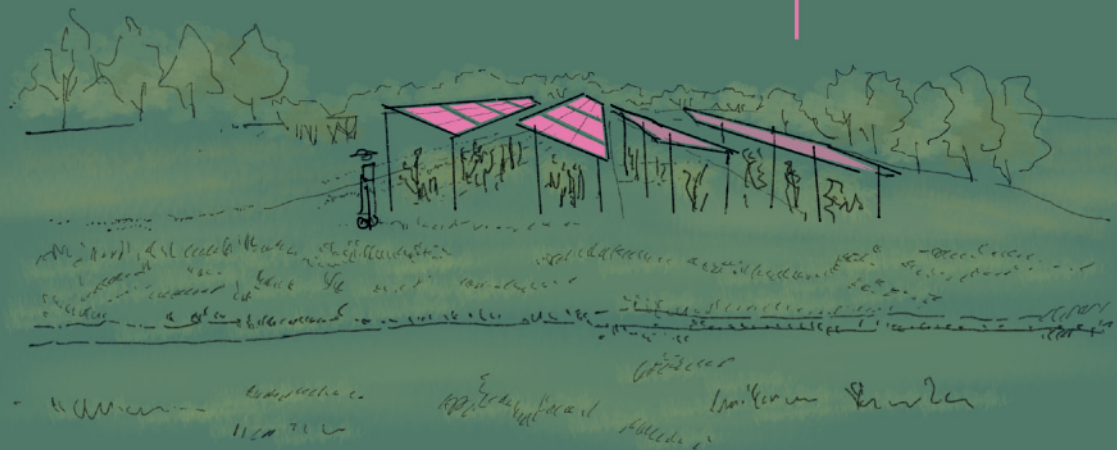


ENERGY FROM THE LAND POWER TO THE PEOPLE

Bottom-up approach in the management of identity
transition of the rural landscape



Colophon

Energy from the land, Power to the people
2025

Delft University of Technology
Faculty of Architecture and the Built Environment
MSc Architecture, Urbanism and the Building Sciences
Track Urbanism Q3
AR2U086 Spatial Strategies for the Global Metropolis
AR2U088 Research and Design Methodology for Urbanism

Authors

Shreya Rajmane – 6167780
Roos van der Knaap – 5281059
Hongyue Kang – 6263461
Hugo Lock - 5055652

Tutors

AR2U086
Nikos Katsikis
Marcin Dabrowski

AR2U088

Roberto Rocco
Juliana Goncalves



Abstract

The ongoing energy transition in the Netherlands is a key driver for changing landscape identities. This report examines the disrupted relationship between landscape, energy, and local communities in relation to the energy transition through the case of Northern Netherlands. The study focuses on how a centralized planning approach, coupled with limited community participation, impacts the identity of the rural landscape. This disconnection serves as the starting point for developing an alternative strategy—one that fosters a more just and inclusive transition.

The relationship between landscapes, energy and rural residents is analyzed using maps, literature, case studies and media analysis to gain an in-depth understanding of resistance towards centralized energy projects that go beyond NIMBYism. Core themes including public acceptance, spatial justice, participatory governance, and integrated land-use planning are explored in the report. Existing modes of bottom-up governance such as agriculture and energy cooperatives are used to build an alternate model of governance for management of new energy landscapes. It follows a cooperative approach to empower citizens in the decision making of the new identity.

By coupling energy transition within local participation and sensitivity to the landscape and its identity, this report advocates for an integrated, place-based approach that enhances public acceptance and contributes to a just redefinition of landscape identity.

Table of contents

Chapter 1 Introduction	1	Timeframe & Transition	117
Identity Transition	3	Testing the AECO process - Pilot	121
Lost Dynamic Landscape, Energy & People	15		
Methodology	17		
Theoretical Framework	19		
Conceptual Framework	23		
Chapter 2 Analysis	25		
Landscape x People	27		
Landscape x Energy	37		
Energy x People	47		
Existing Bottom-up Structures	55		
Chapter 3 Vision	65		
Co-creating Energy Landscapes	67		
Vision Map	69		
AECO: New Cooperative	73		
Chapter 4 Strategy	79		
Spatial Principles	83		
Catalogue	85		
Positioning Policies	101		
Positioning Stakeholders	105		
AECO: Governance & Structure	111		
		Chapter 5 Conclusion & Reflection	135
		Conclusion - New Energy Landscape	137
		Reflection	145
		Bibliography	151
		List of figures	157
		Appendix	162

CHAPTER 1 INTRODUCTION

Identity transition
Lost dynamic Landscape, Energy & People
Methodology
Theoretical Framework
Conceptual Framework

Identity transition

Impact of energy transition

The Dutch landscape is undergoing a vital transition with the introduction of renewable energy projects across the country. The Netherlands must accelerate the implementation of renewable energy to comply with international agreements related to energy transition. Within Europe, the Netherlands is one of the countries with the highest population density and this scarcity of space results in many places in eroding support for renewable energy projects. To paraphrase a recent manifesto from the Amsterdam Academy of architecture in the Netherlands we need more landscape (Oudes, Picchi and Stremke, 2018).

Understanding the origins of centralized renewable energy developments is critical for properly analyzing the underlying tensions. The centralized projects for energy transition stem from the global imperative to combat climate change—a phenomenon primarily driven by anthropogenic greenhouse gas emissions, particularly from the combustion of fossil fuels (NASA Science, 2024). Rising global temperatures pose substantial threats to ecosystems, sea levels, and general living conditions, necessitating a rapid shift from fossil fuel dependency to renewable energy sources, including solar and wind energy (TU Delft, n.d.).

This transition represents a complex yet urgent shift from a fossil-based to a renewable energy system. The urgency of this transformation demands a sustainable and well-considered approach. Without it, the Netherlands risks failing to meet critical climate targets. According to the Dutch Climate Agreement (2019), the country aims to reduce CO₂ emissions by 49% by 2030

(compared to 1990 levels), with an aspirational target of a 95% reduction by 2050. Furthermore, by 2030, 70% of electricity generation is expected to come from renewable sources. These ambitions underscore the need for a comprehensive and inclusive approach to energy system transformation. It is apparent that the shift towards renewable energy comes at the expense of space. Most of the large wind farms and solar parks are conveniently located in rural areas with vast expanses of farmlands. While the energy potential is a critical factor in these locations, the landscape transition is often overlooked. Much in line with the European landscape convention, the practice of energy transition needs to engage with landscapes and communities. The great majority of initiatives such as the so-called national energy strategies, however continue to pursue energy transition in a sectoral manner, where the focus is on quantity of production rather than identifying much needed integral and multifunctional solutions (Oudes, Picchi and Stremke, 2018).

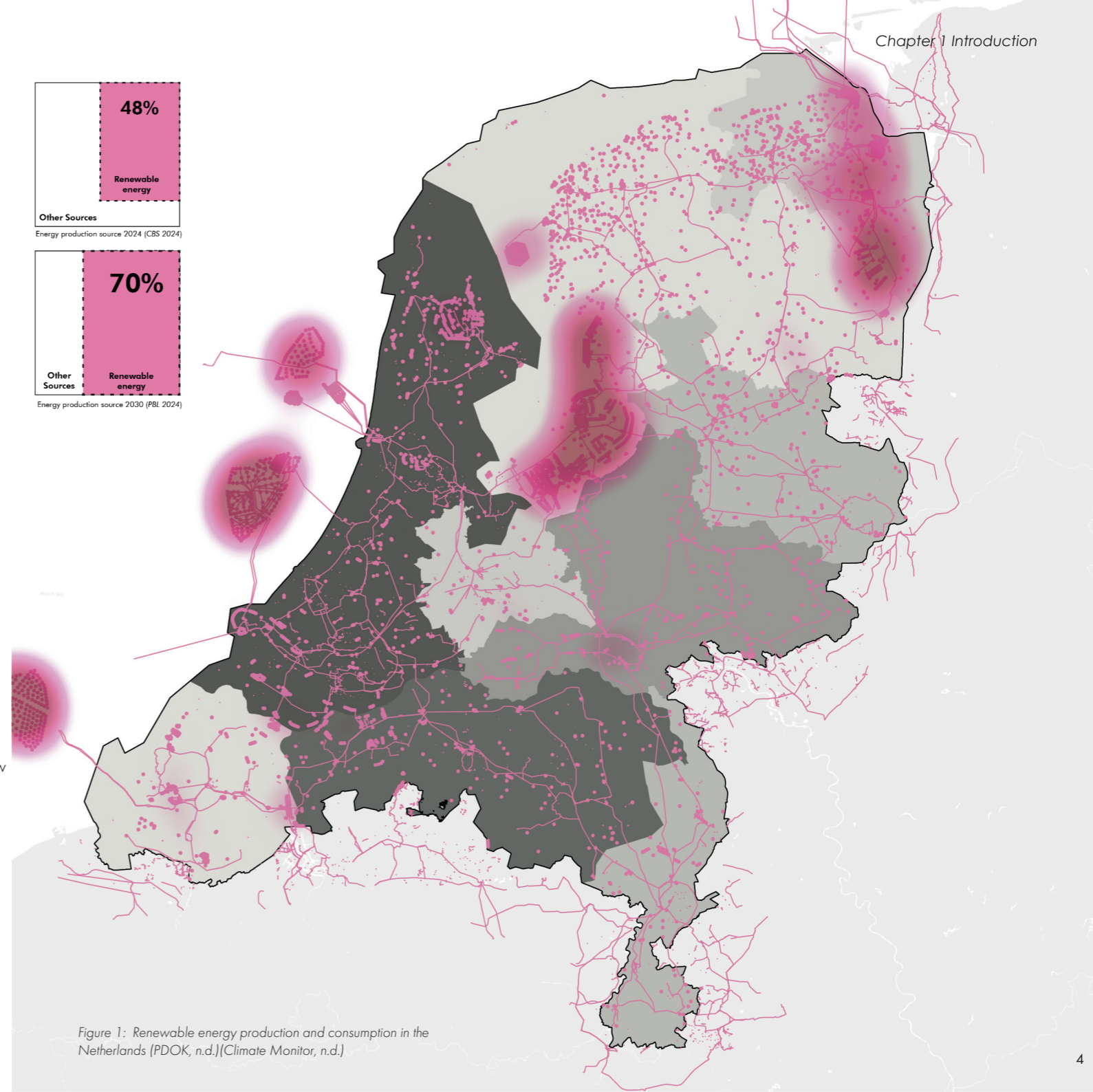
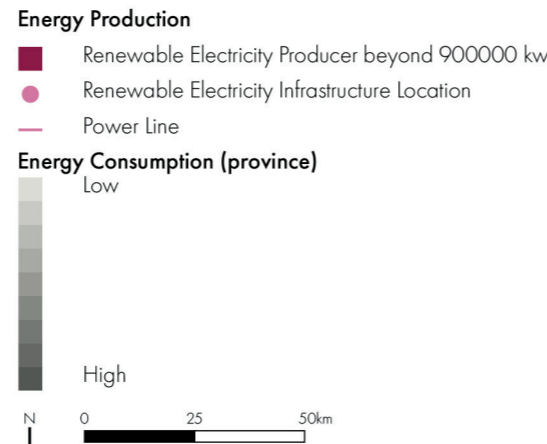


Figure 1: Renewable energy production and consumption in the Netherlands (PDOK, n.d.)(Climate Monitor, n.d.)

The Dutch rural landscape

Landscape is defined as the human habitat part of the natural environment, as seen and understood through the medium of our own perceptions (Bell, 1999 as cited by Wolsink, 2019). When envisioning the traditional Dutch landscape, one often imagines flat, open vistas characterized by dikes, farms, and grasslands. However, this image is increasingly being challenged, particularly in rural areas, where large-scale renewable energy projects—such as wind farms and solar parks—are being introduced. These developments have significantly altered the visual and cultural identity of the landscape. Rather than being thoughtfully integrated, these projects often appear disconnected from their environmental and social contexts. Their imposition without sufficient regard for the surrounding ecology or local communities has led to a degradation of the landscape, provoking widespread resistance among residents. This raises a crucial question: is this truly the optimal path forward, or might a more integrated and inclusive approach be possible? We argue that a different strategy is not only possible, but necessary. Nature and landscape are strongly connected in perception and valuation. Landscapes are understood as being either territory or scenery, but they should also be conceived as contested spaces, based on the bond between 'community, justice, nature and environmental equity' (Olwig, 1996, as cited by Wolsink 2019). Transformation of the Dutch rural identity is inevitable, but it can be co-created taking into consideration place attachment and the residents of the landscape.

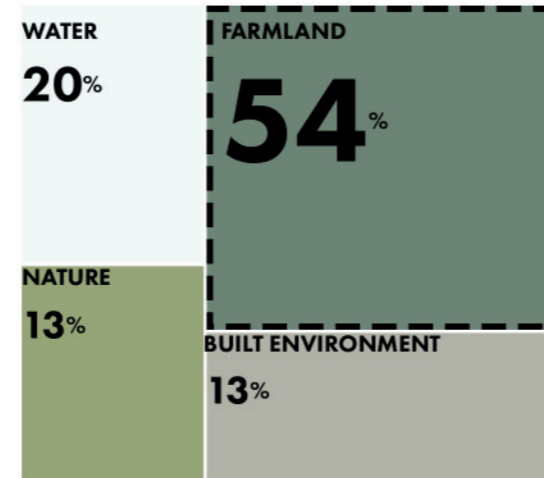


Figure 2: Land use of the Netherlands (CBS, 2020)

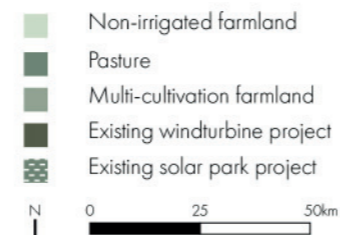


Figure 3: Agricultural land types in the Netherlands (PDOK, n.d.)(CLC, 2018)

Conflict in landscape

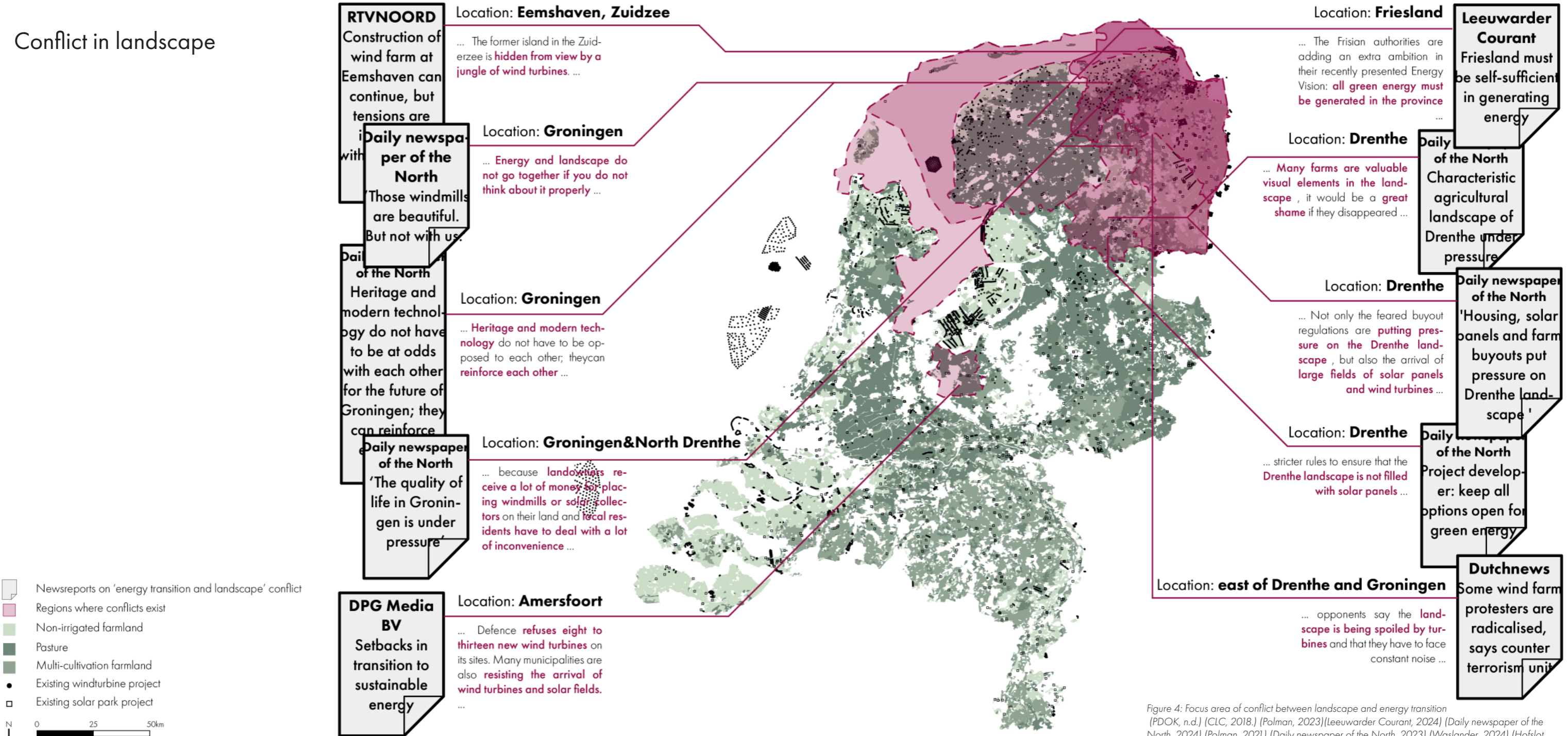


Figure 4: Focus area of conflict between landscape and energy transition (PDOK, n.d.) (CLC, 2018.) (Polman, 2023)(Leeuwarder Courant, 2024) (Daily newspaper of the North, 2024) (Polman, 2021) (Daily newspaper of the North, 2023) (Waslander, 2024) (Hofslot, 2024) (Paster, 2024)(Dutchnews, 2018)

As illustrated in Figure 3, the Netherlands is characterized by a highly urbanized core surrounded by vast rural and agricultural regions. Given the spatial demands of renewable energy infrastructure—often requiring more land than traditional fossil fuel plants—it is logical that these projects are predominantly planned in less densely populated, rural zones. Coastal areas, in particular, exhibit strong potential for renewable energy production. However, these areas also carry deep-rooted cultural and historical ties to the land, with strong local identities shaped by traditional agricultural practices and landscapes.

The implementation of centralized renewable energy projects in these regions is often perceived as intrusive and disruptive. Wind turbines, for instance, are highly visible structures that can significantly alter the perceived naturalness and aesthetic qualities of the landscape (Molnarova et al., 2012). Because these projects are frequently initiated by governmental bodies and executed by large energy corporations, they are commonly perceived as being imposed from above, without adequate consultation or participation from local communities.

