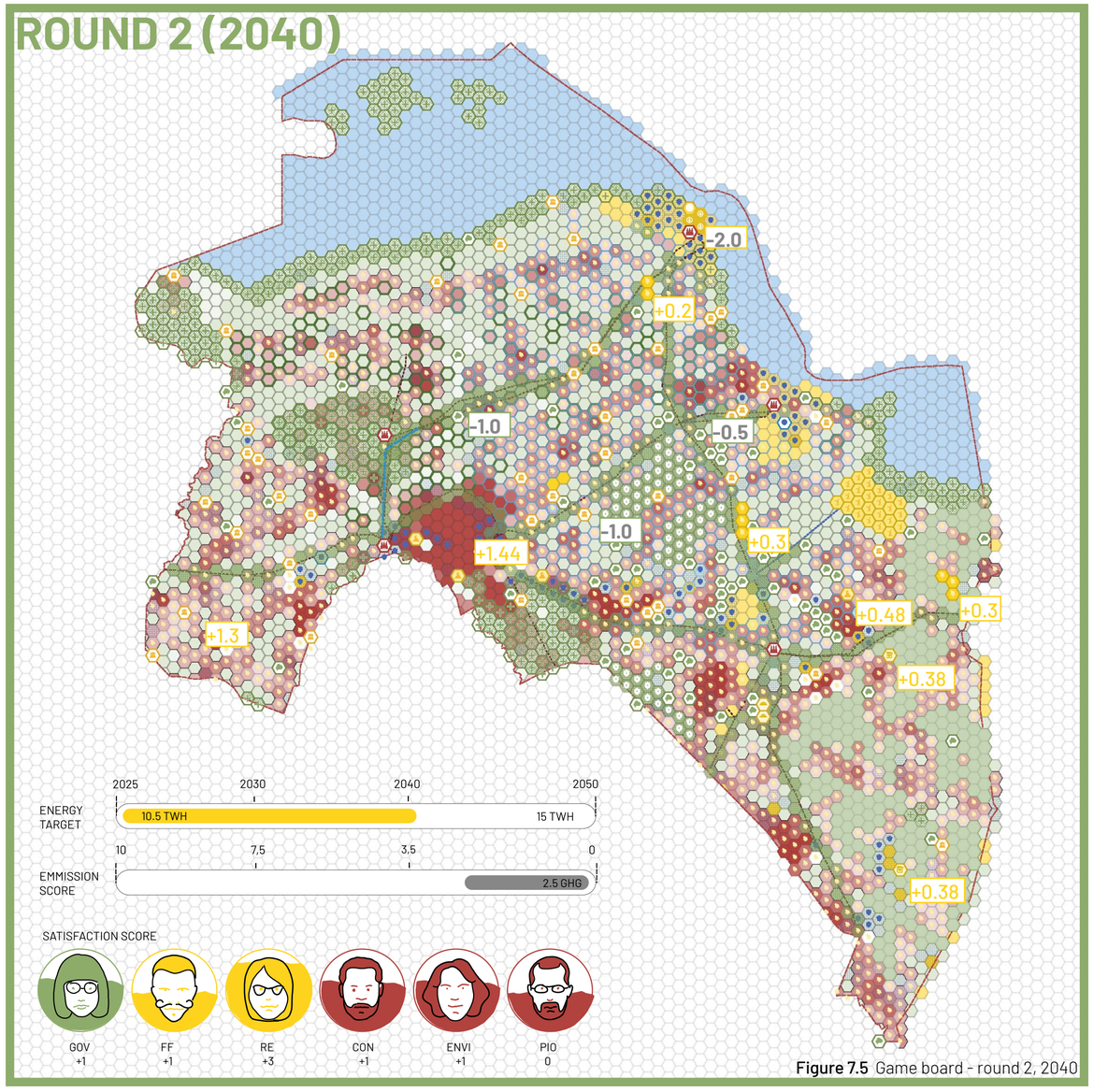


Figure 7.5 Game board - round 2, 2040

BARGAINING

Values and Demands

Synergies and Conflicts

Proposal 1

GHG
Just Energy Transition

Convert all fossil plants to biomass, deal with farmers

Reaction tab +1 +1

Transition to clean energy

Fossil Fuel Business

Profit for agriculture industry

Biomass Energy

Restoration of landscape

Proposal 2

Equity in Satisfaction

Policies for reusing old gas extraction sites!

Reaction tab +1 +1

Fossil fuel industry

Adaptive reuse of old gas infrastructure

Cultural Value

Climate Action

Proposal 3

Quality of Life and Environment

Focus on our quality of life!

History of gas extraction, heavy industry

Landscape Quality and opportunities

Climate Action

Policies to prioritise natural landscapes

Protected landscapes, healthy environment

Satisfation of civil society

Expand protected landscapes and settlements, solar roof subsidies!