This top-down approach has led to significant resistance from rural residents, as exemplified by various news headlines included in Figure 4. Many inhabitants feel their environment is being altered negatively and without meaningful involvement in the decision-making process. Compounding this issue is the fact that these

residents often receive minimal benefits from the energy being produced in their own backyards. They are, in essence, asked to bear the burdens of the transition without enjoying its rewards. While such opposition is often attributed to NIMBYism (the concept of Not-In-My-BackYard, according to which people oppose to interventions taking place in their immediate vicinity), the reality is usually more complicated (Psarra et al, 2024). The report aims to analyze root causes of the resistance in further sections to better implement energy transition in rural landscapes.

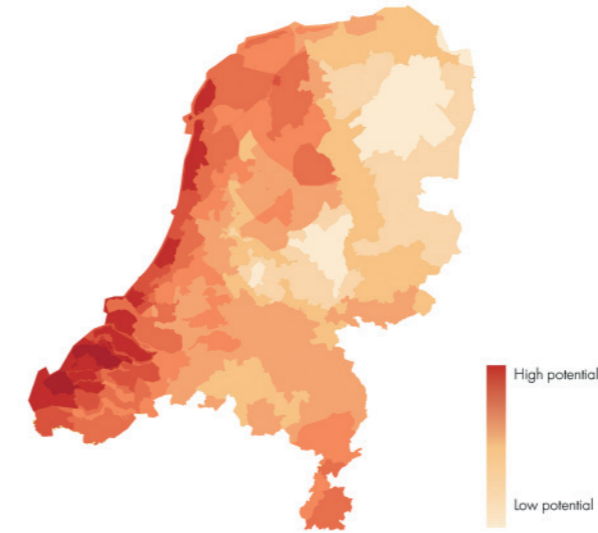


Figure 5: Solar potential of the Netherlands (PDOK, n.d.)

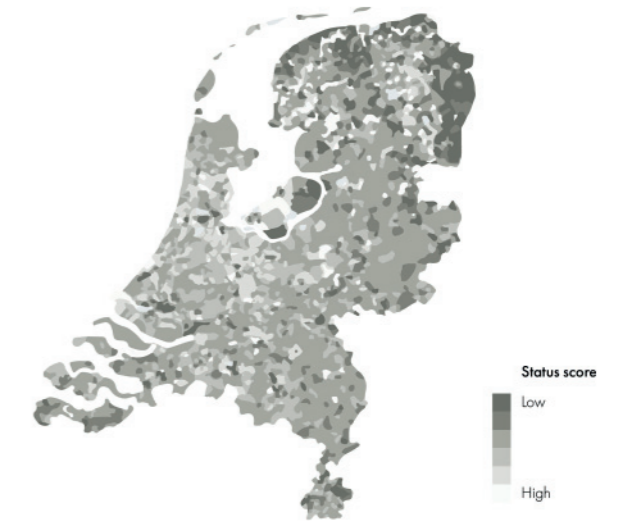


Figure 7: Socio-economic status (Vaals, 2022)

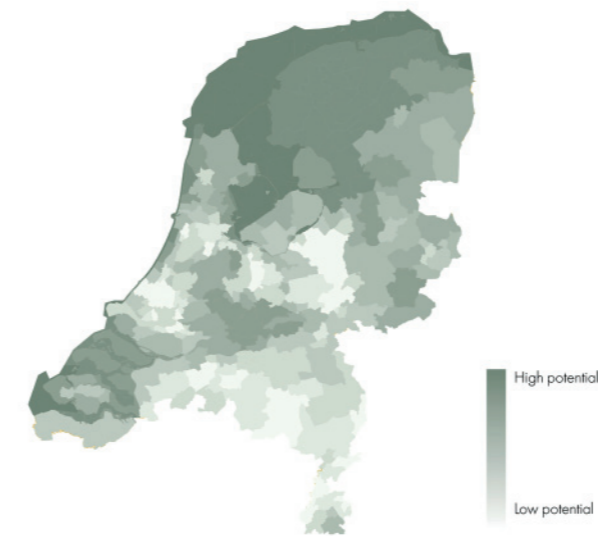


Figure 6: Wind potential of the Netherlands (PDOK, n.d.)

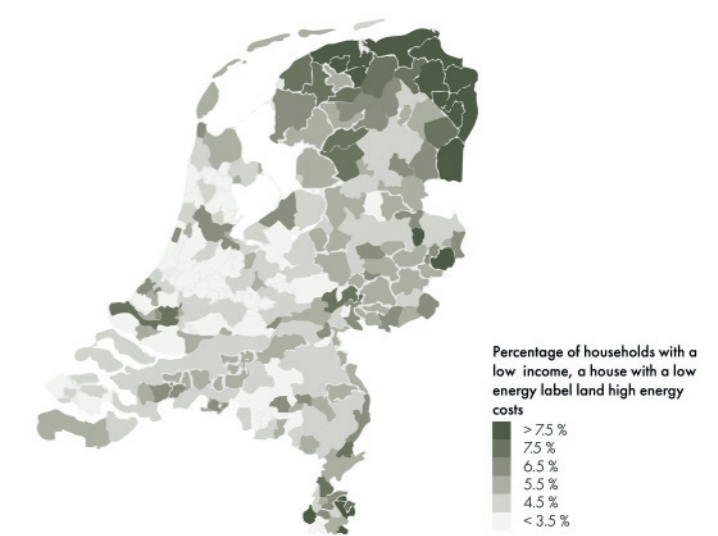


Figure 8: Low income and High energy costs (NOS, 2023)

Case of the Northern Netherlands

Looking ahead, it is expected that renewable energy projects will increasingly be concentrated in coastal and rural areas, where population density is lower and spatial availability is higher. This creates a particular tension in areas where local traditions and landscape identity are strongly embedded in community life. One such region is the Northern Netherlands, encompassing the provinces of Friesland, Groningen, and Drenthe. This region offers significant potential for large-scale renewable energy generation due to its extensive agricultural land and relatively sparse population (Centraal Bureau voor de Statistiek, 2023). It is also one of the most socio-economically deprived areas of the country. This region clearly exemplifies the friction between spatial suitability and cultural sensitivity.

Figure 4 shows news reports from this region that highlight ongoing conflicts between local communities and centralized decision-makers. The Northern Netherlands has emerged as a focal point of the challenges associated with the energy transition, where large-scale interventions are clashing with deeply rooted social and cultural landscapes.

Attributes of landscape identity that the rural residents of northern Netherlands associate with the region need to be identified and taken into consideration for any large-scale transformation. Any landscape change through RES infrastructure is considered a 'disturbance', sometimes combined with 'scale' and 'complexity' when size and number of constructions are taken into account. Concepts containing cultural, social,

historical and functional elements that have value only in 'the eye of the beholder' (Lothian, 1999 as cited by Wolsink 2019) are disregarded in this process. Hence, landscape values can be adequately evaluated only by including the beholder in the process of assessment and decision-making (Wolsink 2019).



Figure 9: Focus region – provinces of Friesland, Drenthe and Groningen

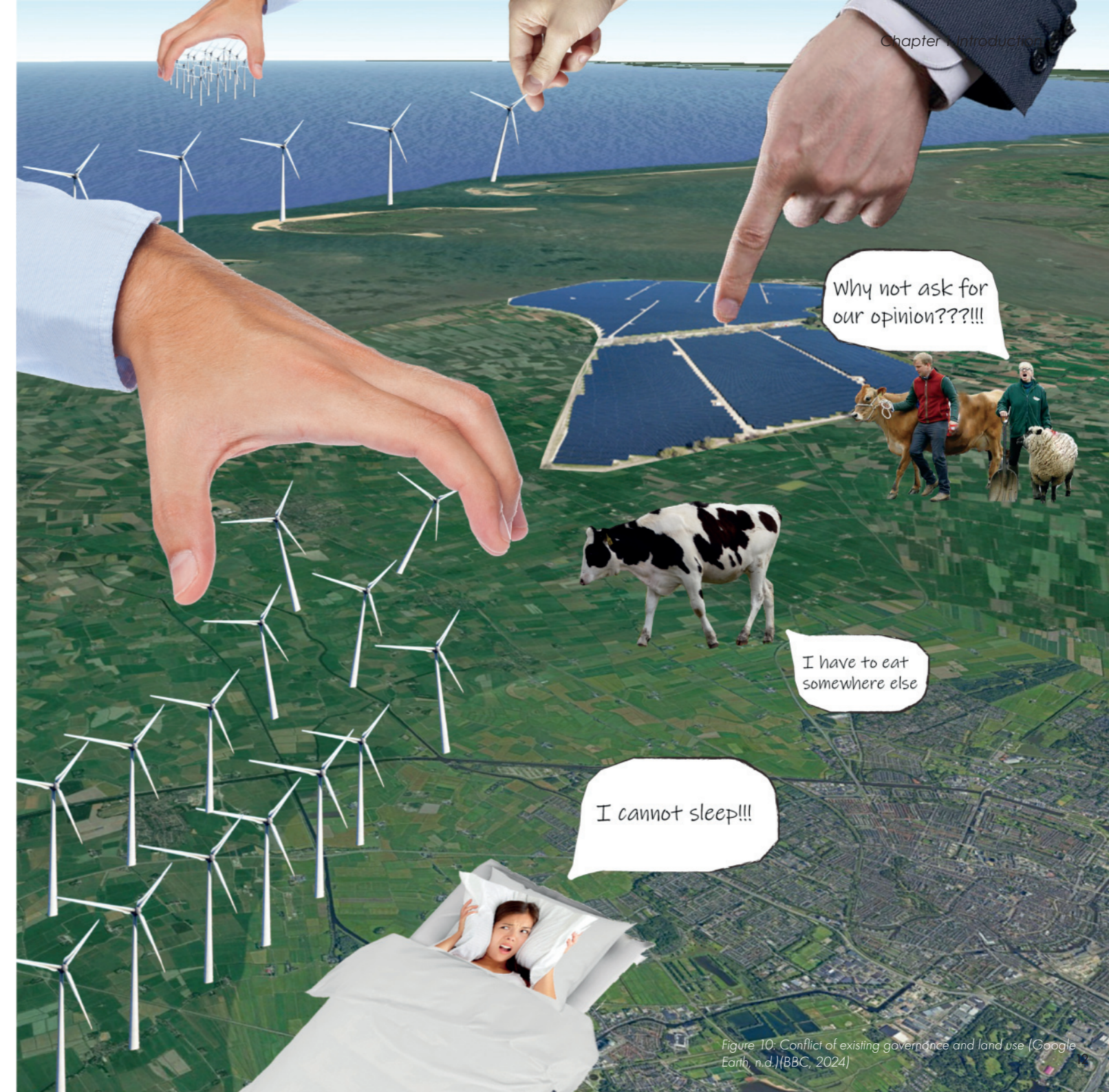


Figure 10: Conflict of existing governance and land use (Google Earth, n.d.)(BBC, 2024)

Rural community

Identifying the custodians of the landscape

At the heart of the conflict lies a centralized decision-making model that neglects to integrate local voices and contextual knowledge. The rapid transformation of the landscape—coupled with the exclusion of local residents from planning processes—has heightened feelings of alienation and opposition. The rural community of the Northern Netherlands, as the primary stakeholder in these spatial changes, must therefore be central to any discussion on equitable energy transition.

This community not only experiences the most direct impact of renewable energy projects but also plays a key role in shaping and maintaining the cultural landscape. As shown in Figure 4, dissatisfaction is widespread and largely driven by a lack of participatory mechanisms. This exclusion is further compounded by broader socio-economic disadvantages, including energy poverty, income disparities, and population decline.

Addressing this issue requires a shift in how renewable energy infrastructure is conceptualized and implemented. Top-down designs that bypass the local community threaten trust relationships and landscape justice in the siting of renewables (Wolsink 2019). A better framework such as the Integrated Energy Landscape (IEL) framework, where IELs are multifunctional physical and socio-economic landscapes characterised by synergies between the built environment and the energy systems (Stremke and Dobbelsteen 2012, as cited by Psarra et al, 2024) needs to be explored. A more inclusive and context-sensitive approach—one that

engages local rural residents as co-producers rather than passive recipients—could help mitigate conflict and foster more sustainable, socially accepted energy transitions.

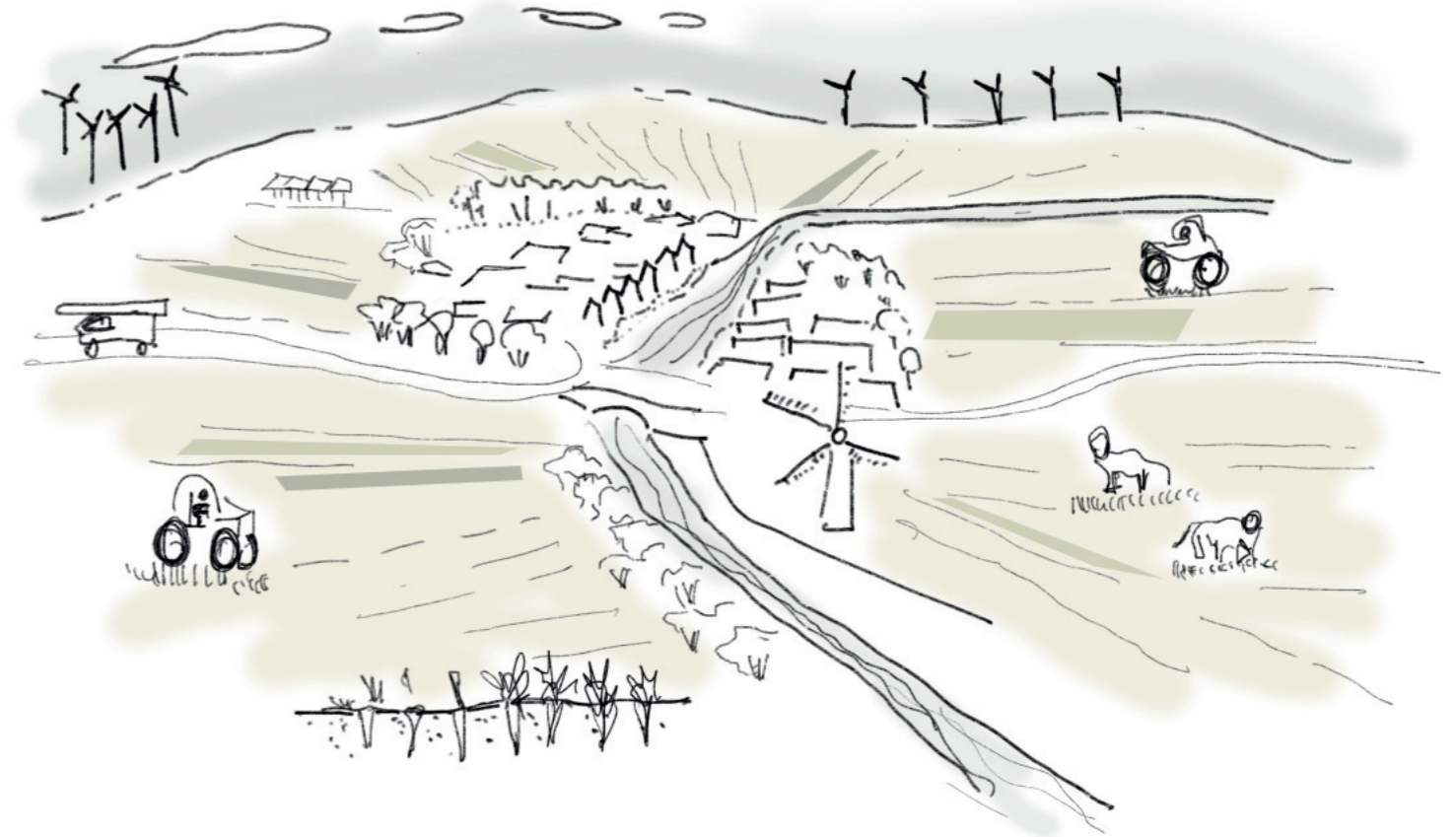


Figure 11: Sketch – Typical rural landscape in northern netherlands

Lost dynamic Landscape, Energy & People

Problem statement

By 2050, the Netherlands aims to achieve almost complete **climate neutrality**. All electricity in the Netherlands must come from renewable sources, such as wind, solar and biomass. This comes with an **inevitable impact on the rural agricultural landscapes**. The Netherlands consists of 54 percent agricultural land of its total surface area. It is anticipated that a substantial proportion of renewable energy projects will be situated in these rural zones, given their availability of space. At the same time, these rural and agricultural regions have a **strong tradition and cultural heritage**, with **landscape identity** playing a central role in the collective sense of place.

From the perspective of rural communities, the current approach to implementing the energy transition is **inequitable and disregards their participation** in the landscape transition. They are expected to bear the environmental and spatial burdens, while receiving no direct benefits. This causes **widespread resistance** to renewable energy projects but also threatens to hinder the pace and effectiveness of the transition itself. Ensuring a **just and inclusive approach** is therefore essential for both the legitimacy and the success of the Netherlands' climate goals.

Main Research question :

How can we manage the production of renewable energy in rural parts of north Netherlands while ensuring a fair identity transition of the regional landscape?

Sub-questions

What are the existing and proposed energy plans for the region of North Netherlands, and how do landscape and energy currently relate to each other?

What elements make up the landscape and how this shapes the identity of the landscape? How can these elements be respected more in the future?

How do citizens and other actors think about energy projects? And which bottom-up organisations are already in place regarding land and energy? How can citizens be involved in the decision-making process?

Methodology

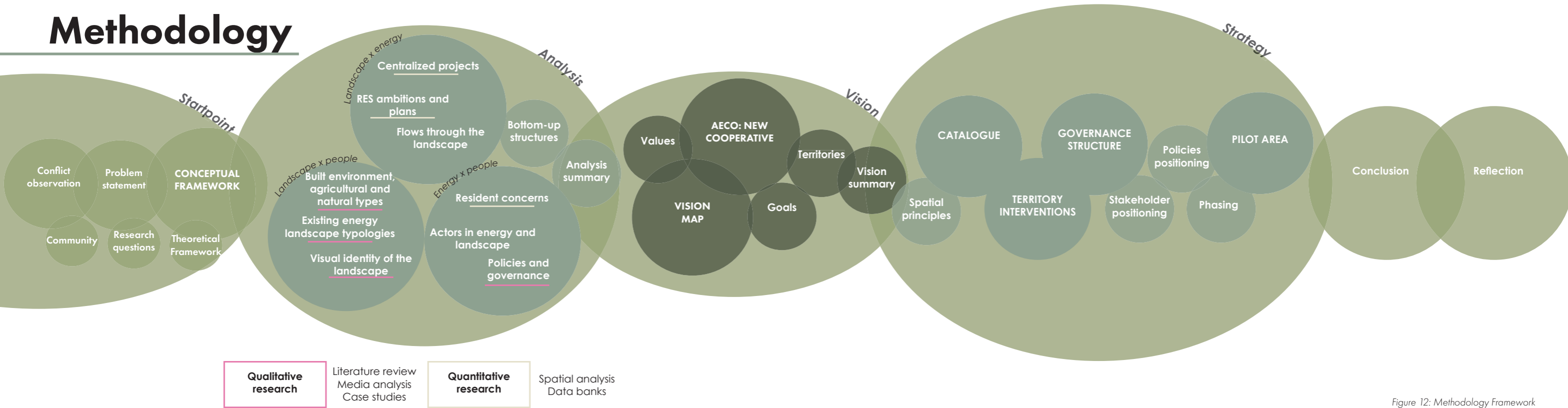


Figure 12: Methodology Framework

Our research has four main steps: a startpoint, an analysis, a vision and a strategy. Each of them has its own 'bubble' in the methodology diagram above, in chronological order.

The analysis has been carried out in three main themes; 'landscape x energy', 'landscape x people' and 'people x energy'. These themes embody the relation between the different dimensions that act as key components to the topic of the report. As stated in the problem statement, as of this moment these dimensions are not in line with each other. In the analysis we aim to reveal these relations and where eventual conflict are. In the research conducted in the analysis, various

methods have been used, both qualitative and quantitative, which makes it a mix methods research. Examples of used methods are literature review, media analysis, case studies, spatial analysis and data banks. The research from the analysis is concluded in a SWOT analysis, a systemic section and a synergy of landscape diagram. This is then translated to values and goals for the vision. These values and goals form the base for a new bottom-up approach to the energy transition. As a result, a new kind of cooperative is proposed, as well as a vision map showing the spatial elements of the vision. This includes a division of the region in territories, spatial characteristics of these

territories and an overview of the operation.

To realise the vision, a strategy is proposed. The strategy explains two aspects: the spatial working and a new governing system. Which are then processed into a policy frame and a time frame. Finally, the outcomes of the report are summarised in the conclusion and reflection. Throughout the analysis, vision and strategy, a couple key concepts are at play, displayed in the boxes on the bottom of the diagram. These concepts and theories embody important elements in this topic. These elements will be further explained in the theoretical framework.

Theoretical Framework

Theoretical concept

Definition

Integration in our project

Bottom-up approach

Duquenoy, S. (2021)

Local consultation approach of a collective process whereby a local community can take charge of the future of its own area. It is crucial to a quality integrated area-based approach. It enhances social cohesion, consultation and decision-making transparency.

Bottom-up approach is at the core of our strategy, as we convert the current centralized approach to a more decentralized one. As a result, social cohesion, consultation, decision-making transparency, as well as public acceptance are improved.

Public goods

Plata, J. (2020)

Everyone has the right to a standard of living adequate to the health and well-being of himself and his family. In economics, a public good is defined as a good that is available to all and where one person's use does not subtract from another's use. A substantial aspect of urban well-being is granting access to public goods for all social groups

The quality of the landscape is viewed as a public good. It is an aspect of society, health and well-being that is shared by all. The proposed new cooperatives are the communities to whom this public good 'belongs', and they are the ones to manage the landscape.

Spatial justice

Moroni, S., De Franco, A. (2024)

The idea that justice of injustice take place somewhere, that there is a geography to justice. One of the aspects of spatial justice is the fair distribution of the buns and the burdens of our human association. Space in itself is not just of unjust: the subject of (social) justice is always the way in which institutions treat persons.

Part of our strategy is a more fair distribution of the buns and burdens of the energy transition. By empowering local people to shape their environment, the burden is both decreased, as well as more equally distributed. Also the benefits are divided more equal.

Multifunctional land-use

Vreeker, R. (2004)

Multifunctional land use is the combination of different socio-economic functions in the same area. Cultural landscapes are multifunctional by supporting habitat, productivity, regulatory, social and economic factors at the same time.

Part of our strategy is a better integration of energy projects and the landscape. Multifunctional land-use is a key element in this approach, as it enables to combine functions, giving room to the important aspects of the identity of the landscape.

Public acceptance

Upham, P., Oltira, C., Boso, A. (2015)

Public acceptance is the attitude or behavioral response towards the implementation or adoption of a plan proposed by a government.

Through empowering the rural community, which has been neglected and disadvantaged in various ways in the past, energy projects will be locally owned and also locally consumed. This will enhance public acceptance of energy projects.

Spectrum of participation

Michaelson et al. (2024)

Describes five general modes of participation on increasing public influence over decision-making in a civic-engagement process: inform, consult, involve, collaborate, empower

The proposed new cooperative is a different approach to the governing system of energy landscape planning. One of the main goals of this new cooperative is to improve engagement and involvement of the local community. In other words, our vision aims for a higher modes of participation on the spectrum.

Throughout the projects different concepts and theories have been used as a framework. Through these theories we have gotten to a better understanding of different dynamics in urban planning and governance. For example, bottom-up approach. A bottom-up approach is defined as an local consultation approach of a collective process whereby a local community can take charge of the future of its own area (Duquenoy, S., 2021). After defining the current system as top-down, and observing the conflicts and complications in this system, one of the goals of our vision had been established: a new cooperative should be bottom-up. This means a system where the local community collaborates in a collective decision-making process on energy projects in their environment. Through the bottom-up approach the local community is empowered to shape the future of their area.

The project is shaped around one main theme: landscape identity transition. The landscape identity of rural environments is transitioning towards an energy integrated landscape. In this project, it is important to view the landscape identity as a public good. A public good is a good that is available to all and where one person's use does not subtract from another's use (Plata, J., 2020). The landscape identity is a good shared by everyone. Properties of land can be owned by individuals, but the identity of the landscape is something intangible. It is something everyone has access to, and is simultaneously formed by every member of society. It is important to impress the public nature of the landscape, as one of the main values of

Figure 13: Key theories used in the report (Moroni, S., De Franco, A., 2024), (Duquenoy, S., 2021), (Vreeker, R., 2004), (Upham et al., 2015), (Plata, J., 2020), (Michaelson et al., 2024)

our vision is to empower the local community in their involvement over the management of the landscape.

Building on the notion of public goods, it is of large significance to explore the justice of the current governing system regarding the planning of energy projects. Spatial justice is the idea that justice or injustice takes place somewhere (Moroni, S., De Franco, A., 2024). One of the aspects of spatial justice is the fair distribution of the buns and burdens of our human association. Another aspect of spatial justice is equal opportunities, meaning a fair access to the socially valued resources. In our view, these elements are very much missing in the current top-down approach of the planning of energy projects. Projects are centralized, large-scale and owned by big energy companies. Resultingly, the benefits of the energy production of entirely for the energy company, meaning that the residents of the area around this energy infrastructure do not benefit. In fact, the local residents are the ones to take the burden, meaning a significant change in landscape identity. In case of these centralized projects, that are very much disconnected from the surroundings, it is possible to view it as a harm to the landscape. Concludingly, right now spatial justice is very weak. In our vision, though, this is significantly improved. By having the landscape managed by the local community, everyone has equal access to being part of the decision-making process. One of the most important effects of this strategy of local management is also a more evenly distributed network of energy infrastructure. Thirdly, the local community finally benefits from the energy production as it is their

property.

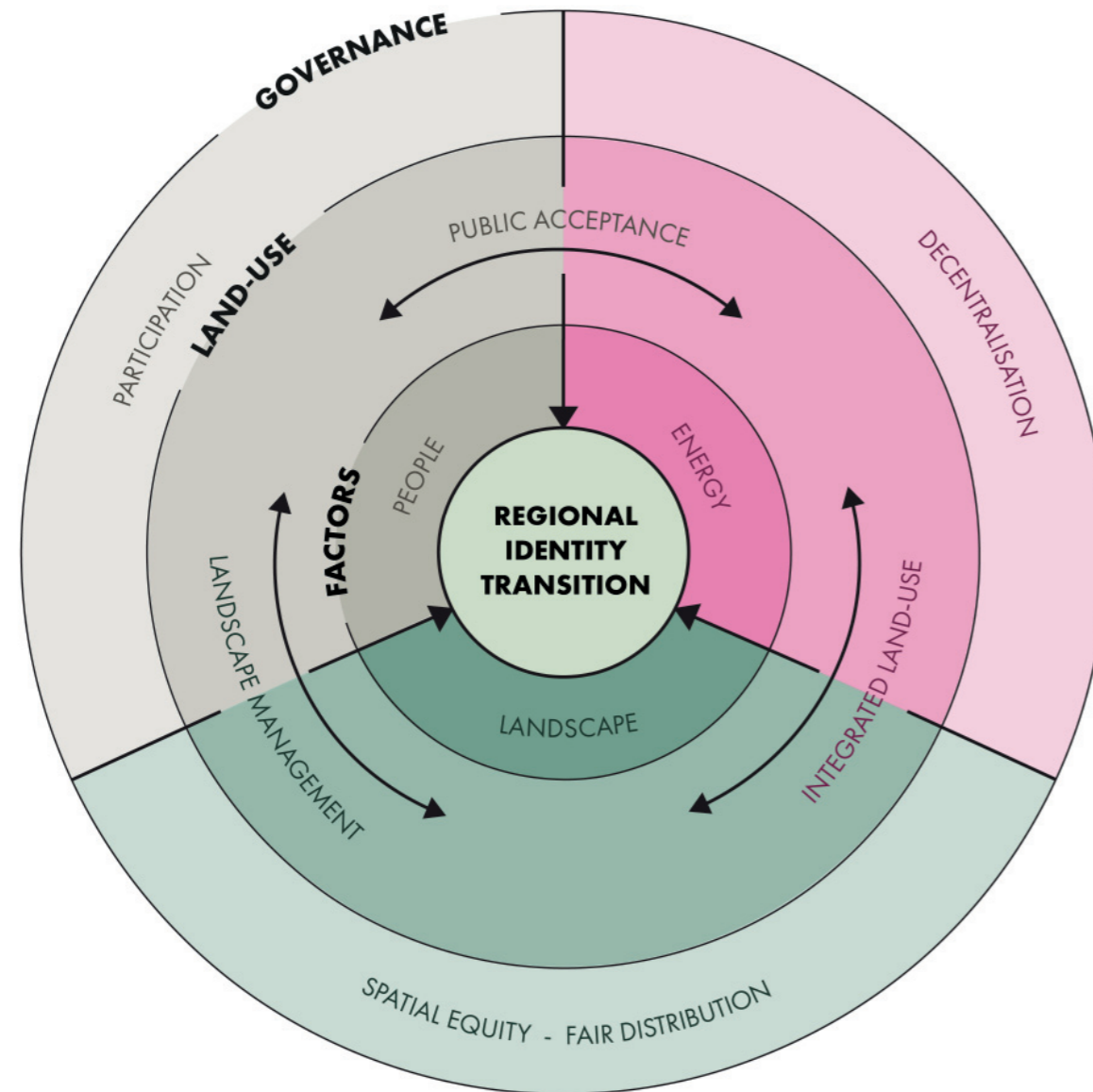
Another element, mainly regarding the landscape and energy dimensions, is multifunctional land-use or integrated land-use. As stated before, many of the current energy infrastructure is very disconnected to its surroundings. The dynamic between large wind or solar parks and the landscape is very shallow. As a result, the identity of the landscape is distorted. In our vision we state that the implementation of energy projects in the landscape should be integrated in a well balanced manner. This can be achieved by combining functions. Multifunctional land-use is the combination of different socio-economic functions in the same area (Vreeker, R., 2004). Cultural landscapes are multifunctional by supporting habitat, productivity, regulatory, social and economic factors at the same time. To implement energy infrastructure in the landscape in such a way, we propose a catalogue in which combination of landscape typologies and energy infrastructure are combined, as well as factors as biodiversity. This results in a well balanced, synchronized dynamic of the landscape, which manages the identity of the landscape in an integrated approach.

One of the problems with the current approach of the governing system regarding the planning of energy projects and landscape is the lack of public acceptance. Public acceptance is the attitude or behavioral response towards the implementation or adoption of a plan proposed by a government (Upham et al., 2015). Due to the absence of real participation and consultation of the local community, who carry most of the burdens of

the energy projects, there is a lot of resistance against these projects. Not only does this slow down the energy transition, it is also morally questionable. As a governing body, one should aim to shape and design the landscape and energy system in such a way that no one is neglected. In the approach we propose, the people affected by developments are also the ones to shape and design them. Furthermore, the benefits of the energy production are more equally shared. By making the governing system bottom-up, public acceptance is stimulated. Additionally, the needs and vulnerabilities of a marginalised community are addressed. As a result, empathy, attentiveness and responsiveness are fostered.

Finally, an important concept that has been used as a framework is the spectrum of participation. The spectrum of participation builds on the concept of bottom-up approach. It describes five general modes of participation on increasing influence over decision-making in a civic-engagement process: inform, consult, involve, collaborate, empower (Michaelson et al, 2024). In the current approach, in most cases participation is a minor part of the decision-making process, in other words it is low on the spectrum of participation. In our vision we propose a new cooperative. One of the main goals of the new cooperative is to improve engagement and involvement of the local community in the decision-making process. In fact, we aim for the highest modes of participation: collaboration and empowerment.

Conceptual Framework



Landscape identity transition is the main topic of this project. A better approach to landscape identity transition is our main goal.

The concept of landscape identity is viewed from three different dimensions: landscape, energy and people. We observe an unsynchronized dynamic between these factors, resulting in a not well managed landscape identity transition. Streamlining the relation between landscape, energy and people is key to an improved transition. In this framework, the relations between the three dimensions are key components to achieve our vision. The relations are divided in two layers: land-use and governance.

The first layer is the land-use layer, which includes integrated land-use, landscape management and public acceptance. Integrated or multifunctional land-use (Vreeker, R., 2004) shows the desired dynamic between landscape and energy. Through designing spatial principles and a catalogue, different functions on the same piece of land are combined, which should result in a better dynamic between landscape and energy.

Landscape management describes the relation between landscape and people. Currently, the management of land (and energy) in a certain region is often not connected to the residents of this region. As a result, these people feel disconnected from the changing environment and they also combat development. Our aim is to connect these two dimensions, where residents of an area have more influence over the developments in this area.

Public acceptance (Upham et al., 2015) is a desired result in the relation between people and energy. As of now, citizens often resist new energy projects in their surroundings. This is due to a lack of participation

in the decision-making process, with a lack of public acceptance as a result. By empowering the local community, public acceptance should improve.

This brings us to the second layer, governance. Participation is one of the key concepts in the project. It is the aim to position the new governance in a higher mode of governance (Michaelson et al., 2024) By collaborating with and empowering the local community in the decision-making process, the landscape identity transition will happen in a more fair manner. This adds to the concept of decentralisation, which can be applied to all three dimensions. For this concept the notion of spatial justice (Moroni, S., De Franco, A., 2024) is very important. The proposed decentralized governance is a bottom-up approach (Duquenoy, S., 2021) and should result in more equal opportunities to resources that are useful in the development of energy projects. This goes hand in hand with the concept of fair distribution. Fair distribution describes a fair spatial division of the burdens and benefits of energy projects. Ultimately, the combination of all these concept should lead to a better approach to regional identity transition.

Figure 14: Conceptual Framework (Przybylinski, S., 2023), (European Commission, n.d.), (Vreeker, R., 2004), (Upham et al., 2015), (Michaelson et al., 2024)

CHAPTER 2 ANALYSIS

Landscape x People
Landscape x Energy
Energy x People
Existing Bottom-up Structures

Landscape x People

Nature and landscape are strongly entangled in perceptions (van den Berg and Vlek, 1998 as cited by Wolsink 2010). It is mainly the perceived qualities of the site that determine the acceptability of wind turbines (Wolsink 2010).

The second analytical section explores the relationship between people and landscape, focusing on public perceptions of the landscape, the people's attachment and experience in the local environment. Rural landscapes and nature in particular are strongly associated with idealised notions of a 'natural, pure environment', that is, 'spaces free of intrusive technology' (Cowell, Bristow, & Munday, 2011, as cited by Wolsink 2019). Conflict analyses indicate that many residents perceive negative changes in the landscape, driven by various developments. This section therefore identifies key landscape types and the elements that residents consider essential to their spatial environment.

The sub-questions addressed include:

What is the current landscape identity of the Dutch rural landscape?

Which elements define identity, and what values do residents attach to their landscape?

Methods : Both qualitative and quantitative research methodologies have been employed, including literature review through research papers and mapping using PDOK database.