Solar power generation

Policies to prioritise natural landscapes

Decentralised energy, protected landscapes

Reaction tab +1

icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

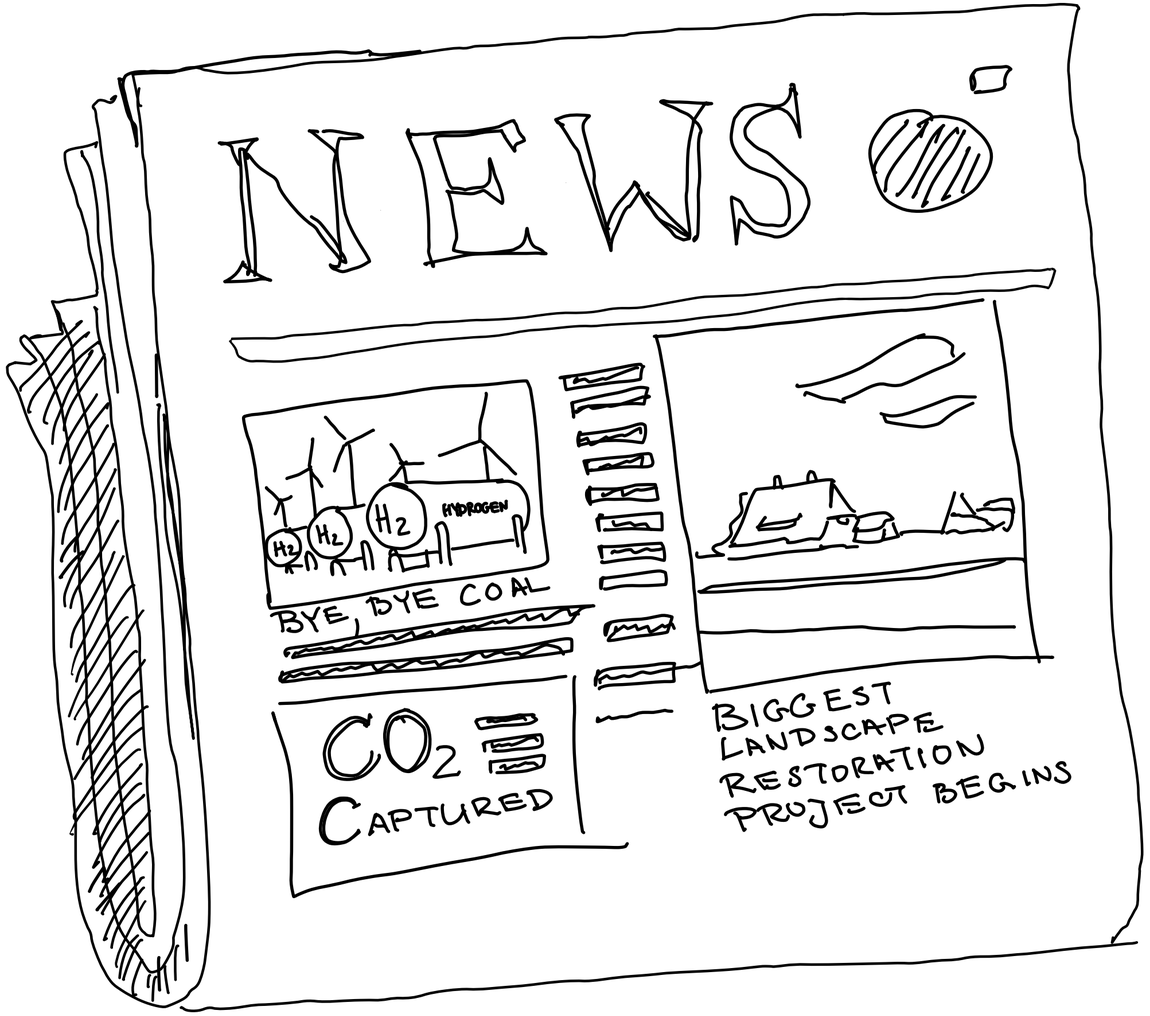


Figure 7.6 Groningen news, 2040

Action Plan for Groningen 2040

Policy Bulletin

November 1, 2030

The Province of Groningen is laying the foundation for a resilient, inclusive, and climate-neutral future by addressing the environmental, economic, and social dimensions of the energy transition. This policy bulletin outlines key actions in climate mitigation, public safety, landscape restoration and sustainable regional development.

1. Climate action

1.1. Invest in carbon capture and storage while actively reducing greenhouse gas emissions across sectors.
1.2. Develop green belts around high voltage lines to support biodiversity corridors and ecosystem resilience.
1.3.Transition the coal industry toward cleaner alternatives, including hydrogen and sustainably sourced biomass.

2. Safety and security

2.1. Establish protective buffer zones around major energy grids to enhance public safety.
2.2. Eliminate health risks near energy infrastructure by using green belts to reduce noise and electromagnetic exposure, and by preventing hydrogen leakage—particularly in salt mine storage areas.

3.Cultural heritage and landscape

3.1. Restore the subsurface and surrounding landscape affected by past extraction activities.
3.2. Designate new protected community green spaces to enhance biodiversity and improve residents' well-being.
3.3. Create a dedicated fund to strengthen social infrastructure in urban areas, ensuring vibrant, resilient cities.

4. Democratic deliberation

4.1. Promote household energy independence by supporting rooftop solar panel installations.
4.2. Foster energy communities and local coalitions that empower citizens to participate in energy production and governance.
4.3. Develop an inclusive, unified energy grid that enables seamless power exchange between civic and private producers—ensuring everyone has a stake in the energy transition.

5.Prosperous province

5.1. Strengthen the agricultural sector by integrating biomass production as a source of revenue and circular value.
5.2. Ensure that electricity generation also benefits local communities—enabling Groningen to thrive as both a producer and a stakeholder in the clean energy economy.

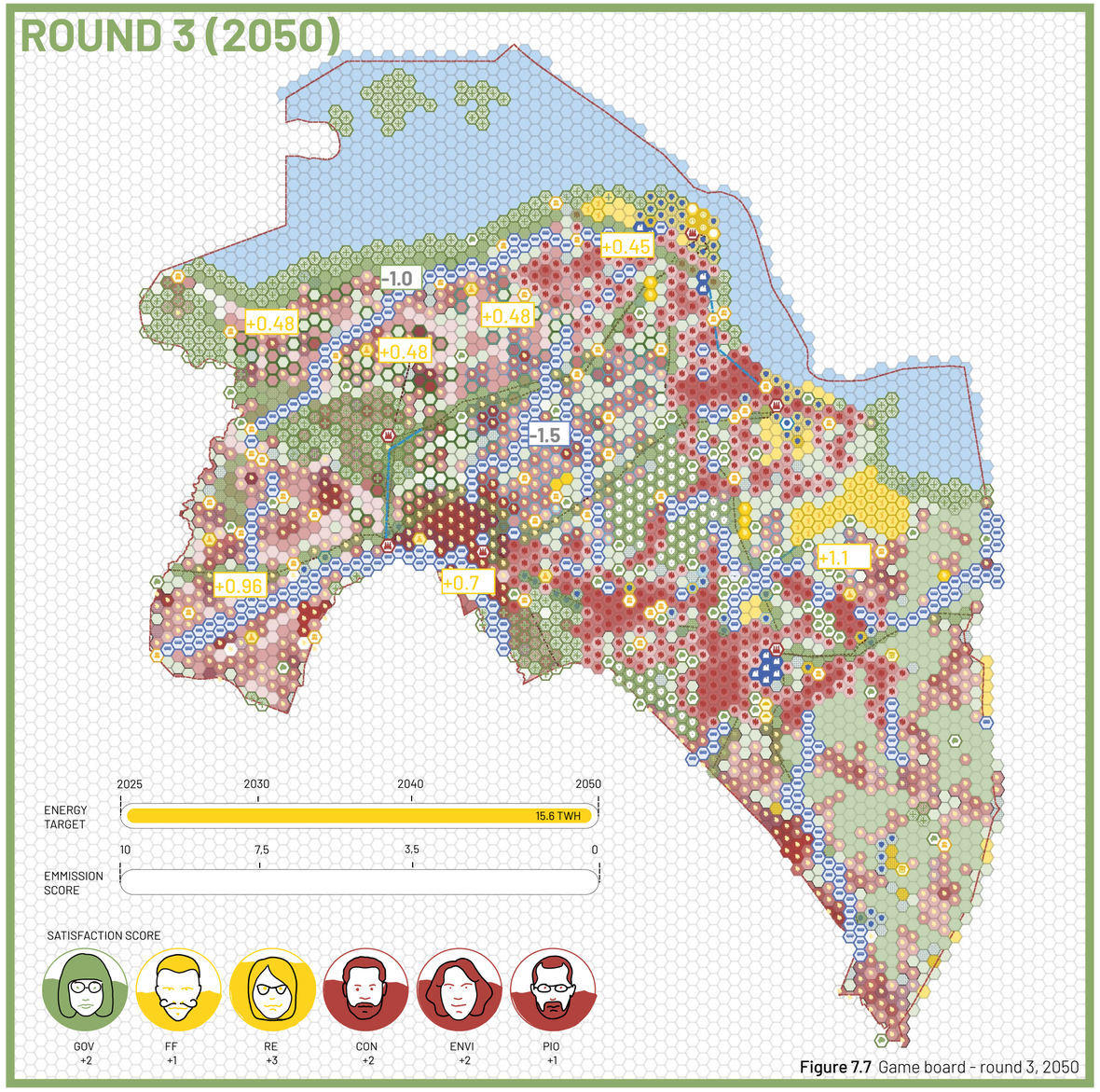
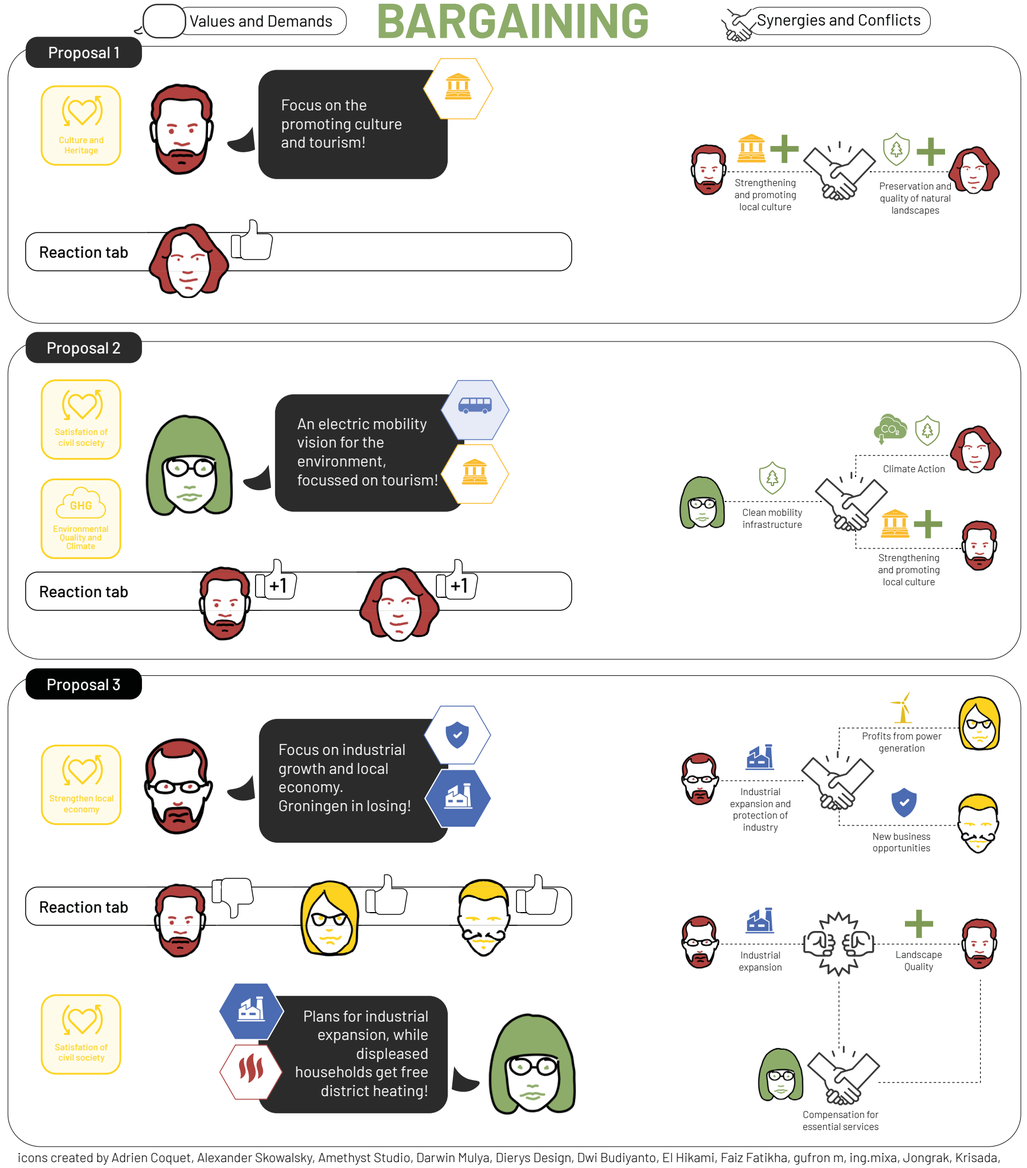