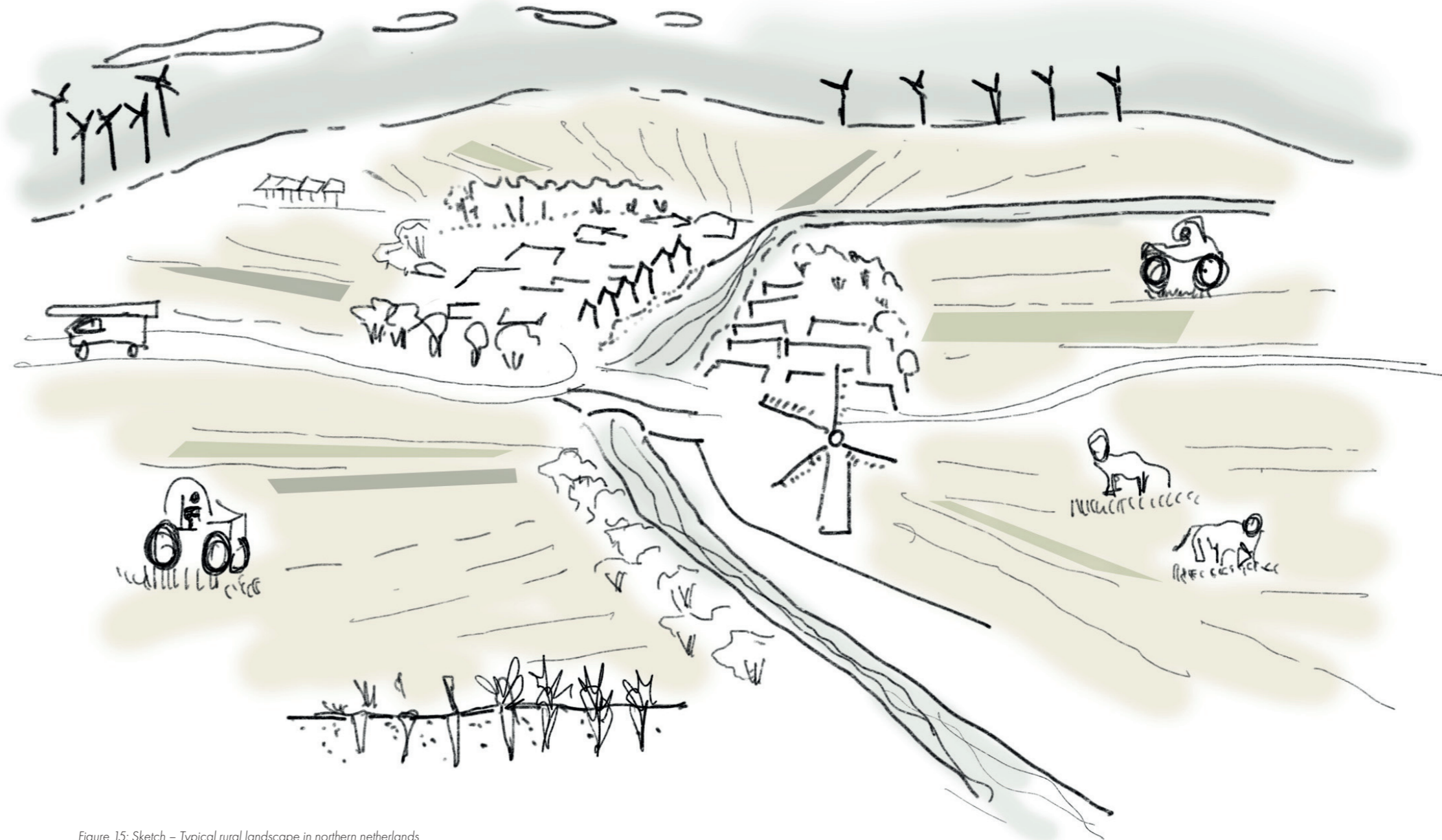


Figure 15: Sketch – Typical rural landscape in northern netherlands

Built environment types

The spatial organization of settlements plays a critical role in shaping residents' connections with the landscape. Figure 16 illustrates the urban fabric of the Northern Netherlands, characterized by a large number of villages and a limited number of larger cities, such as Groningen and Leeuwarden. Proximity to rural areas is a fundamental aspect of village life, contributing to a strong sense of connection with the natural surroundings. According to research by the Netherlands Institute for Social Research (Sociaal en Cultureel Planbureau, 2017), residents in this region generally express positive sentiments about their rural environment.

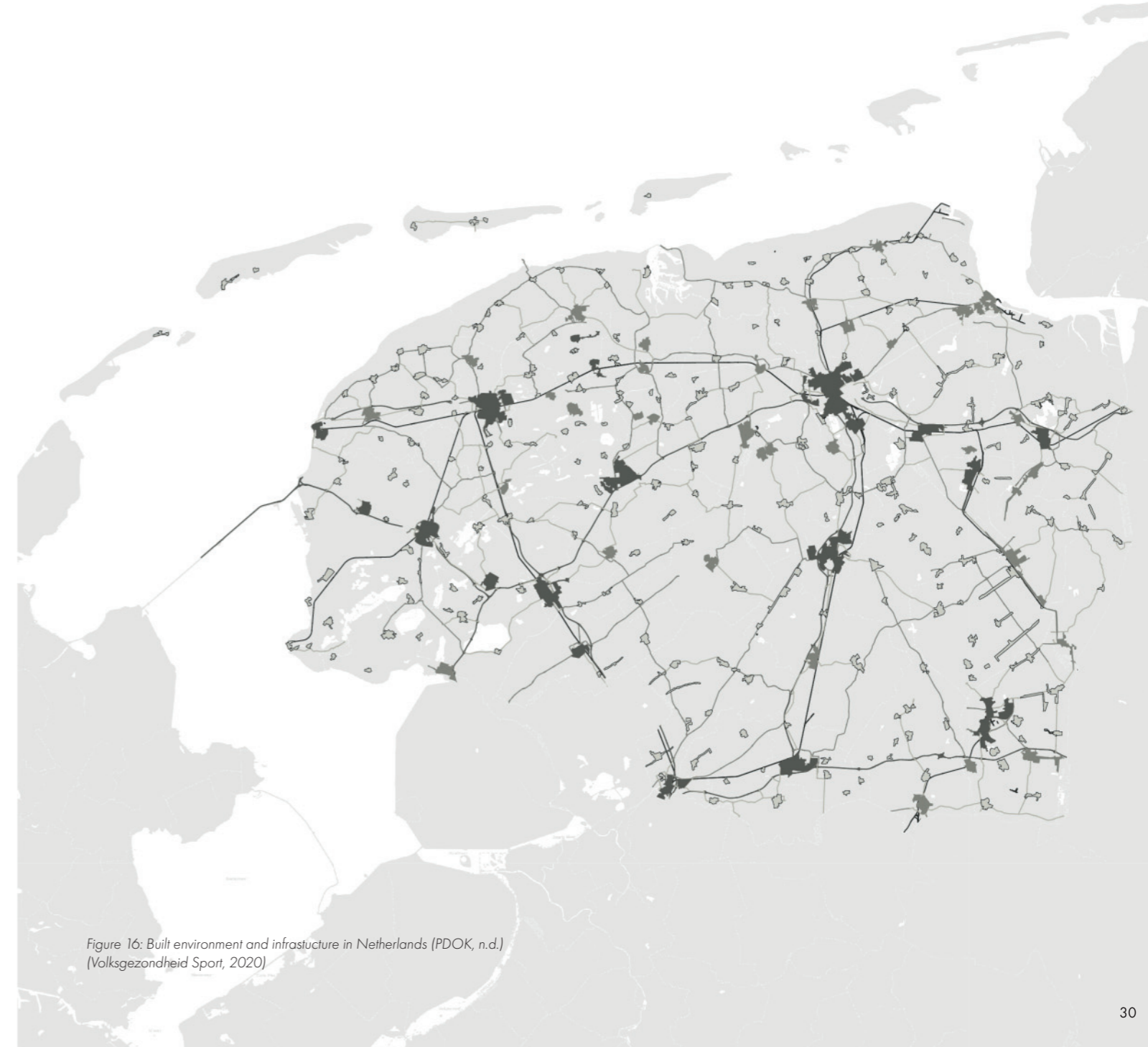
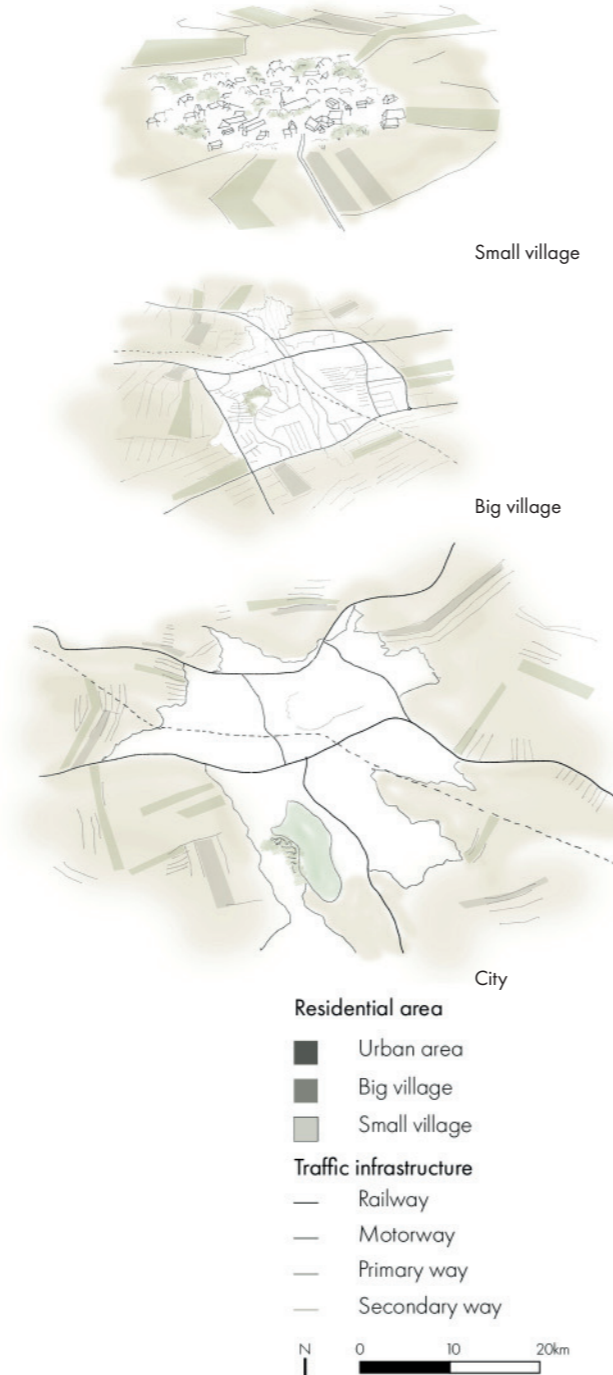


Figure 16: Built environment and infrastructure in Netherlands (PDOK, n.d.) (Volksgezondheid Sport, 2020)

Agricultural landscape types

The region's identity is further shaped by the extensive presence of agricultural zones, which can be categorized into:

Pastures (dairy farming)

Non-irrigated arable land (crop farming)

Complex cultivation patterns (mixed agriculture)

These agricultural types significantly influence the visual appearance, spatial structure, and functional dynamics of the landscape. For example, pastures are associated with a sense of openness and minimal structural interference, rendering them particularly sensitive to the visual impacts of large-scale energy infrastructure.

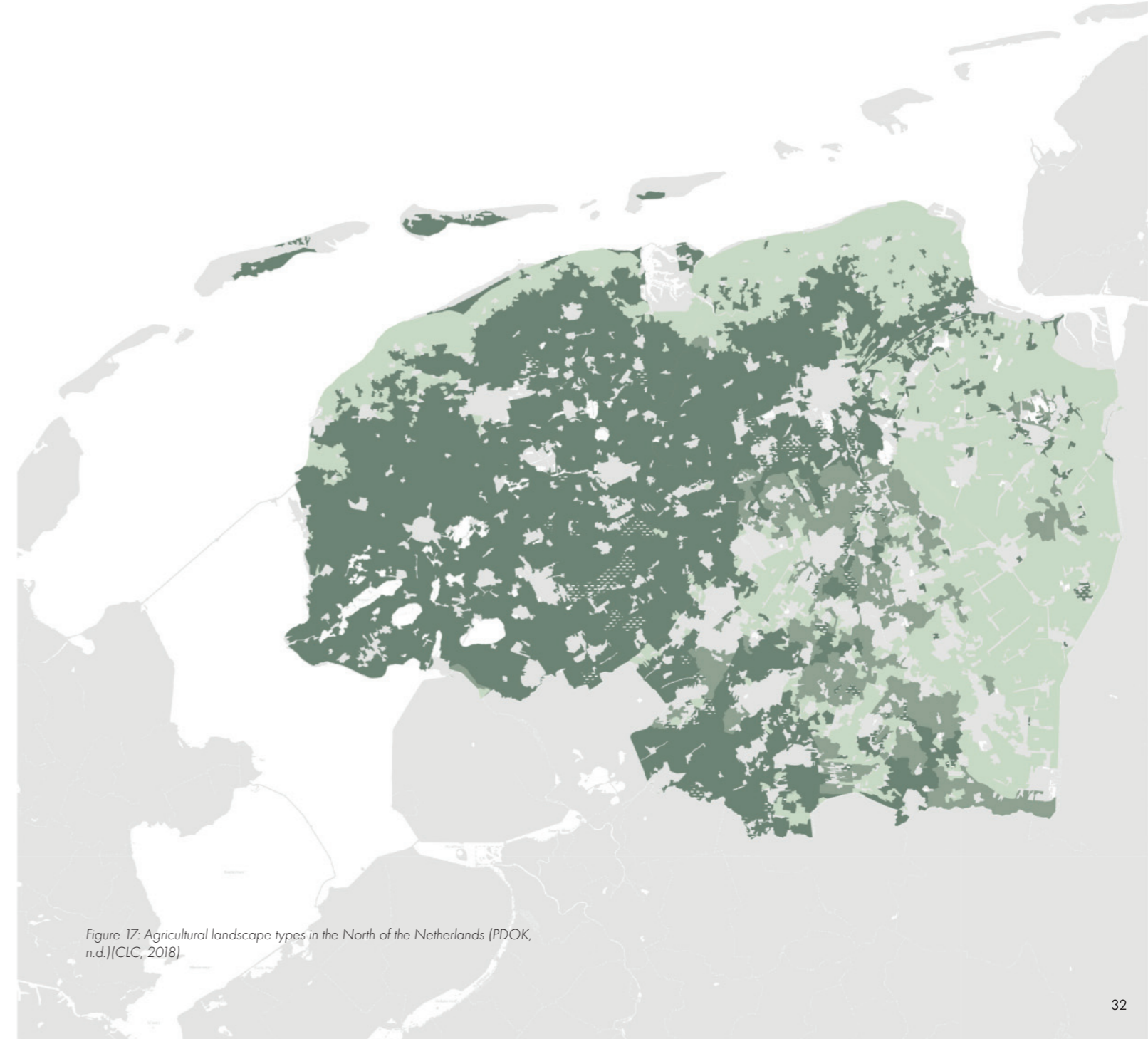
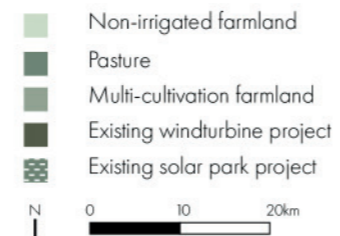
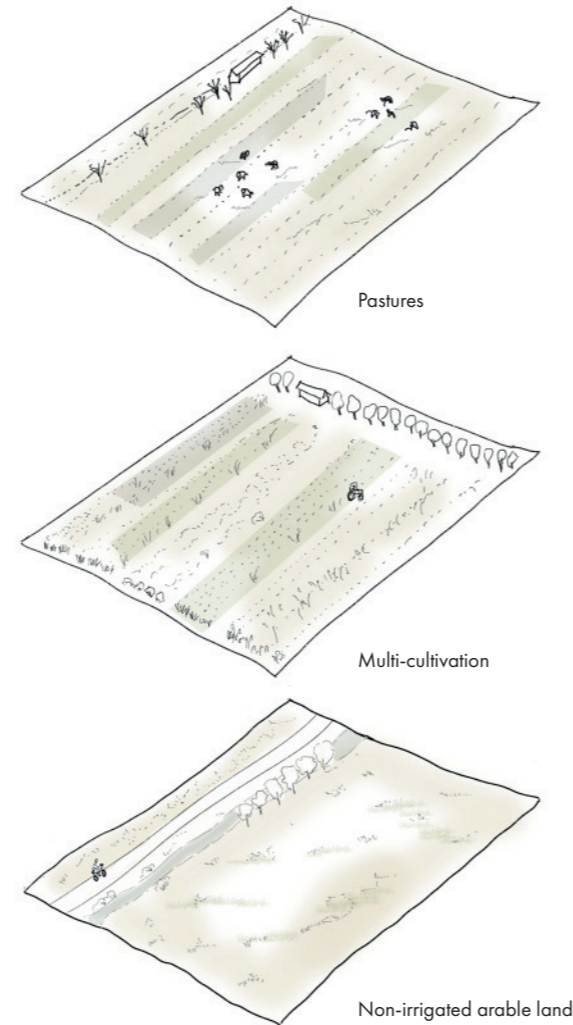


Figure 17: Agricultural landscape types in the North of the Netherlands (PDOK, n.d.)(CLC, 2018).

Natural landscape types

Despite intensive land use, natural areas remain important components of the Northern Netherlands. The province of Drenthe contains the largest share of protected natural land, especially within the Drentsche Aa region. Additional natural zones exist in Friesland and Groningen, with Friesland's lakes also protected under environmental regulations. These areas are generally highly valued by residents and play a crucial role in public perception of landscape quality.

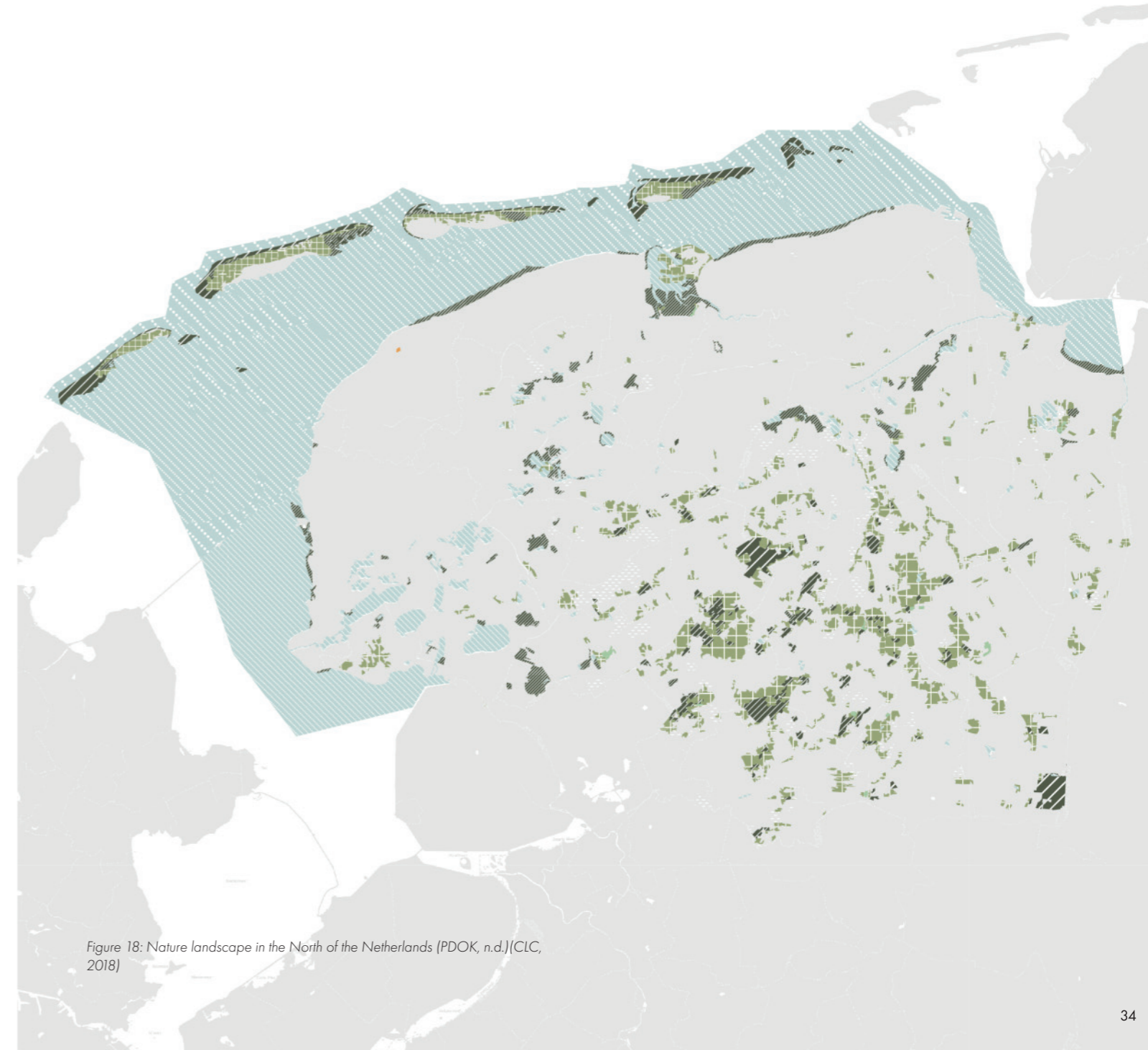
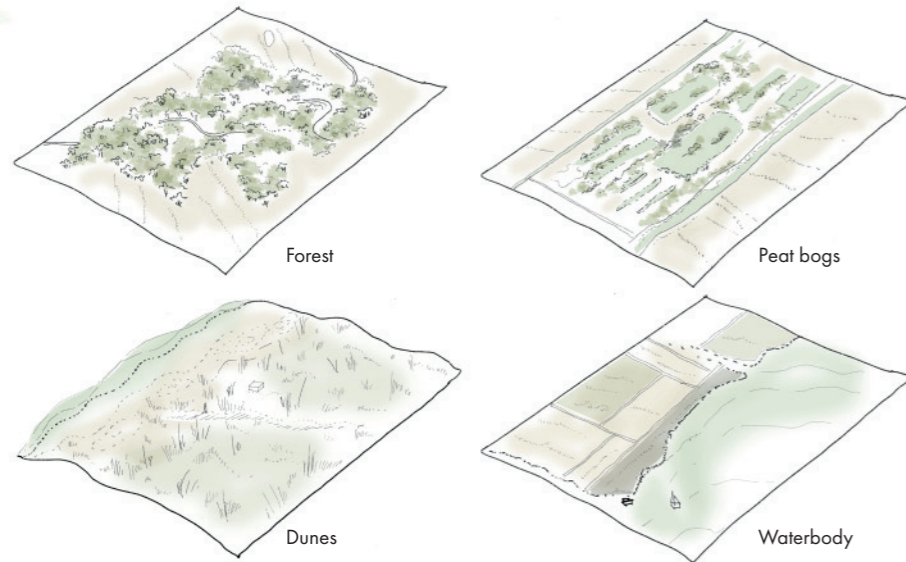


Figure 18: Nature landscape in the North of the Netherlands (PDOK, n.d.)(CLC, 2018)

Visual identity

A clear understanding of landscape identity from the perspective of local inhabitants is essential for guiding energy-related landscape transitions. Based on a literature review, interviews and studies that provide insight into the perceptions and experiences of residents and stakeholders regarding the identity of the landscape in the Northern Netherlands, four key visual characteristics have been identified for the North of the Netherlands:

- Open and Expansive Character

Features: Broad grasslands, uninterrupted horizons, minimal built elements, tranquility, and a perceived closeness to nature (Feenstra, 1993) (Berveas & De Vries, 2019).

- Farmhouse Typologies

Prominent forms: 'Kop-hals-romp' farms and 'Hallehuis' farms, reflecting agricultural heritage and traditions (Libua, 2019).

- Water Management and Ditch Networks

A visible system of ditches, canals, and trenches contributes to the spatial order and is vital for land drainage and irrigation (Nationaal Programma Groningen, 2022).

- Terps and Dikes

Historical mounds and dikes create a distinctive boundary between agricultural land and water, contributing to regional landscape memory (Nieuwhof, 2002).

These visual elements are deeply ingrained in the landscape identity, often dating back centuries. Though man-made, they are frequently perceived as natural components due to their long-standing presence and integration into daily life.

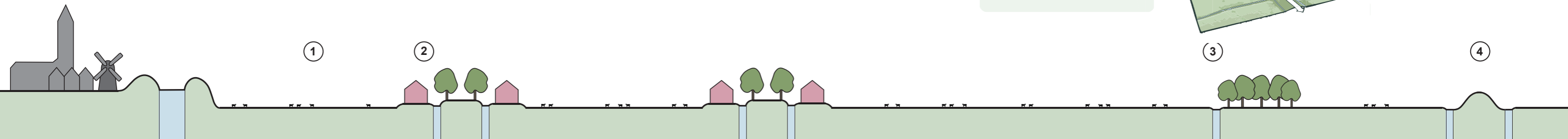
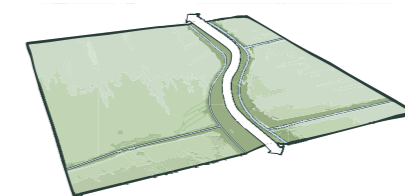
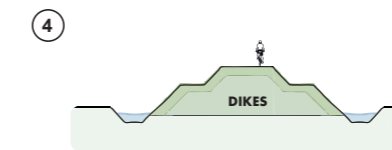
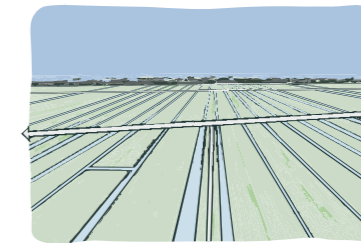
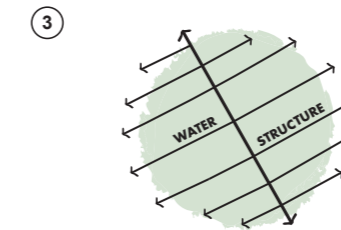
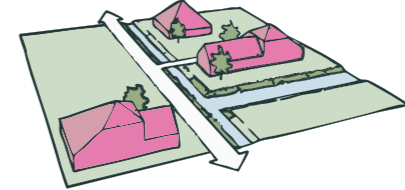
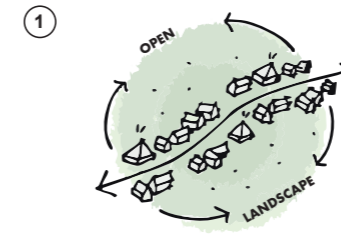


Figure 19: Visual characteristics of the Landscape

Landscape x Energy

This segment explores the relationship between landscape and energy, primarily from a spatial perspective.

Implementation of renewable energy projects is a highly space consuming act. Not only do renewables typically demand more space for production than energy production from fossil sources, they also tend to be highly visible, specifically in the case of solar and wind farms (Boer and Zuidema, 2015). It is crucial to understand the spatial and visual implications of energy projects in order to propose alternatives that align with the identity question for local communities.

The analysis includes an examination of current centralized energy production and consumption, typologies of landscapes and energy systems, ambitions and plans derived from Regional Energy Strategies (RES), historical relationships between landscape and energy, and two case studies exemplifying energy landscapes.

The core question underpinning this segment is:

What are the primary drivers of the energy transition, and what are the existing and proposed energy strategies for the Northern Netherlands?

Methods : Both qualitative and quantitative research methodologies have been employed, including literature review through research papers and government reports, mapping using PDOK database.

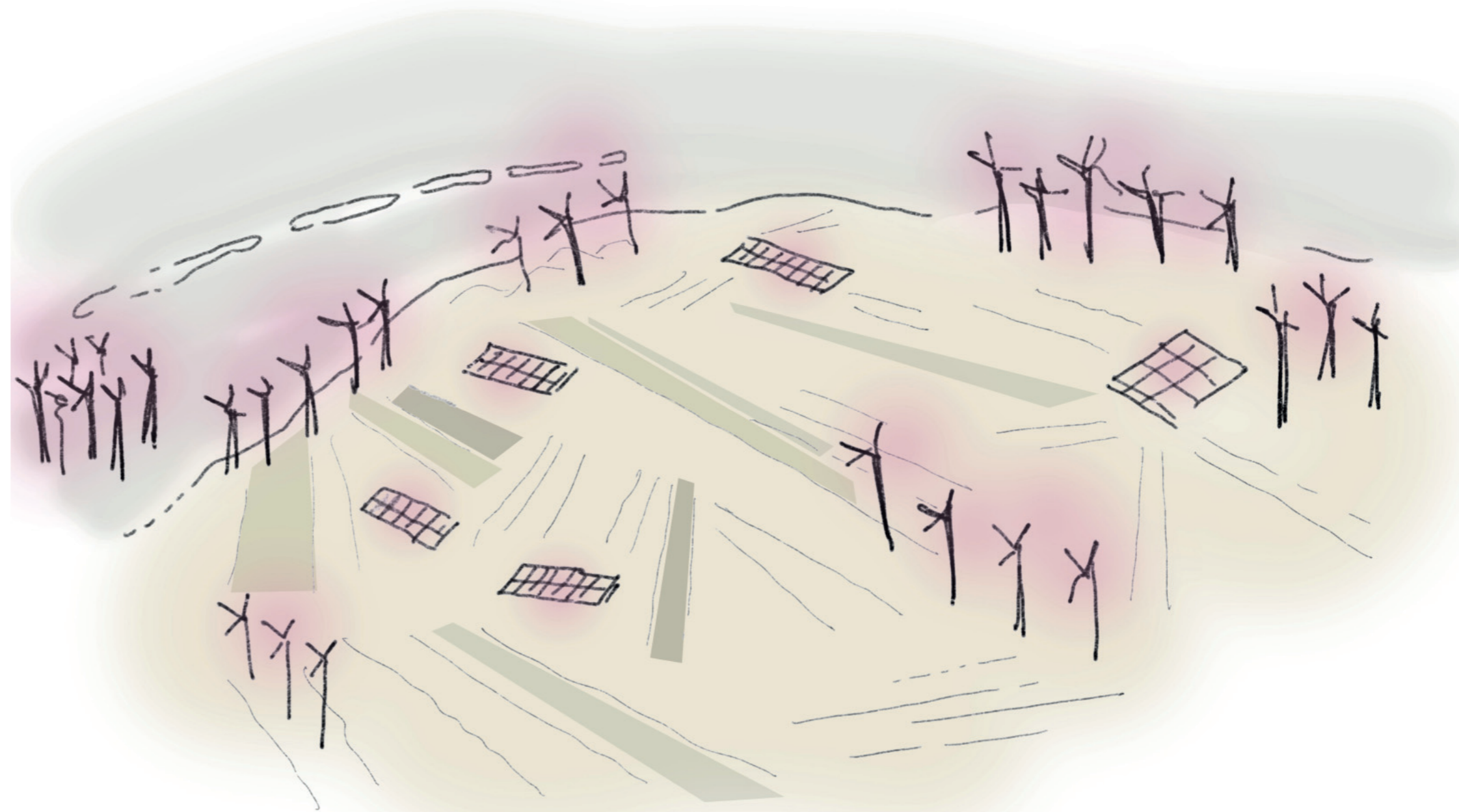


Figure 20: Sketch- Configuration energy infrastructure on landscape types

Typologies of landscape and energy production

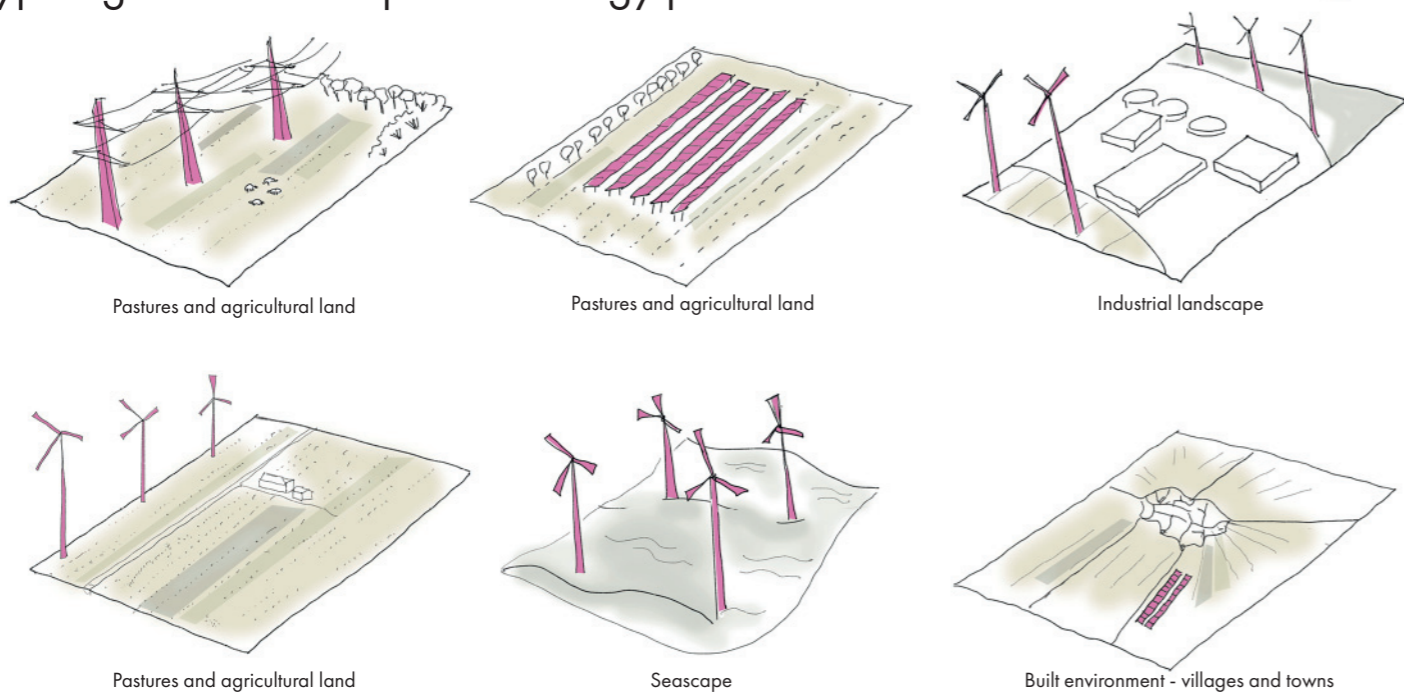


Figure 21 illustrates the spatial distribution and configuration of energy infrastructure across various landscape typologies. The focus lies on wind turbines and solar panels, due to their substantial impact on the visual identity of the landscape and their high potential in the North. As previously discussed, energy infrastructure is predominantly planned through a centralized approach, often resulting in high concentrations of installations with limited integration into the existing landscape.

To better understand the spatial variation in energy landscapes, typologies have been categorized into four groups:

- Pastures and Agricultural land
- Residential built environments
- Industrial landscapes
- Seascapes

- ▨ "Grid + Farming land" area
- ▨ "Windturbine + Farming land" area
- ▨ "Solar park + Farming land" area
- ▨ "Solar park + Residential" area
- ▨ "Industrial + energy" area
- ▨ Seascape
- ▨ Farming land
- ▨ Nature area
- ▨ Waterbody
- ▨ Residential area
- ▨ Industrial area

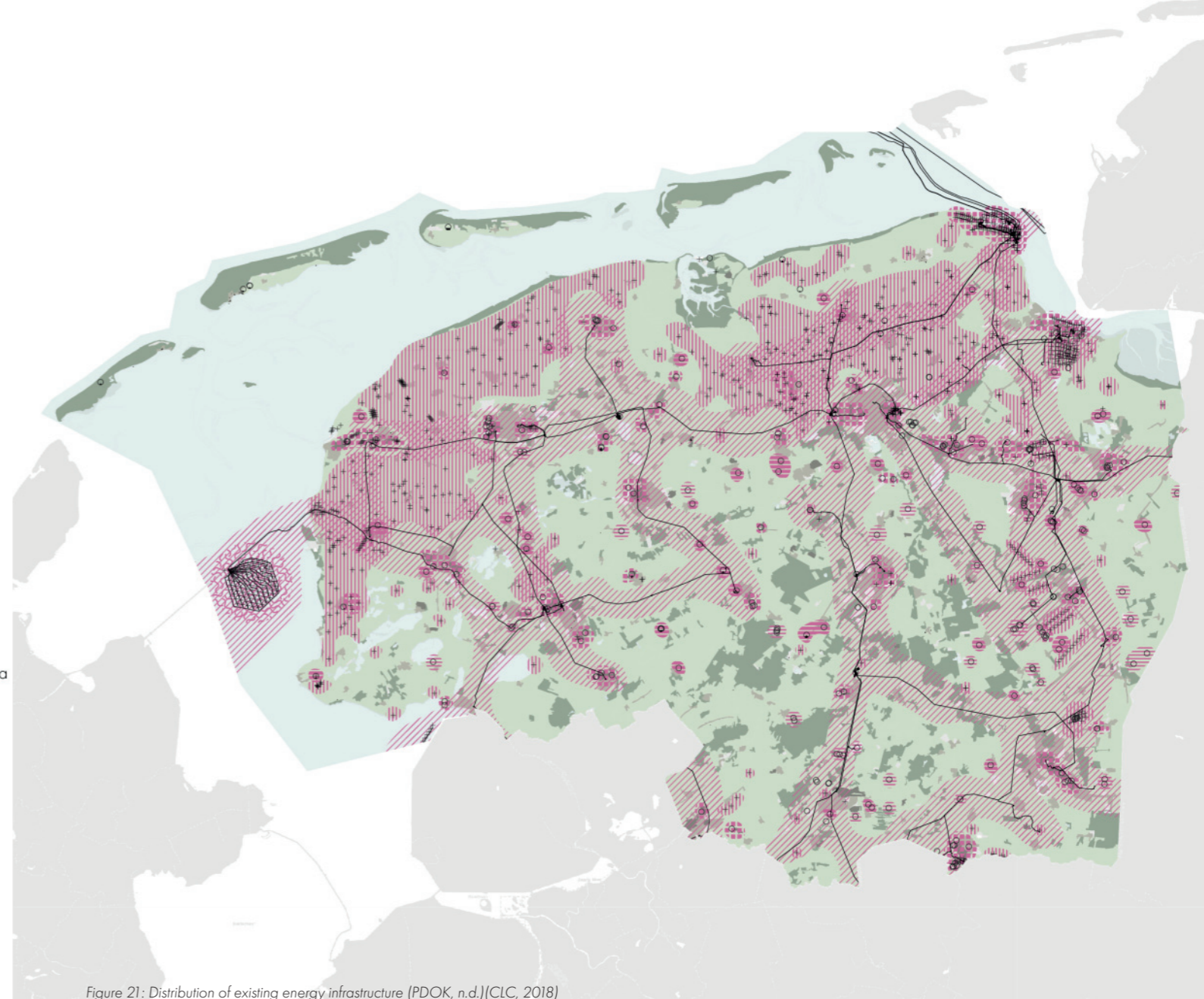


Figure 21: Distribution of existing energy infrastructure (PDOK, n.d.)(CLC, 2018)

History of the landscape and energy

It is not the first time that the landscape is transformed as a result of energy extraction. Many centuries ago peat energy was one of the main sources of energy. A large amount of the peat extraction was conducted in the northeastern region of The Netherlands. This created the 'Veenkoloniën', a landscape characterised by long straight lines close to roads and waterways. Peat extraction was a major form landscape transformation up till the nineteenth century. Only after that, the biggest part of the region became agriculturally oriented. Nowadays, the landscape transition as a result of peat extraction is viewed as a key aspect of the region's spatial expression. Notably, a interventions in the energy industry many centuries ago is still a very important part of the landscape identity of today.