Figure 7.7 Game board - round 3, 2050



icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Figure 7.8 Groningen news, 2050

Action Plan for Groningen 2050

Policy Bulletin

August 13, 2040

Groningen is committed to a sustainable future through actions that tackle climate change, enhance safety, preserve heritage, and drive economic growth. This policy bulletin outlines key steps to reduce emissions, promote clean mobility, and empower local communities for a resilient region.

1. Climate action

1.1. Promote the transition to electric vehicles and vehicles powered by sustainable biodiesel, reducing transportation-related emissions and supporting clean mobility.
1.2. Reduce emissions by expanding and modernizing the public transport network, making sustainable mobility more accessible and attractive for residents and visitors alike.

2. Safety and security

2.1. Strengthen the coastline by establishing a wider protected landscape buffer, enhancing natural resilience against environmental risks and climate impacts.

3.Cultural heritage and landscape

3.1. Limit urban sprawl by expanding green protected landscapes, preserving Groningen's natural and cultural character while promoting ecological balance.

4. Democratic deliberation

4.1. Empower energy communities by developing geothermal energy projects that offer shared ownership and direct local benefits.

5.Prosperous province

5.1. Encourage the development of light industries and modern industrial sectors that generate new employment opportunities.
5.2. Integrate district heating systems into industrial expansion plans to support sustainable energy and industry.
5.3. Facilitate new residential developments to accommodate population growth and community needs.
5.4.Promote tourism through new bus routes that connect transformed former gas extraction sites now repurposed as recreational and cultural destinations.
5.5. Expand the regional public transport and cycling network by introducing new, well-connected bicycle routes and enhancing existing infrastructure, promoting accessible, low-emission mobility options that support both daily commuting and tourism across the province.

08 STRATEGY

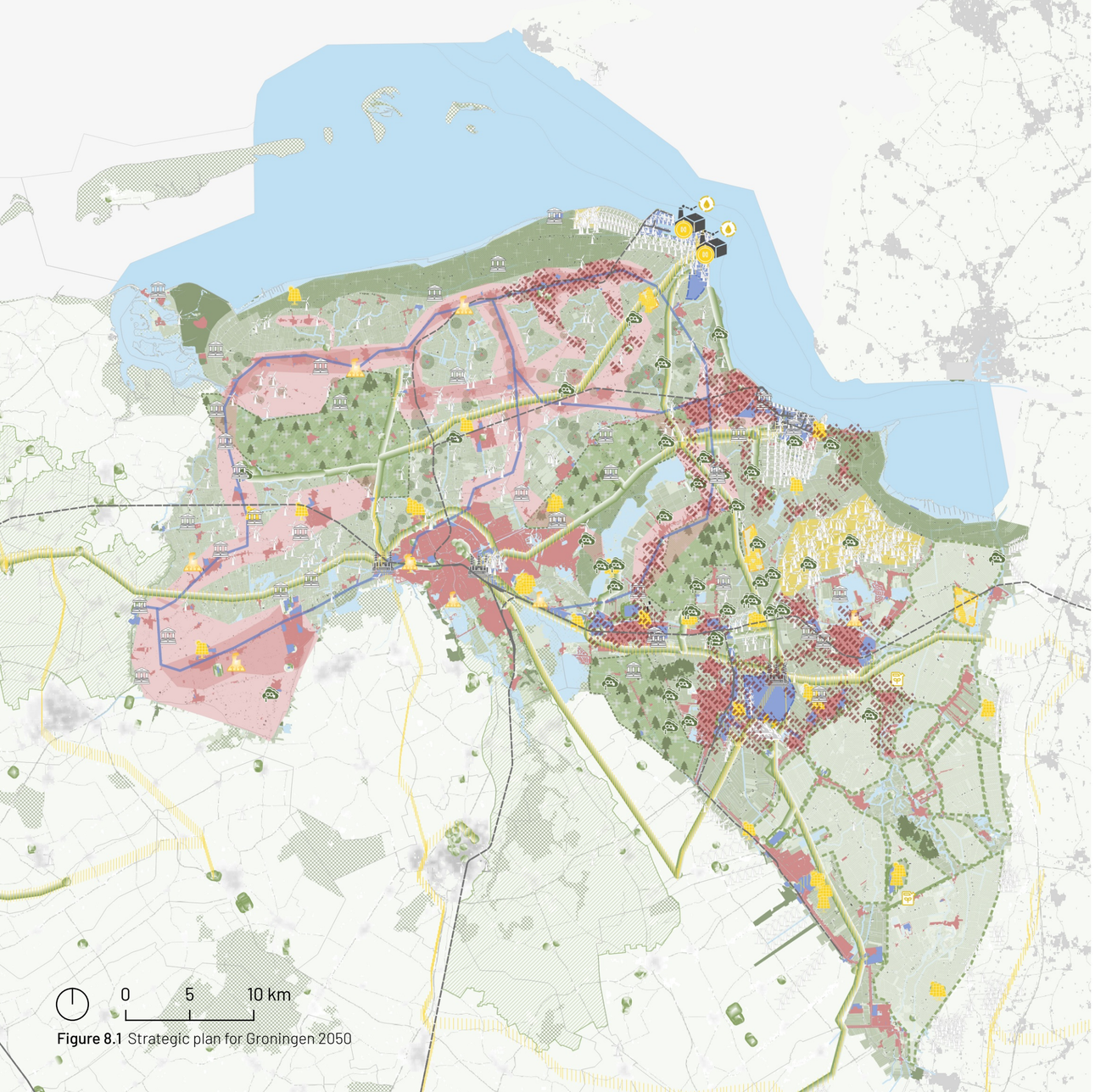


Figure 8.1 Strategic plan for Groningen 2050

Regional Plan 2050

Legend

- Landscape
- Expansion of protected areas - inland
- Expansion of protected areas - coastline
- National protected area
- Natura 2000
- Protected terp villages
- Urbanized area
- Urban expansion
- Sea, lakes and waterstreams

- Existing industry
- New industry
- Biomass production
- Biomass Industry
- CO2 storage point
- Green belts on high voltage line
- New busline for tourism
- Trainline
- Gas extraction memorial

- District heating

Electrical grid

- Substations
- Windmills
- Transmission tower
- Geothermal energy
- Hydrogen and biofuel plant
- Existing solar parks
- New windparks
- New solar parks

icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Scenario After the Game

After the game concluded and all stakeholders reached a satisfying outcome for the energy transition, the next step was to translate this shared vision back into physical space. This is where urbanists were brought in, working closely with stakeholders to reimagine and detail the different regions—ensuring that the policies written truly reflected the needs and aspirations of those they were meant to serve.

The province of Groningen has since transformed into a thriving hub for people, industry, and nature. It has become energy self-sufficient and successfully achieved its climate goals for 2050. Through a participatory process rooted in collaboration and consensus, Groningen transitioned to sustainable energy sources supported by minimally invasive infrastructure. The province now stands as a powerful example of cooperation, where once-divergent parties have come together to build a better, shared future. Trust between stakeholders has been restored, and vibrant energy communities have emerged—allowing civil society to become active participants in the just energy transition. Together, they now collaboratively contribute to a democratized and resilient energy grid.

Safety across the natural landscape is also being restored. Investments are being made not only in the local flora and fauna but also in social, public infrastructure, and community facilities that promote well-being.

Industrial heritage sites have been preserved and reimagined as cultural landmarks, now accessible through guided tours that reflect on the region's history. These sites, maintained by local communities, have become a symbol of remembrance and resilience.

With the overall revitalization of the province, Groningen has become a more attractive place to live, work, and grow. New job opportunities have arisen through the shift toward light industry. Housing development projects are underway, supporting the growing population and reinforcing Groningen's role as a model for a just and inclusive energy future.

Timeline

The timeline shows the implementation of the decisions which were formed at the end of each round. The game is played for three phases, 2025 - 2030, 2030 - 2040 and 2040 - 2050.

Our goal for 2050, which is to achieve a just energy transition has three main segements: to satisfy the needs of the community, to produce a certain threshhold of energy, and to reduce the greenhouse gas emissions to zero. The timeline is hence represented in a way which shows the different policies from the policy packages and key projects along the three goals, showing how they develop in each phase.

Each phase can be defined by three broad outcomes - the first one focussed on lifting the most crucial burdens from the community, answering to the most urgent needs. The second phase focussed more on the environmental quality and introducing a shift towards decentralisation and building civil-private partnerships. The thirds phase then caters towards prosperity - capitlising on the idea of civic-private partnerships, local industrial growth and on tourism to promote the culture and recreation in the province.