Later, in the 1940's, oil and gas fields were discovered in the region. This lead to many decades of oil and gas extraction, establishing the northern region even more as a energy exporting region (Sijmons et al., 2014).

For The Netherlands as a whole, three generations of energy landscapes can be distinguished. The first generation is characterised by an organic economy where the main energy sources were wood, peat and wind (windmill) energy.

The second generation of energy landscape was defined by a fossil fuel based system, which still covers the biggest part of the global energy system. Thirdly, a energy landscape based on modern renewables. Various periods of energy systems had their share in transforming the landscape. For example after the invention of the windmill, which was mostly used to drain water from the land. Windmills have a relatively large visual impact on the land, especially for that period of time. Many windmills have since been deconstructed, making it a temporal spatial impact (De Jong, J., Stremke, S., 2020).

Energy period	Impact on landscape	Time
Wood energy system	Urban settlements near forests	Until 1000
Peat energy system	Long straight lines near road and waterways due to peat extraction	1000-1500
Wind energy system	Wind mills in landscape: visually prominent	1500-1800
Fossil fuel energy system	Power plants and electricity infrastructure	1800-2000
Renewable energy system	Windturbines, solarpanels, electricity infrastructure, large visual impact	2000-present

Figure 22: Impacts on landscape in different energy periods (De Jong, J., & Stremke, S., 2020)

Case studies of Energy landscape

To inform an integrated approach to energy and landscape planning, two case studies have been analyzed:

Case Study 1: ZONB Solar Parks in North Brabant

This project was initiated by the provincial government of North Brabant, which commissioned research on the spatial development of large-scale solar parks. The ZONB project aimed to ensure that landscape transformation resulting from the energy transition would be sustainable and sensitive to spatial quality. The research emphasized the socio-cultural dimension and proposed design principles that respected the existing landscape typologies. These principles include:

Shape: Square configurations are most efficient for solar panel installations.

Location: Solar parks should be sited near existing infrastructure and roads, and away from shade-casting objects, preferably in parcel corners to maintain agricultural functionality.

Orientation: South-facing panels maximize energy output.

Distance from users: Visual experience can be improved by creating buffer zones or using vegetation to screen installations.

Fencing: Enclosures should be context-sensitive, possibly using vegetative buffers.

Colour: The colour of panels affects visual impact and should be considered in design.

(Stremke, S., Schöbel, S., 2019)

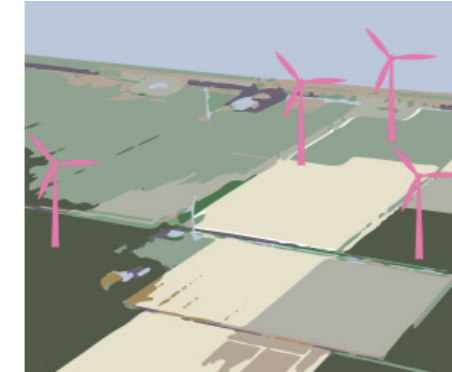
Case Study 2: Citizen Wind Parks in South-East Germany

In this project, 62 landowners collaborated with municipalities to develop two wind parks near a World Heritage site. The protected status of the area required careful preservation of visual integrity. Landscape-sensitive design principles were employed, including the strategic use of landscape relief and vegetation to visually disconnect turbines from heritage sites. One key principle emphasized the avoidance of turbines aligned in strict geometric patterns, ensuring a more organic integration into the landscape (Stremke & Schöbel, 2018).

Literature review: Recommendations for implementation of windturbines in the landscape

The recommendations on the placement of windturbines in the landscape from Stroeken et al. (2021) is used as inspiration to shape relevant guidelines later in the project.

Two take-aways from this report are highlighted and visualised in figure 1. Firstly, when designing an energy landscape, one should consider to have areas with windturbines and areas without. This recommendation is a result of research that establishes that the first windturbine has the biggest impact on the experience of the landscape, after that the impact is relatively lower. Secondly, windturbines would relate to their surroundings in a less awkward manner when the scale of the windturbine is directly derived from the scale of the surroundings, for example placing large windturbines close to highways.

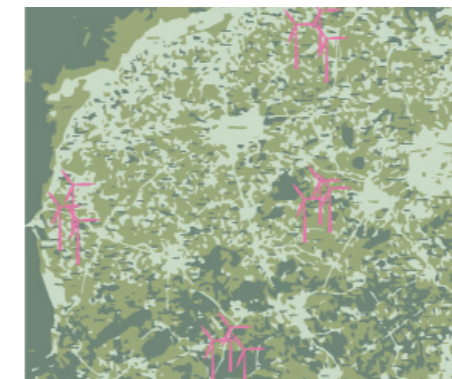


Pastures and agricultural land

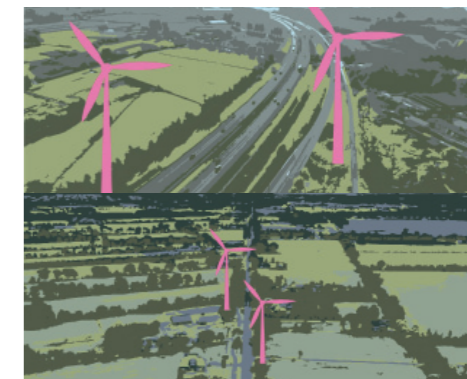


Avoid obstruction of important visual elements

Figure 23: Guidelines for implementation of windturbines from Stremke, S., & Schöbel, S. (2019)



Divide regions with and without windturbines



Consider scale for the size of the windturbine

Figure 23: Guidelines for implementation of windturbines from Stroeken et al. (2021)

Policies & Governance

The following policies are in play in the energy transition in the Northern Netherlands.

European Green Deal (2015)

- Agreement to keep global surface temperature well below 2 degrees Celcius (preferably below 1,5 degrees Celcius), compared to pre-industrial levels.
- No net emissions of greenhouse gasses by 2050
- Economic growth decoupled from resource use
- No person and no place left behind (European Commission, 2021)

Natura 2000

European network of protected natural areas

- Natura 2000 areas may not shrink in size
- It is not allowed to realise projects that have significant consequences for a Natura 2000 area (European Environment Agency, n.d.)

Common Agriculture Policy

- Support farmers and improve agricultural productivity
- Help tackle climate change and the sustainable management of natural resources
- Maintain rural areas and landscapes
- Keep the rural economy alive by promoting jobs in farming, agri-food industry and associated sectors (Paneva, V., 2021)

Climate accord (2019)

Vision: Climate neutral in 2050

- Agriculture & Land-use: We need an integral approach to combining the climate plans and agricultural wants and needs. The climate plans are the base for planning, but synenergy between agriculture and cli-

mate mitigation is the goal.

- Electricity on land: participation and acceptance are very important for the planning of the energy transition
- Societal support is essential for an emission free energy system. Citizens can be active in new projects.
- A sufficient participation process helps with a better quality of decision-making, which will improve acceptance of the transition.
- Participation is an integral part of the 'Omgevingswet', which means participation is mandatory part of the decision-making process. Institutions are free to choose in which way participation happens.

(Ministerie van Economische Zaken en Klimaat, 2021)

RES Friesland:

- 3 TWh renewable energy (2021: 2,5 TWh)
- Production of renewable energy and organising local ownership
- Support of process- and projectparticion, as well as landscape integration (Poepjes et al., 2021)

RES Groningen:

- 5,7 TWh renewable energy (2021: 4 TWh)
- Support for local ownership (Aim: 50%)
- Decision-making: municipalities can engage citizens (Westra & Stuurgroep RES Groningen, 2021)

RES Drenthe:

- 3,5 TWh renawable energy (2021:3 TWh)
- Multifunctional land-use and local consumption
- Stimulating biodiversity (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021)



Figure 25: RES regions in The Netherlands (Wang et al., 2023)

Current government structure

It is important to understand the current governing sytem regarding the planning of energy infrastructure. The national government sets goals for renewable energy ambitions, in the National Environmental Vision. Provincial governments also have their own vision policies on implementation of energy projects. Municipalities have the right to decide on any building activity within their territory. When a project developer wants to develop an energy project, the first step is to decide on a potential location. This location is then proposed to either the provincial government or the municipality. Large energy projects are usually the task of the province, respectively, small energy projects are for municipalities to decide on. It is up to a municipality to engage residents in the process (Van Essen, H., 2023).

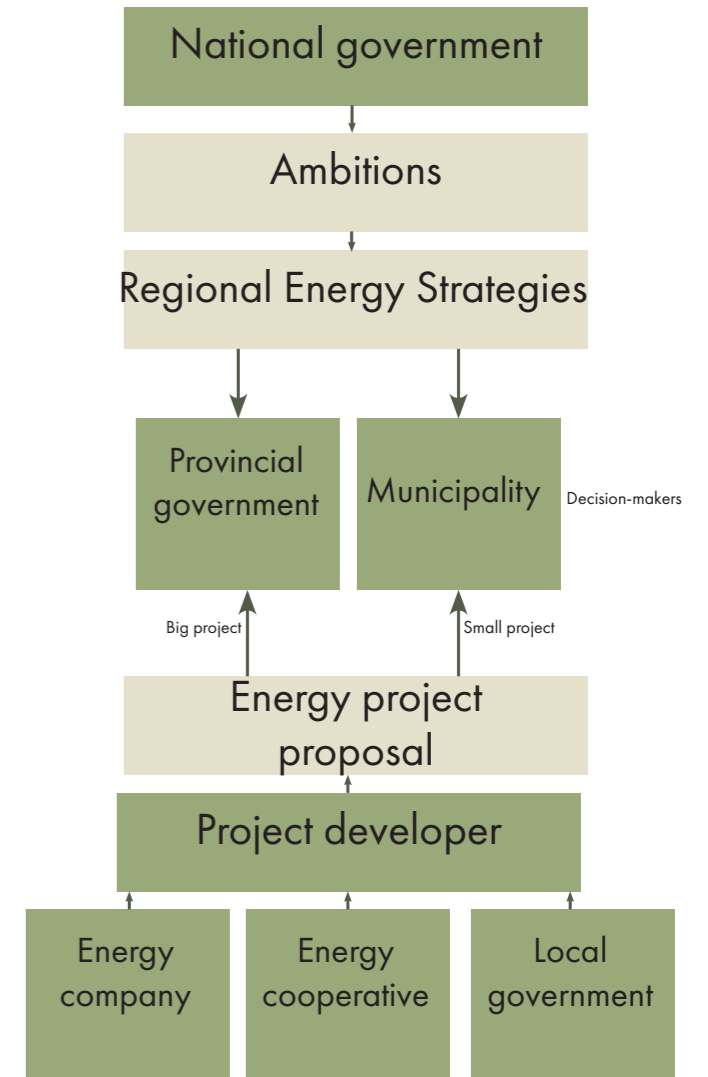


Figure 26: Current government structure (Van Essen, H., 2023)

Energy x People

The last segment of the analysis, called 'People x Energy', explores the perceptions of people around transition to renewable energy in northern Netherlands. Transition to renewable energy comes at the cost of a huge amount of space as explored in the earlier sections. This space (landscape) has a close emotional and physical relation to its everyday users. Generation of identity of the landscape is thus intricately linked to people's perceptions. Public acceptance and resistance to change in identity is often attributed to Not in my backyard (NIMBY) syndrome but these attitudes stem from deeper institutional factors (Wolsink, 1999). This section aims to decode citizen perceptions and understand them beyond NIMBY-ism.

This section seeks to answer the following sub research question :

What role can local participation play in the decision-making process for sustainable energy development?

Methods used : Media analysis, secondary data from interviews, literature review.

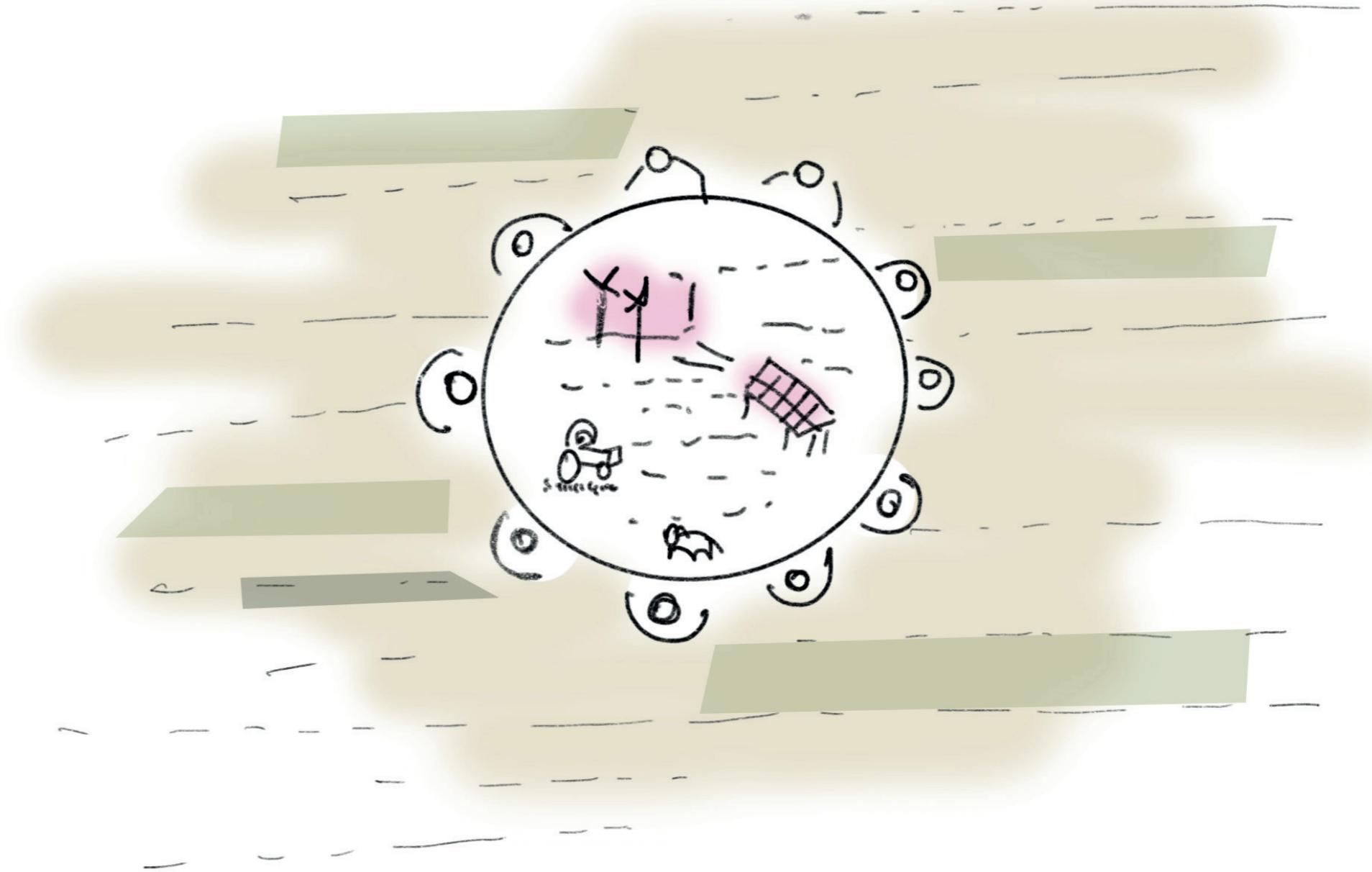


Figure 27: Sketch - Participation in decision making

Actors concerned with identity

In the transition of the landscape and its identity, the most impact is faced by groups residing closest to the newly proposed projects. The absence of public support for energy initiatives is one of the primary reasons for this topic's research. Infrastructure for renewable energy, particularly energy infrastructure that has a significant impact on the landscape, is often viewed negatively.

Local rural residents are the primary community for this investigation. Farmers and civil society organisations also form an important group concerned with the identity transition. Views of influential groups such as political parties, institutions and government bodies are also considered to find gaps and synergies in. Through media reports and secondary interview sources, different perspectives on the energy transition and how it affects the environment.

It is important to note that many energy projects already exist in the region. These are mostly located in low population areas and along the coast, revealing the missing link between technical decisions and citizen inputs in landscape transition.