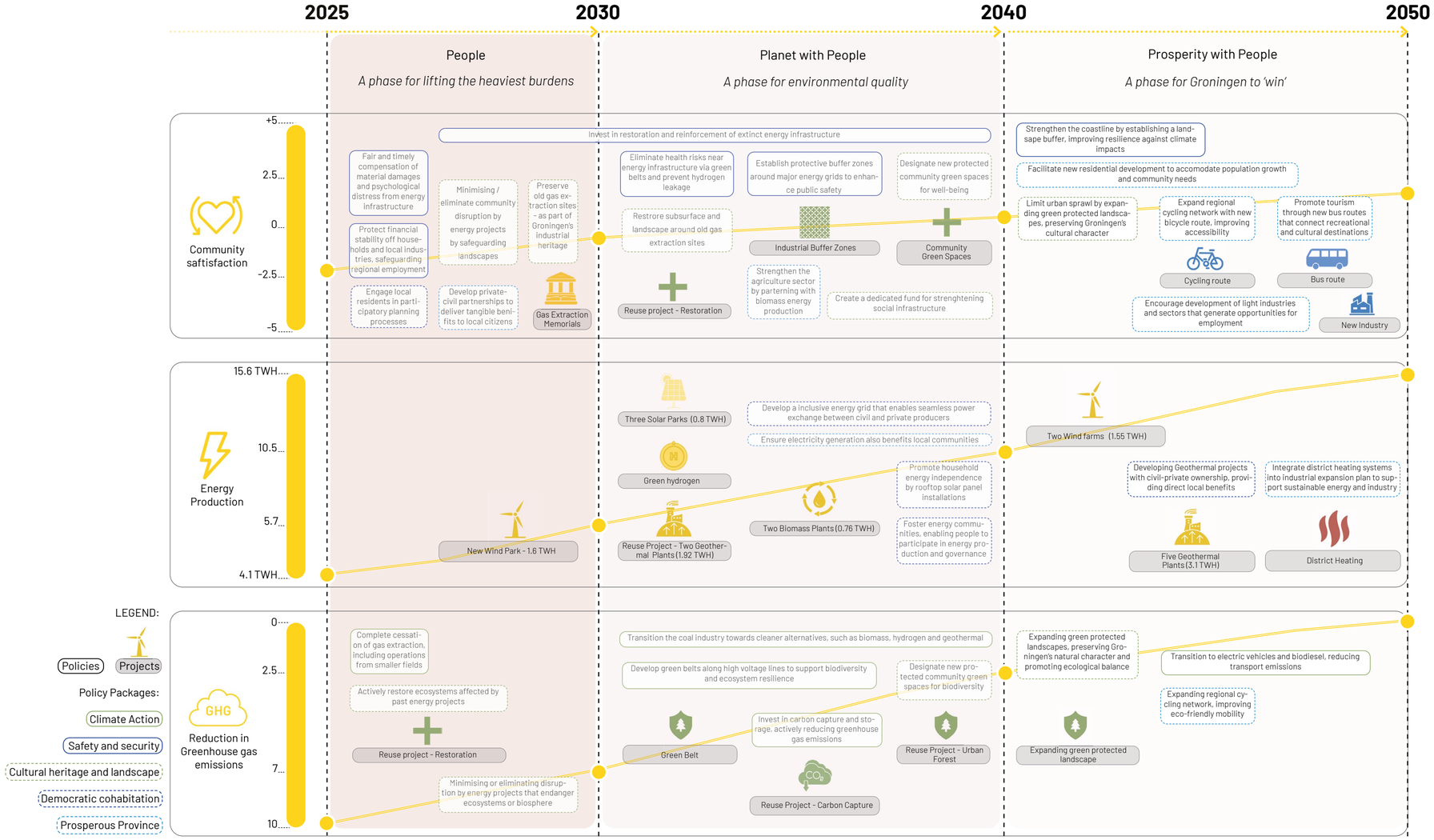


Figure 8.2 Implementation timeline

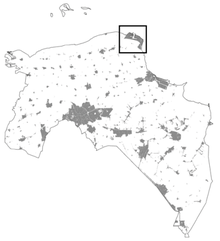
icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Apreliyanto from **Noun Project**

Figure 8.3 Strategic plan for Groningen 2050 - zoom in port .
Icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Budiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Zoom-in Eemshaven

Legend

- Buffer zone
- Expansion of protected area
- Protected terp vilages
- Buildings
- Urbanized area
- Urban expansion
- Industry
- Windpark expansion
- Windmills
- Solar parks
- Power line
- Rooftop solar panels
- District heating connection
- Monument and cultural centre
- New port industry
- Hydrogen and Biomass energy plants
- Touristic route
- CO2 storage



Eemshaven Port 2050

Eemshaven has grown into the most important green seaport and industrial hub of the northern Netherlands. The energy cluster has fully transitioned to sustainable sources, using hydrogen electrolysers to supply the electrical grid, while the former coal plant now operates as a biomass facility, activated only when necessary. Throughout this transformation, local jobs were safeguarded.

Thanks to the strong link between the Energy and Dataport in Eemshaven and the bio-based chemicals and recycling cluster in Delfzijl, the region has fulfilled its ambition of becoming a green port—serving both international energy and industry interests, as well as regional needs for transport, logistics, and economic growth. An underground energy line toward Delfzijl was carried out, incorporating green buffers to protect people and nature, while also generating district heating for nearby communities.

Participatory activities have been preserved at a significant cultural site—formerly a gas extraction location—which now serves as a dedicated space for regular meetings between stakeholders and actors. This space ensures continued dialogue, transparency, and fairness in shaping future projects.

2030

2040

2050

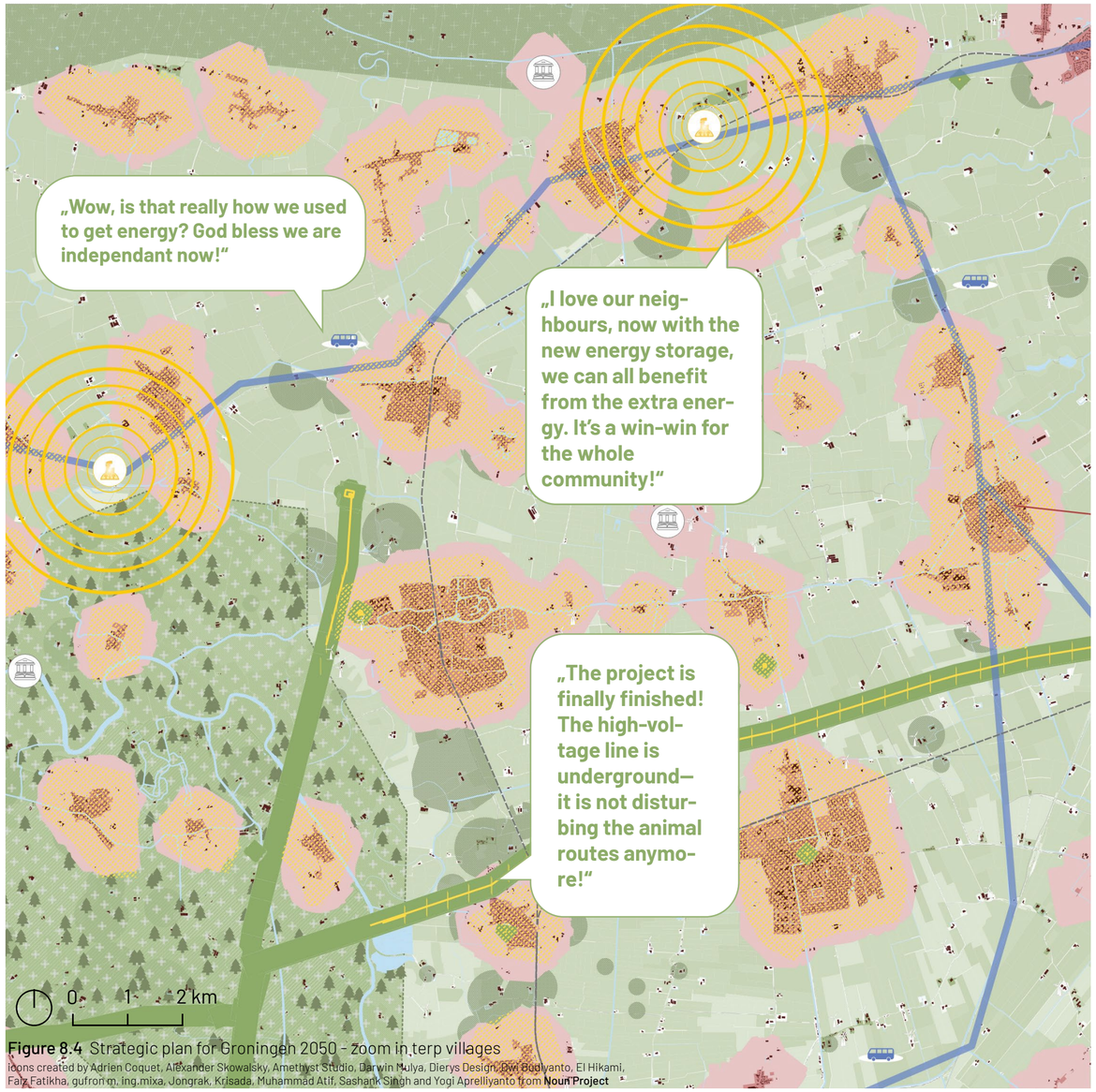


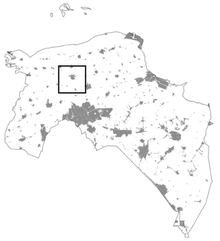
Figure 8.4 Strategic plan for Groningen 2050 - zoom in terp villages

Icons created by Adrien Coquet, Alexander Skowalsky, Amethyst Studio, Darwin Mulya, Dierys Design, Dwi Sodiyanto, El Hikami, Faiz Fatikha, gufron m, ing.mixa, Jongrak, Krisada, Muhammad Atif, Sashank Singh and Yogi Aprelliyanto from **Noun Project**

Zoom-in Terp Villages

Legend

- Buffer zone
- Expansion of protected area
- Protected terp vilages
- Buildings
- Urbanized area
- Urban expansion
- Solar parks
- Power line
- Rooftop solar panels
- Monument and cultural centre
- Touristic route
- Expansion of protected areas - inland
- Geothermal energy
- CO2 storage

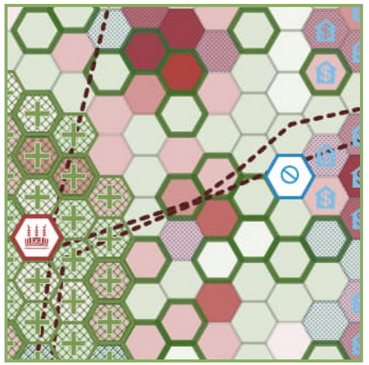


Terp Villages 2050

This region, characterized by its protected landscape and network of small, interconnected villages, has emerged as a strong, united community in the energy transition. In line with the 2040 policy for democratized energy production, residents are now permitted to install energy systems on their rooftops and generate their own power. Decentralized wind turbines and the development of communal energy storage solutions are further empowering local independence.

The introduction of geothermal energy, located near the villages, provides an alternative to large-scale infrastructure by offering a clean, shared heat source that strengthens community ties and resilience. As part of broader urban expansion, this area will welcome residents relocating from former energy landscapes, offering compensation and a safer, more stable living environment. Infrastructure will be improved, including enhanced public transport to better connect the villages with the rest of Groningen, all while maintaining the region's privacy, ecological integrity, and sense of community.

2030



2040

2050


WE MADE IT!

09

REFLECTION

Reflection on the Game

Learnings from Developing and Playing

Developing the game required a high level of abstraction - both spatially and in terms of processes and relationships. Translating complex energy transition dynamics into rules and game mechanics challenged us to deepen our understanding of technical, spatial, and social aspects. This process involved extensive research: stakeholder analysis, studying spatial impacts of energy infrastructure, calculating energy outputs of different technologies, and revisiting technical fundamentals such as the difference between power and energy.

Despite our efforts, we realized that we are not energy experts. Many calculations relied on rough estimates and simplifications - constantly negotiating the fine line between oversimplification and overcomplication. In hindsight, we might have overestimated the energy output of renewable infrastructure tiles, as reaching energy goals during gameplay was easier than expected. Moreover, while we accounted for renewable energy potential, we underestimated the critical role of energy storage. Although we included hydrogen storage in the game, it was not directly linked to renewable energy production through specific mechanics - an important shortcoming. The spatial abstraction also posed challenges. We wanted to represent small villages, which resulted in a rather fine grid that increased the game's complexity. A more flexible board - using a larger grid for the regional scale and smaller grids for zooming into conflict areas - could have improved gameplay and spatial resolution.

Playing the game took us about five hours, demonstrating how time-consuming negotiation and bargaining processes can be. We found that gameplay worked better when players had a rough strategy beforehand, rather than playing entirely unprepared.

We intentionally designed the game to empower civil society players by including multiple civil society roles and developing the satisfaction scores as a key game mechanic. This worked well: satisfaction scores effectively limited where energy infrastructure could be placed, reinforcing the bargaining power of the civil society players.

One important insight was that the private sector struggled to improve its satisfaction score. In order to gain acceptance for projects, profits often had to be shared or invested in compensation measures. This dynamic reflects a real-world challenge: if private companies perceive profits to be too low, investment in the region might decline. This raises the question of whether public or civil-society-driven energy projects - focused on the common good rather than profit - might be a good and necessary alternative.

Another key learning was that it is impossible to satisfy all interests in every location. Specialized regions will likely emerge, and compensation for negative impacts may need to happen elsewhere. While we could not make everyone extremely happy in the game, we succeeded in balancing satisfaction levels - making everyone more equally (un)happy. Research shows that perceived fairness and equality have a strong influence on general happiness, often more so than absolute gains (Oishi et al., 2011). In this sense, reducing inequality (in the satisfaction scores of the game) was an important achievement.

Finally, the game created a scenario and timeline for the energy transition up to 2050. However, we are aware that this timeline simplifies real-world dynamics - preparation times, planning procedures, and implementation processes are far more complex. Still, the game allowed us to simulate negotiations and trade-offs that are essential for a just energy transition.

The Potential of Games in Planning

Serious games have the potential to become critical tools in participatory planning. They enable stakeholders to engage with complex issues in an accessible way, test strategies, and experience the consequences of their decisions. As shown by Vreugdenhil et al. (2022) in a case study on the Dutch coast, serious games can help actors explore opportunities, foster cooperation, and gain insights into feasible solutions.
Although we could not test our game with real stakeholders due to time constraints, the process of simulating their perspectives already provided us with valuable insights. We believe that, with further development, our game could facilitate meaningful participation in real-world planning processes - contributing to more just and inclusive energy transitions.

Our Role as Planners

We see ourselves less as "masterplanners" and more as mediators and facilitators. Ensuring spatial justice, especially procedural justice, means enabling affected communities to actively influence decisions that shape their lives. We are aware of the limits of our knowledge and expertise. Instead of imposing top-down solutions, we aim to create tools and spaces for dialogue, negotiation, and collective decision-making. Participation is not just a method but a core principle for creating more just and inclusive planning outcomes.

Project Evaluation

Spatial Justice and the 3 Ps of Sustainability

As outlined in our conceptual framework, the "Just Energy Transition Windmill," the core of our project is the pursuit of a just energy transition, grounded in the concept of spatial justice and its three interrelated dimensions: recognitional, procedural, and distributive justice (Rocco, 2023). Surrounding this central concept are three interdependent blades - People, Prosperity, and Planet - representing the key dimensions for achieving a just energy transition. This framework aligns with the widely recognized model of the three pillars of sustainable development, often referred to as the "3 Ps."

This framework guided us throughout the project. At the conclusion of our analysis, we categorized the identified community needs and desires according to both the 3 Ps and the three dimensions of spatial justice. This process revealed spatial justice as a central concern for the community — a finding that resonates with our understanding of the communities as those who have experienced extensive injustice, leading them to protest.

We sought to integrate all identified needs and desires into the community visions we developed. From there, our primary focus shifted to procedural justice, particularly through the development of a participatory game. The game is designed to enable residents to engage with complex transition dynamics, negotiate with diverse stakeholders, and actively shape future outcomes. The scenario and timeline generated by playing the game represent one possible outcome among many. Since much of our effort centered on developing the game itself, the evaluation of the scenario will be discussed only briefly, with greater emphasis placed on the participatory game.