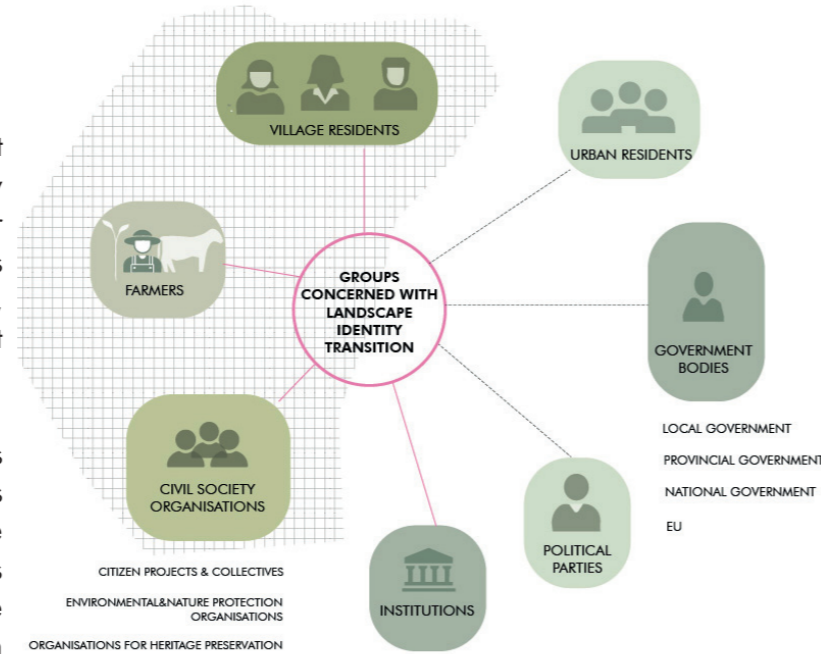


Figure 28: Groups concerned with landscape identity transition

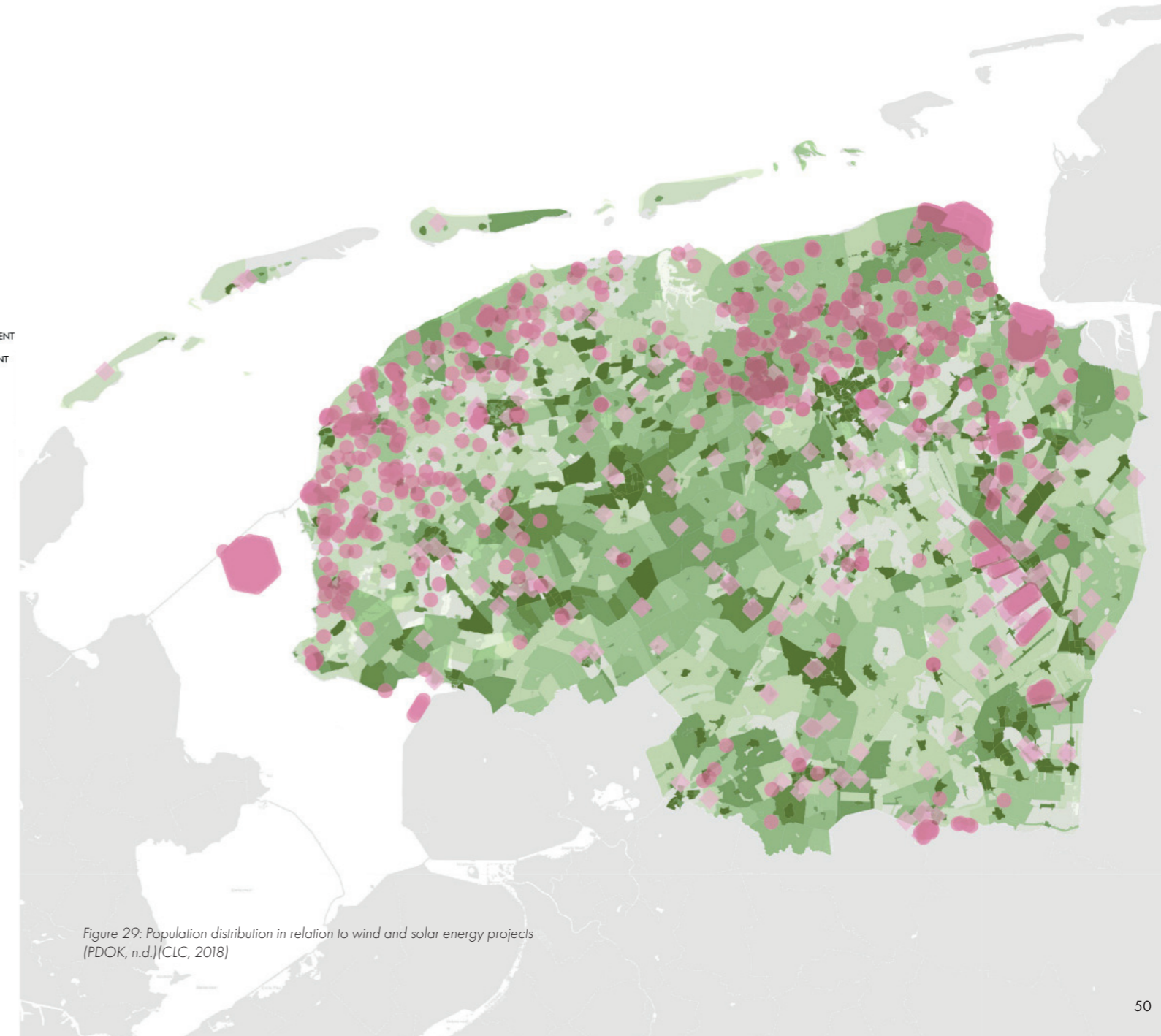
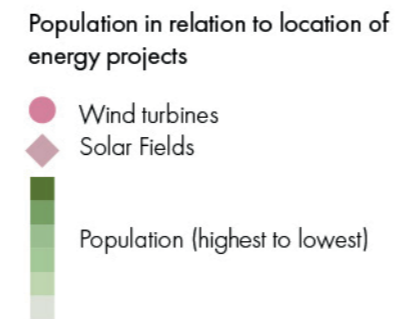


Figure 29: Population distribution in relation to wind and solar energy projects (PDOK, n.d.)(CLC, 2018)

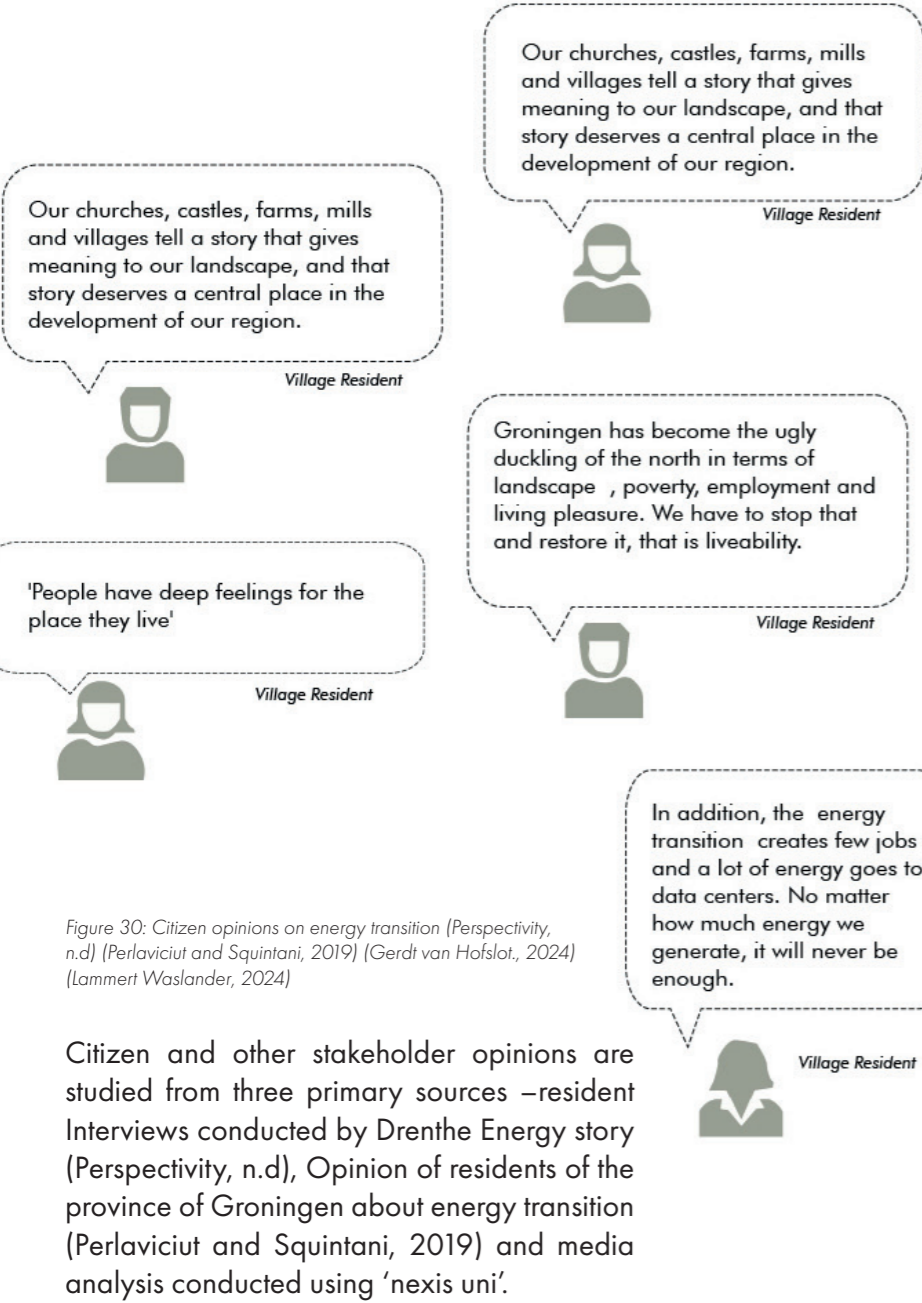


Figure 30: Citizen opinions on energy transition (Perspectivity, n.d.) (Perlaviciut and Squintani, 2019) (Gerdt van Hofslot., 2024) (Lammert Waslander, 2024)

Citizen and other stakeholder opinions are studied from three primary sources –resident Interviews conducted by Drenthe Energy story (Perspectivity, n.d), Opinion of residents of the province of Groningen about energy transition (Perlaviciut and Squintani, 2019) and media analysis conducted using 'nexis uni'.

ATTITUDE TOWARDS ENERGY TRANSITION

"Residents seem to have no influence on the decision-making process for wind farm construction"

Village Resident

Groningen can develop as an example of how heritage and progress go hand in hand, with both contributing to a stronger identity and a sustainable future.

Municipal representative

Many farms are valuable visual elements in the landscape, it would be a great shame if they disappeared. Not only the feared buyout regulations are putting pressure on the Drenthe landscape, but also the arrival of large fields of solar panels and wind turbines

Village Resident

Left-wing politicians keep preaching hell and damnation about climate and energy targets, causing confused youngsters to spend weekends sitting on highways, but the reality is that we simply achieved many of those targets

Political party representative

'Mooi die windmolens. Maar niet bij ons'

Windmolens, zonneparken en hoogspanningsleidingen. De een vindt ze mooi, de ander gruwel er van. Energie en landschap gaan niet samen als je er niet goed over nadenkt. Dat bleek de afgelopen jaren ook in Groningen.



Windmolens bij Meeden zagen ook velds en velds voor overlast. (Foto: J. van der Vliet)

De ruis van de impact van de energietransitie is steiler, niet nu je uitkijkt naar zonneparken en het afgevoerde landbouwgrond. De ruis is er verantwoordelijk voor dat landbouw? Experts bogen zich weerom, melding in Groningen naar de weg. (Foto: De maatschappij van de provincie)

...en die niet belang bij die projecten hebben. In wat het te kort door de bocht. (Foto: Provincie Groningen)

...van het Groninger Landschap is overtuigd van een energie landschap. Groningen heeft een 'Mensen koesteren diepe gevoelens' overgeving. Bovendien wordt tegenwoordig vaak samengewerkt met energiecoöperaties, zoals er meer

Karakteristieke agrarische landschap Drenthe onder druk

Het karakteristieke agrarische landschap in Drenthe staat onder druk. Stichting Drents Agrarisch Erfgoed (DAE) zoekt op lossingen tijdens een symposium, volgende week donderdag op het provinciehuis.



Een verloren boerderij in Borger. Stichting Agrarisch Erfgoed is bezorgd over de dreigerige leegstand op het Drentse platteland. (Foto: J. van der Vliet)

HILBRAND POLMAN

Wat gaan we doen als er boerderijen leeg komen te staan omdat de eigenaren zijn uitgekracht? Deze vraag houdt voorzitter Rob Staal van Drents Agrarisch Erfgoed intensief bezig. Want leegstand kan het gevolg zijn als de aanpak van de problematiek leidt tot het op grote schaal uitkopen van boerderijen.

Staal: 'Zinken we dan een nieuwe invulling van deze panden of zetten we de shovelfuor? Veel boerderijen zijn waardevolle beeldvormende elementen in het landschap, het zou enorm wennen zijn als dat verdwijnt.' Niet alleen de gestrekte uitkoopregelingen zetten het Drentse landschap onder druk, ook de komst van grote velden met zonnepanelen en windturbines. En dan is er nog de opgave om de komende jaren 15.000 woningen te bouwen. Vroegere tijd, vinden Staal en zijn collega's van DAE, om op een symposium te bespreken hoe al deze ontwikkelingen kunnen samenhangen met het behoud en de bescherming van het gebied en landschapelijk erfgoed. Nu kan je natuurlijk van de nood een deugd maken door begeerte boerderijen om te bouwen tot karakteristieke Drentse agrarische landschap voor het nageslacht te behouden. 'We kunnen dit ook niet alleen' benadrukt Staal. 'We werken nauw samen met onder anderen Stichting Het Drentse Landschap en Rood Harnschut, die waakt over cultureel erfgoed.' Op het symposium spreekt historicus geograf Elyse Steerns van de Wageningen Universiteit over de vraag hoe agrarisch erfgoed in de toekomst is voor het woningbouw. Architect Pieter Brik, bestuurslid van de stichting DAE, geeft vervolgens een aantal mogelijke toekomstscenario's. Wat is DAE wil uiteindelijk met voor stichting DAE staat. Sinds oktober 2020 stelt zij zich inzetten om het karakteristieke Drentse agrarische landschap te maken met groene energie, nu

OPINIE Tweedeling provincie door focus op energie

Lammert Waslander twijfelt over de rol van Groningen bij de energietransitie zoals René Paas, Koen Schuilend en Johan Remkes deze onlangs presenteerden in Den Haag.



In opzichts nu steeds meer van de elektriciteitspalen of steden, jaar nieuwe in concepten naast elkaar zoals bij Wetzlar op de Aduard', zegt Lammert Waslander. (Foto: J. van der Vliet)

LAMMERT WASLANDER

'Wees bewust van het belang van het unieke Groninger landschap'

Afgelopen week getuigde van de provincie, met een oproep tot de provincie om te zorgen voor de kwaliteit van het landschap. Het is niet de bedoeling om de provincie te laten beslissen over de kwaliteit van het landschap, maar om de provincie te laten beslissen over de kwaliteit van het landschap. Het is niet de bedoeling om de provincie te laten beslissen over de kwaliteit van het landschap, maar om de provincie te laten beslissen over de kwaliteit van het landschap.

De provincie van de Groninger bestuursleden René Paas en Koen Schuilend, met de provincie, om te zorgen voor de kwaliteit van het landschap. Het is niet de bedoeling om de provincie te laten beslissen over de kwaliteit van het landschap, maar om de provincie te laten beslissen over de kwaliteit van het landschap.

Figure 31: Media analysis key articles - (Gerdt van Hofslot., 2024) (Hilbrand Polman, 2023) (Lammert Waslander, 2023)

ENERGY TRANSITION IS IMPORTANT

BIG SUPPORT FOR SOLAR PANELS ON ROOFS

CONCERNED ABOUT LANDSCAPE CHANGE

CONCERNED ABOUT CLIMATE CHANGE

LOSS OF FARMLAND

DAMAGE TO LANDSCAPE & VIEW

NOISE POLLUTION

HARMFUL FOR NATURE

SHADOW FLICKER AND GLARE FROM THE BLADES

DECREASE IN HOME VALUE

If you oppose, you don't necessarily oppose the whole idea of a wind farm. Usually some sort development can still take place... but in a different way. For instance, in a project with ten turbines, it might be that only cause a problem, so we can negotiate that they are moved to another place



COMMUNITY HOPES AND DREAMS

We want to be engaged in the decision making process at an early stage rather than being consulted at the last minute, when decisions have already been taken and agendas have already been set



STRONG NEED FOR CITIZEN INVOLVEMENT IN DECISIONMAKING

TRANSPARENCY IN DECISIONS ABOUT THE LANDSCAPE

IDENTITY IS DYNAMIC AND EVOLVES WITH TIME

The general idea around sustainability transition can be observed to be on a positive side, showing support towards a new identity transition and a move towards renewable energy. Although different actors often have a different perspective, most agree on the fact that the implementation of energy projects into the landscape is not managed well.

In general planning processes for energy projects, decisions are made by the government, taking input from experts into account, which are then communicated to

other stakeholders and often lay people in a Decide-Announce-Defend (DAD) model (Komendantova 2021 as cited by Psarra et al 2024). In conclusion, citizen aspirations lie around involvement in the decision-making process to maintain some levels of autonomy in shaping their landscape of the future.

Figure 32: Community concerns, hopes and dreams (Perspectivity, n.d) (Perlaviciut and Squintani, 2019) (Wolsink, 2011)

Existing Bottom-up Structures

Energy cooperatives

So far, the centralised approach of the planning and policy system has been the main focus, as it makes up the largest portion of energy projects. Since recently though, other forms of organisations for energy projects have emerged: energy cooperatives.

Energy cooperatives are small organisations on a very local scale, often neighbourhood or village scale. These cooperatives often consist of around 100-500 people and are focused on small scale energy projects. The structure and organisation of these cooperatives can vary, some are focused on heating, insulation and renovation strategies, while others are focused on financing and building energy infrastructure, such as a windturbine or a small solarpark (Local4Local).

In The Netherlands, already more than 700 energy cooperatives exist, their locations are shown in figure 33. Although the number is energy cooperatives is quite large, this does not mean the cooperative struggle with certain aspects. The main limitations of energy cooperatives include the following.

Financial challenges

Cooperatives are limited due to a lack of financial resources in the early stages of their projects. Subsidies can often be provided later in the process, but it appears that it is difficult to rely on these subsidies.

Regulations and policies

Permit processes often take a long time which result in extensive administrative efforts. Also, in many places the electricity grid approaches its limit, blocking new energy projects.

Engagement and organizational challenges

The existence of energy cooperatives is often not very well known among citizens. Also, cooperatives often rely on volunteers. As the energy cooperative tries to grow, it finds its limitations in having members with enough time and expertise (Energie Samen, n.d.).



Figure 33: Location of Energy Cooperatives (Hier.nu, n.d.)