The 3 Ps of Sustainability

The scenario created through the game addresses environmental challenges by restoring landscapes, storing CO2 emissions in depleted gas fields, and creating protected areas where both communities and ecosystems can thrive. Social issues are addressed by halting gas extraction and ensuring fair compensation and benefits for affected communities. To foster economic growth, we propose new industrial opportunities and support for farmers to sell biowaste for biogas production, contributing to a sustainable and circular economy.

Intra- and Inter-Generational Justice

While our strategy strongly supports intra-generational justice, it does not explicitly prioritize inter-generational justice. Nonetheless, by implementing policies that promote population growth, safety, environmental restoration, and local employment opportunities, the developed scenario contributes to long-term sustainability and well-being for future generations.

Recognitional Justice

The game acknowledges the vulnerabilities of communities disproportionately impacted by energy infrastructure and its transition. We identified their identities, needs, and values — recognizing what matters most to them.

Procedural Justice

The game seeks to create a platform for negotiation among multiple stakeholders. This participatory mechanism aims to empower affected communities while considering the diversity of interests and vulnerabilities within them.

Distributive Justice

The game places particular emphasis on the fair distribution of burdens and benefits. Within the negotiation process, stakeholders who benefit from a development plan are required to compensate those negatively affected. A plan can only proceed if it ensures that no stakeholder is harmed without receiving appropriate compensation. This model represents an ideal framework for distributing benefits and burdens more equitably.

Sustainable Development Goals (SDGs)

The 17 Sustainable Development Goals (SDGs) provide a broad framework encompassing the various dimensions of sustainable development. While we share Girardet's (2014) critique that SDGs are often applied superficially, their widespread recognition makes them a useful tool to quickly grasp a project's scope and focus. Our project mainly relates to the following SDGs:

Figure 4.5 Related sustainable development goals
Source: United Nations, n.d.

Transition Theory

Applying Loorbach's X-Curve model of transition helped us understand the dynamic interaction between processes of build-up and breakdown. This model is particularly useful for analyzing the technical aspects of the energy transition — showing how renewable energy technologies have moved from experimentation to acceleration, challenging the fossil fuel regime, supported by declared policy goals.
However, applying this model to the region's protests and social movements offers even more valuable insights. Beyond the energy transition itself, we observe a transition from hierarchical, top-down planning approaches that overlook local needs, toward more inclusive and just planning processes. Grassroots movements and protests play a crucial role in destabilizing the current system — openly criticizing the status quo and promoting alternative visions grounded in a more just distribution of burdens and benefits.

Participation

A widely recognized framework for evaluating participation is Arnstein's "Ladder of Citizen Participation" (1969), which illustrates increasing levels of citizen power, ranging from nonparticipation to degrees of citizen control.
If our game were to be implemented with the premise that its outcomes would influence real-world planning, we would place our project on the 6th rung of Arnstein's ladder: "Partnership." In Arnstein's words: "*At this rung of the ladder, power is in fact redistributed through negotiation between citizens and powerholders. They agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees, and mechanisms for resolving impasses.*" (Arnstein, 1969, p. 22)

Arnstein notes, however, that in many partnership situations, power is not willingly shared by public institutions but rather taken by citizens. This observation fits our case well, as protests served as the catalyst for our project — aiming to empower citizens and provide them with greater agency.
While we avoided creating a tool for mere tokenism, the evaluation using Arnstein's ladder reveals that we have not granted civil society the highest level of power possible, reaching only the 6th of 8 rungs. Our participatory tool centers on stakeholder collaboration and empowers protestors to become active players, negotiating alongside other stakeholders. However, we did not adopt a radical approach of placing full control of the transition and planning process solely in the hands of civil society.

Individual Reflection

Alankrita Sharma (6148263)

The third quarter presented a compelling regional design challenge: to integrate community perspectives to develop a spatial strategy for a just energy transition. In practice, regional design and planning presently cater to more top-down processes, which often do not include the voices of the citizens in making decisions.

The process probed us to reflect on our role as a regional designer and planner, and enabled us to empathise with people whom we design for, while understanding and integrating citizen voices in the power dynamics which the regional scale presents.

While selecting the site for our project, we chose the Groningen gasfield region, as we were compelled by its significance in the energy sector and the socio-economic impacts of the gas extraction on the local citizens. During our preliminary research and analysis phase, we sought to define and empathise with our community, which was at the receiving end of liveability challenges from the environmental externalities of industrial expansion and gas extraction earthquakes. Due to negligence and injustice, there was a lack of trust in the government authorities. Our community was hence defined by this cacophony of burdens, which resisted and protested to meet their needs and demands. The field visit to the areas of concern in Groningen, street interviews and qualitative media analysis of the protests were paramount to define and empathise with the community's needs and values.

As planners, we were presented with a complex challenge of conflicting needs and inequity of benefits between the private sector, public sector and the civil society, akin to a 'wicked problem' (Rocco, 2025) which ideally must be resolved, while the energy transition continues. Our conceptual framework was thus rooted in providing spatial justice, with its three pillars of recognition, procedure and distribution.

Based on this, two clear groups of the community were defined for whom the transition visions were created. The visions helped us to extrapolate the needs spatially and became a tool to imagine and envision the future that the communities could desire for themselves. It also revealed the similarities and the contrasts within the community, indicating the need for negotiation and dialogue. From the analysis, the vision outcomes, and the interrelationships between stakeholders, we recognised a need for the project to focus on the procedure of conflict resolution rather than designing specific spatial outcomes, and our role here was hence that of a mediating planner to deploy the necessary methods for participatory planning and develop the conclusions of the process on the ground.

Gamification was adopted as a method to be deployed to enable procedural justice, such that scenarios which fairly distribute the benefits and burdens can be arrived at. The gameboard is an abstracted representation of the Groningen province, and the game pins represent the energy and socio-ecological infrastructure. We set evaluation criteria which propel equity in satisfaction among the civil society, private and public sectors while reaching the goal for energy production. The game creates a shift in power dynamics, enables negotiations, giving the community the agency to create the spatial conditions to meet their desires, empowering them in regional decision-making.

The experience amplified the need for planners to act as mediators and facilitators today, where we are faced with 'wicked problems', where often the solution can not be a specific vision, but it lies in developing tools and methods for encouraging bottom-up participation to complement top-down technocratic practices.

Haoran Zhang (6358543)

As an exchange student from China, I have participated in several regional planning projects, which have enabled me to master some basic knowledge in regional planning and design. However, this studio still feels like a new and challenging experience for me. This feeling arises from three types of tension.

First, the tension between "region" and "community." In essence, regional planning often follows a top-down approach in urbanism. I have learned that regional planning involves determining how to distribute population and civil infrastructure to achieve regional development goals. In this sense, the "region" in regional planning is synonymous with a scale of governance where a broader, more holistic approach can be taken to manage urban and natural environments (Lord and Tewdwr-Jones, 2015). However, because regional planning aims to serve the "common good" of the entire region, the interests of individual communities can sometimes be overlooked in decision-making. Therefore, advocating for community-led regional planning, which not only focuses on regional goals but also considers the demands of specific communities, is an important innovation.

Yet, challenges arise. Since there are numerous communities within the region, their demands are often conflicting. As a result, a purely bottom-up approach to regional planning, driven solely by community perspectives, is unfeasible. Achieving regional goals while addressing community demands requires negotiation and bargaining. A community-led approach, therefore, is not about serving a single community but about creating an inclusive, participatory platform where consensus can be built and the common good achieved. This is why our project centers on the game as a tool, rather than focusing on concrete strategies.

Second, the tension between "vision" and "reality." For me, the concept of vision is a new aspect in regional planning. In my previous projects, we set target positions for regions but did not establish a vision. Target positioning tends to be more top-down, primarily serving governments and professionals, while a vision is more bottom-up, narrative-driven, and intended to be accessible to the public. A vision typically outlines an ideal future for citizens, but we must recognise that reality is rarely so ideal. Many dreams and hopes coexist in the vision, but the strategies to achieve these dreams can conflict. As a result, people must embrace a future that, though less than perfect, is feasible, with compromises where necessary. This is why we established a common vision along with two conflicting sub-visions in our project, to illustrate the imperfections of the future from the start, which makes bargaining and consensus more valuable.

Third, the tension between "dialogue" and "practice." Dialogue is valuable, as it enables different groups to reach consensus. However, it is also time and energy-consuming. We need to reflect on how, after reaching consensus, we may not have paid enough attention to the concrete practices, as the game process consumed a significant amount of time. This issue also applies to group work. If we spend too much time discussing and reaching consensus, we may not have enough time to carry out the practical tasks.

Regarding the differences in planning education between TU Delft and China, the agenda-setting here is more closely related to sustainability and democracy. Besides, what impressed me most was the organisation of the course system. There were numerous lectures and workshops throughout this quarter, each focused on different topics and delivered by various teachers. Despite this, they were highly coherent and directly supported the studio, which proved to be extremely helpful and saved time while allowing us to learn different skills. I believe this experience would be beneficial if applied in China, especially at my university, if feasible.

Maria Milusheva (6302440)

"The main hope was clear: they wanted to stop the gas extraction."

When our group set out to create a game to help develop a strategy for the complex region of Groningen, we already had a vivid image of the situation in our minds. People were more than just frustrated—over the past 50 years, the region had unofficially been treated as a periphery, where events were overlooked and voices unheard. While it filled the mainland government's coffers, it created human-made disasters at the local level. What brought people together was not a shared vision for the future, but rather a shared sense of fear, anger, and disappointment rooted in historical injustice.

There was a deep mistrust toward the government, which had long neglected their concerns. That's why many felt the need to organize themselves and protest. Community identity was forged in resistance—some groups rallied with torches, others with tractors, and some even came with fire-breathing dragons.

As we delved further into local newspapers, we began noticing scattered demands. These demands weren't tightly interconnected; they were highly **spatialized**, varying by origin, and by the demographics of the people affected—young or old, entrepreneurial or not, each with their own interests. It was hard for them to agree on a clear collective goal. What was more evident, however, was what they didn't want: they wanted gas extraction to end. They wanted Groningen to be more than just an energy periphery. They wanted their story to be heard.

Empowering such a transitioning community is tricky - there are too many conflicts and not enough clarity. That's when it became evident to us, as urban planners, that our role wasn't to give answers, but to create a framework where clarity could emerge. We set out to develop a **democratic** game where every player is an equal stakeholder. To do this, we needed to deeply understand each stakeholder and embody their role - because in a real-life transition, planners would still be at the table as experts. We needed to temporarily become part of that community and ask: *If I were in their shoes, what would I fight for?*

After playing the game, two things became clear. First, the game scenario was more ideal than reality—it's rare that all players agree on a common goal from the outset. Second, the game captured a very real dynamic: bargaining. While some nuances were lost due to simplification, this was necessary to give direction. Making the game collaborative ensured everyone's voice was heard and that everyone was on equal footing. It demonstrated that all stakeholders are, in some way, interdependent. To "win," they had to collaborate.

So, should we design for transition communities?
The short answer is yes. But more importantly, it's not a question of if—it's a question of how. Transition communities are often the most vulnerable, and their struggles reflect broader systemic failures. Ignoring them doesn't make the problem go away; it only grows, until it becomes unavoidable—and possibly too late. Groningen is a case in point: gas extraction led to earthquakes, protests, mistrust, and resentment. If we want a just and inclusive future, we must identify these communities early and equip them for the role they must play in the transition.

Simeon Felix Schwager (6307752)

The emergence of neoliberal policies in the 1980s, led by figures such as Margaret Thatcher and Ronald Reagan, has shaped today's world — increasing profits for a small elite while deepening inequality. Today, the richest 1 percent hold more wealth than the bottom 95 percent combined (Oxfam International, 2024). As climate change accelerates, with severe consequences for both people and nature, the urgency for action has never been greater. Inequality, driven by neoliberalism, increases the risk of dysfunctional political and economic systems, undermining coordinated efforts to address climate change effectively (Rocco, 2025).

The situation in Groningen, as analyzed in this report, reflects neoliberal dynamics, resulting in inequality and a heightened sense of injustice. Nevertheless, these dynamics have also triggered resistance, as communities organize protests and exert pressure on the current system.

The "communicative turn" in spatial planning, characterized by a growing emphasis on participatory approaches since the mid-1990s, can be understood as a professional response to the neoliberalization of planning processes (Angelo & Baiocchi, 2024). In this regard, meaningful participation — understood as citizen empowerment rather than non-participation or tokenism (Arnstein, 1969) — emerges as a crucial strategy for promoting spatial justice.

This shift transforms the planner's role — from expert-designer focused mainly on outcomes to mediator and facilitator of inclusive processes. Although this development has been partly driven by the constraints imposed by neoliberal governance structures, it also opens up new opportunities for advancing spatial justice - a goal planners should actively pursue. It may therefore be regarded as a positive development that the traditional figure of the "masterplanner" — imposing top-down visions on local populations — is increasingly being replaced by more inclusive planning practices.

However, the planner's role as facilitator is not passive. In this project, we focused on understanding the needs and aspirations of the local community in Groningen. We found that community demands often centered on basic needs such as safety, quality of life, and prosperity. While these concerns are undoubtedly legitimate, this observation raised the question of whether communities themselves are likely to articulate demands for systemic change - or whether they may be inclined to settle for moderate improvements within existing structures. This tendency may partly reflect a lack of exposure to alternative socio-spatial imaginaries, as individuals may find it difficult to envision futures beyond their lived experiences. This observation highlights the importance of the planner's role as a provider of creative input. Planners should actively engage in co-producing visions and narratives that challenge existing paradigms and demonstrate that alternative futures are possible. Such narratives can serve as powerful tools to inspire communities, foster agency, and mobilize collective action towards transformative change.

Reflections on the Project Process

Certain challenges emerged during the research process. Groningen is a well-researched region, and the abundance of studies, reports, and strategic documents was both a privilege and a challenge. As most documents were in Dutch, and our group lacked a native speaker, we relied heavily on machine translation tools such as DeepL and Google Translate. While my proficiency in Dutch allowed me to verify certain translations, it is likely that some nuances and contextual details were lost in translation.

Lastly, we applied scientific methods while still learning them, which sometimes limited methodological precision. For example, our selection of newspaper articles for the media analysis was guided more by subjective relevance than by rigorously defined criteria — an area for future improvement.

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