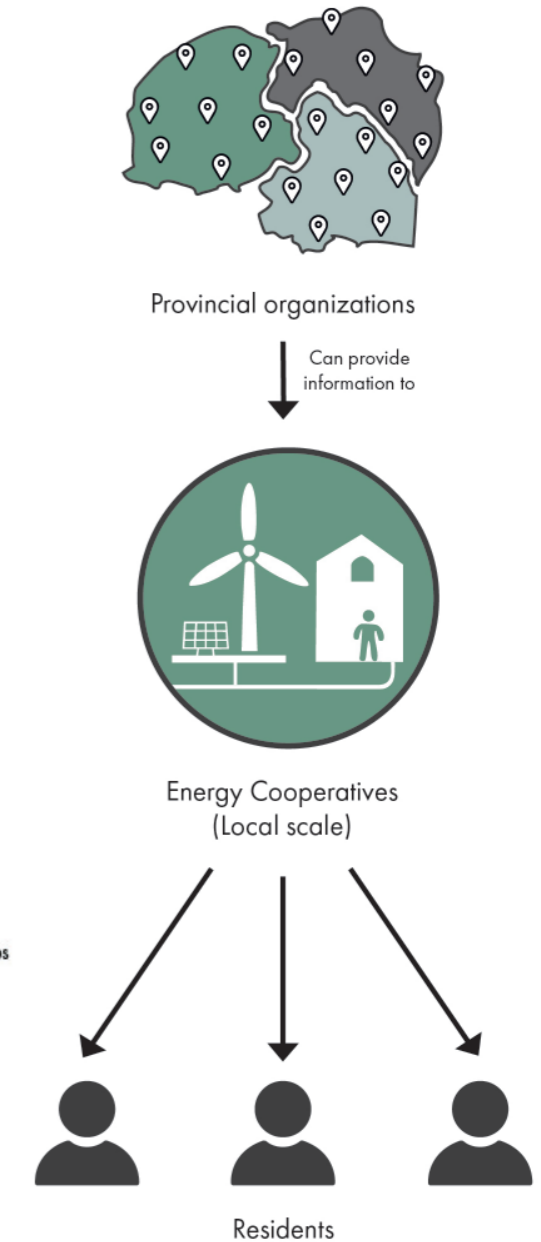


Figure 34: Structure of Energy Cooperatives (Energie Samen, n.d.)

Agricultural collectives

A collective is a collaboration between farmers and other parties in a certain area, with the aim to stimulate agricultural nature management. They work with other parties like nature organisations, municipalities, water-management institutions, hunters and birdwatchers. There are 40 agricultural collectives in The Netherlands. Provincial government policies and goals shape a regional plan made by the agricultural collectives. If the provincial government agrees with this plan, they grant subsidies.

Agricultural collectives conclude agreements with individual farmers and help them with the execution of the plans. Plans can differ in various characteristics. Most plans are aimed at topics such as biodiversity, nature, landscape, environment, energy and waterquality.

The report uses BoerenNatuur as case study of agricultural. It is the umbrella organization of the 40 agricultural collectives, members of BoerenNatuur, they organize the Agricultural Nature and Landscape Management (ANLb) based on the conviction that nature-inclusive agriculture is an agricultural system that strengthens soil, climate, water, nature and landscape on the farm and in the larger region. The collectives are the anchors between the individual farmers who implement the ANLb on their land. Together they ensure a landscape where there is room for more biodiversity, birds and animals (BoerenNatuur, n.d.).



Figure 35: Territories of Agricultural Collectives (BoerenNatuur, n.d.)



Figure 36: Structure of Agricultural Collectives (BoerenNatuur, n.d.)

Towards a collaborative transition

The most relevant take-aways from the analysis are the following. The region of the Northern Netherlands has already some renewable energy infrastructure. Most of these projects are planned through centralized approach. As deduced from the typologies of landscape and energy production, many of these projects exist in the landscape without much relation to its surroundings. The region has a distinct agricultural character, consisting of large stretches of pastures, non-irrigated arable land and mix cultivation zones. This is reflected in the analysis on visual identity. The most important visual characteristics of the visual identity of our region are directly related to farming activities. Also other ways of land and water management have their impact on this identity.

An overview of actor concerns has provided insight in the lack of public acceptance of energy projects. The impact on the identity of the landscape is very much reflected in these concerns.

Finally, existing bottom-up structures regarding landscape and energy have been examined.

Local initiatives and co-operatives can play a catalyst role into the process (Psarra et al, 2024). Understanding the needs and desires of local communities beyond NIMBYism is an important step. By labelling as NIMBYism any form of opposition to energy plans and interventions, all the depth of considerations made by the local society is surpassed and ignored. Recognising the local society as the 'expert of the place' ensures that their knowledge, values, and sensitivity enrich the spatial impact of energy transition (Psarra et al 2024).

Energy cooperatives work on a very small scale and consists of mainly volunteers. The energy cooperative stimulate local engagement in the energy transition as well as social cohesion among communities. They do face their challenges, for example financial resources or expertise. Agricultural collective is a collaboration of farmers and land management experts that work on a larger scale. These collectives handle landscape and biodiversity management including nature and water quality.

Energy cooperatives and agricultural collectives are both important bottom-up structures that manage or shape the current rural landscapes. Both the bottom-up initiatives work towards the common goal of creating a sustainable future for the residents of this region. It can be useful to examine the possibilities to combine these structures into one, fully utilizing each others capabilities and resources. Collaboration between residents through energy cooperatives and farmers through agriculture collectives is key to shape the new energy landscape.

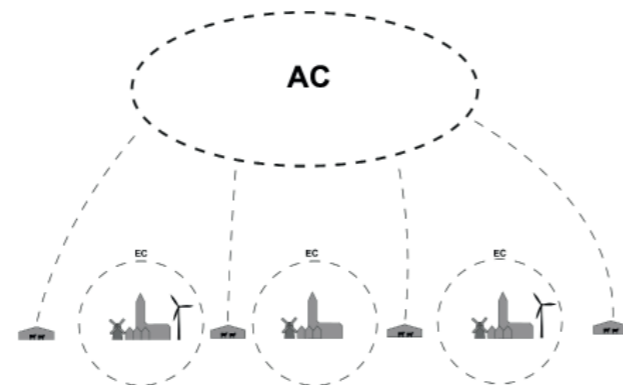


Figure 37: Disconnectedness of energy cooperatives and agricultural collectives

Strengths

Energy cooperatives & farmer collectives	Large amount agricultural land
High potential wind & solar energy	Support for energy transition

Weaknesses

Distrust in national government	Low socio-economic conditions
Not many large consumption areas	Electricity grid almost at full capacity

Economic transition food to energy production	Close connection local government and residents	Local production & consumption of energy
Combining energy cooperatives & farmer collectives	Self sustaining farms	Less CO2 emissions

Loss of agricultural land	Concerns about loss of landscape identity
Financial challenges energy cooperatives	Organizational challenges energy cooperatives

Opportunities

Figure 38: Swot analysis

Threats

Conflict of flows

Various flows through the landscape are not aligned with each other. The main flows through the region are that of food production and energy production. The food industry is very efficient. A large portion of the production is exported. Also the energy flow has a very non-local character. Renewable energy is produced in centralized areas, then transported to urban or industrial areas.

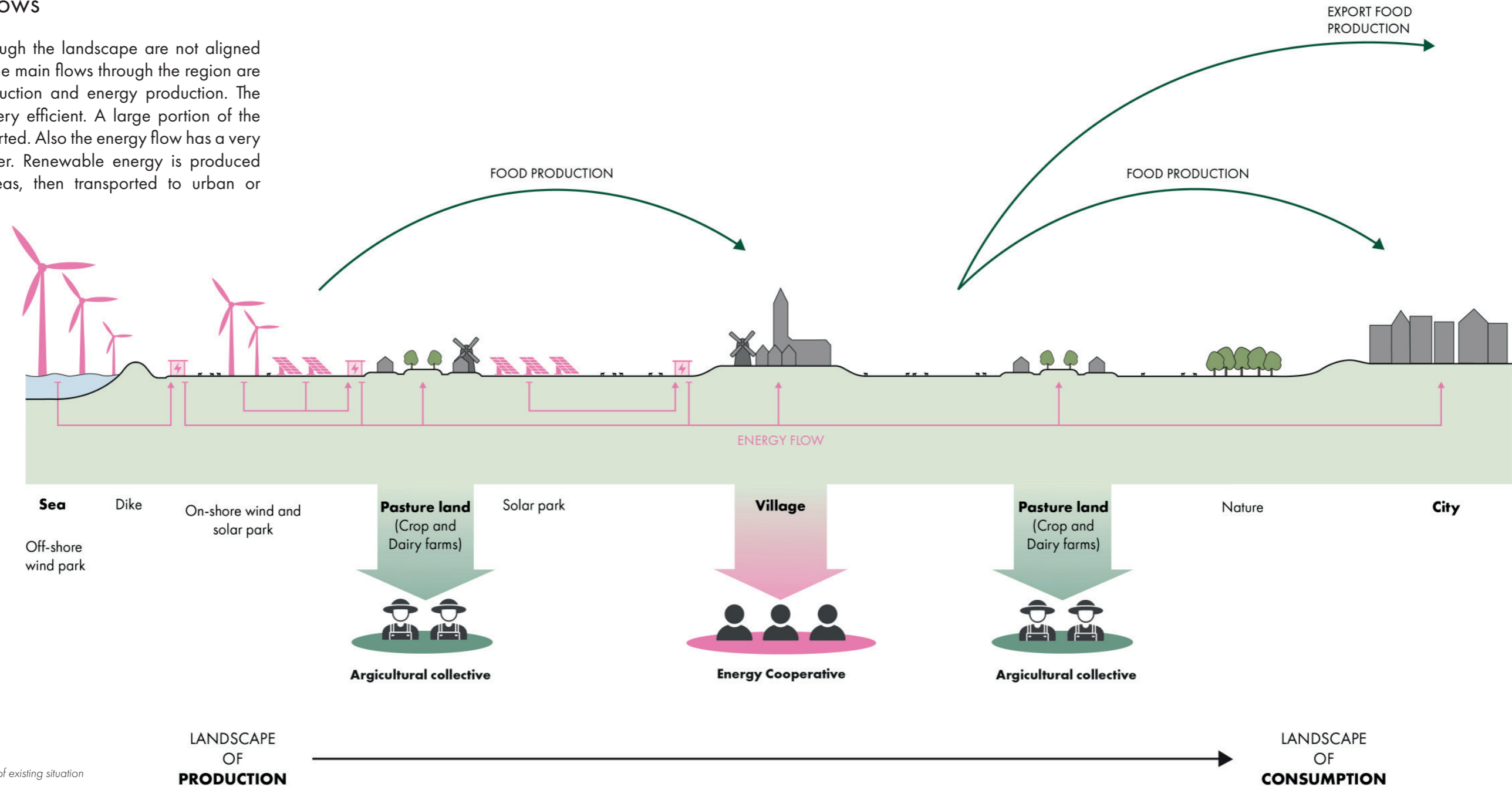


Figure 39: Systemic section of existing situation

Synergy of analysis

Energy development has changed the primitive relationship between human and landscape. While traditional energy exploitation caused great damage to the environment, the early development of new energy sources lacked public acceptance due to its top-down governance. However, energy cooperative has gradually democratized the energy transition and allowed people to participate more in decision-making in energy issue. The next question is how to help the identity transition move in a positive and desirable direction during the energy transition, rather than another “gasquake” in the future.

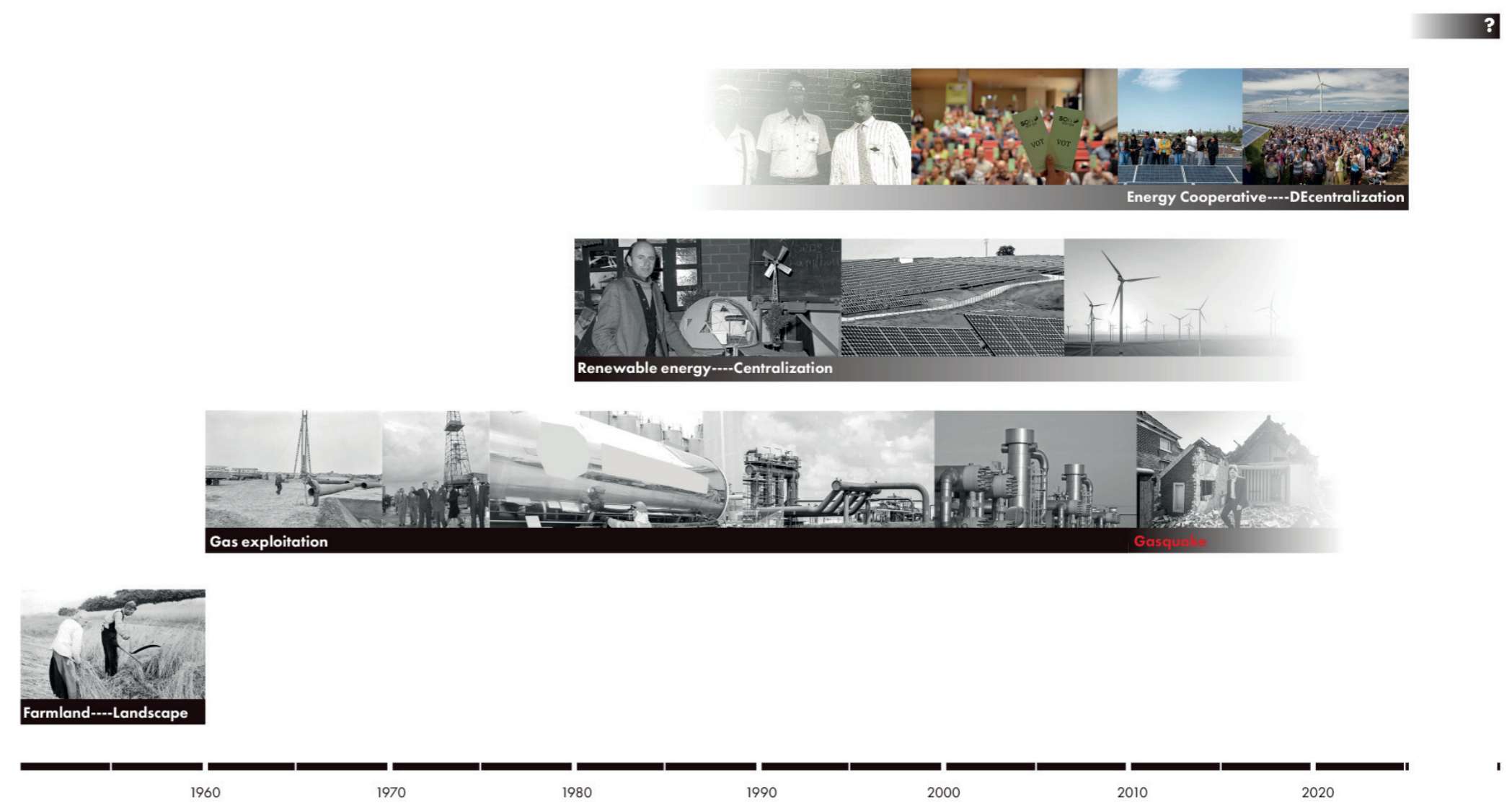
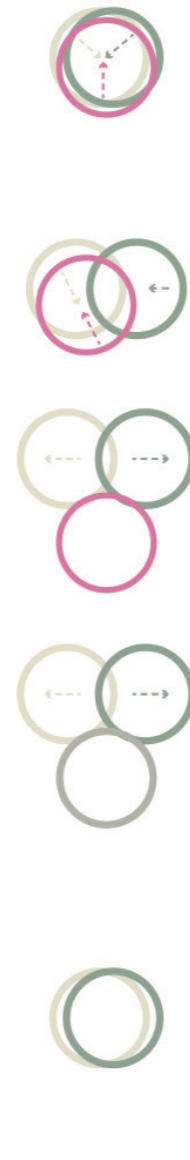


Figure 40: Evolution of relationships among people, energy and landscape
 (Canonvanderland, n.d.) (Rivnoord, 2016) (ESCP, 2024) (Boxtel, Juffermans, 2015) (ondergroningen, n.d.) (Revolve, 2022) (Westmill Solar Co-operative, n.d.) (Rog, n.d.) (Som Energia, n.d.)

CHAPTER 3 VISION

Co-creating Energy Landscapes
Vision Map
AECO: New cooperative

Co-creating Energy Landscapes

Vision

The vision aims to preserve the **autonomy of rural residents** amid the evolving landscape identity brought by the renewable energy transition. By establishing a **new cooperative** that is based on the existing agricultural and energy cooperatives, we empower residents to actively participate in decision-making regarding energy projects on the agricultural land around them. The cooperative also aims to provide fundings and training for rural residents, so that they can make good use of the local energy projects to benefit themselves. This approach promotes **decentralized energy initiatives, fosters integrated and multifunctional land use, and redefines energy as an integral part of the new cultural landscape**. The new cooperatives will be acting in certain territories, primarily based on land-use. In these territories, local residents can directly participate in the decision-making process following the instruction and principles of each territories. These proposed new cooperatives should be fully functional in 2050.

What brings the vision together is an integrated and multifunctional land-use of the rural areas in our region. This means a **more natural dynamic between the food industry and the energy industry**, which will boost the lives of the people that live in our region, who have been neglected in terms of socio-economic perspective for the past decades. Our vision is **more spatially just, sustainable and accessible**.

Values



Just Landscape Identity Transition



Fair Distribution



Empowering Rural Residents

Figure 41: Values of the Vision

To clarify the objectives of the vision, three core values have been established. The first is the pursuit of a just landscape identity transition, which reflects the ambition to reshape the energy transition towards a more equitable and inclusive approach to land and energy governance. This approach explicitly considers the rights and perspectives of vulnerable stakeholders affected by the energy transition. Among these are rural communities and the landscape itself, the latter of which is treated as a stakeholder in its own right. Both are considered integral to the envisioned future and must be taken seriously in planning and decision-making processes.

A second fundamental value is the fair distribution of the burdens and benefits associated with the energy transition. Rural communities, in particular, bear a disproportionate share of the burdens and therefore deserve a more substantial share of the benefits. This principle includes the development of a governance

strategy that decentralizes decision-making to the local level, thereby promoting a more balanced spatial distribution of energy projects.

The third value, which is also embedded in the previous two, is the empowerment of rural communities. Historically marginalized by governmental policies, these communities must now be positioned as active participants in energy-related decision-making. Their empowerment is intended to enhance local economic development, strengthen social cohesion, and deliver long-overdue justice to these regions.

Vision Map

On a practical level, several mechanisms have been devised to implement this vision, as illustrated in Figure 42. The Northern Netherlands region is divided into distinct territories, each governed by an AECO (Area Energy Cooperative Organization). A detailed explanation of this territorial division is provided in Figure 43. Each AECO has a central headquarters located near the geographical center of its respective territory. These headquarters serve as key meeting points where the council discusses energy plans.

However, the scale of these territories exceeds what is suitable for the localized governance approach that is envisioned. To address this, community centers are distributed throughout the territories. Each community typically includes four to five villages. Cooperative members residing within a community are integrated into the local organizational structure through these centers. It is within these spaces that energy plans are deliberated and proposed. A fundamental component of the vision is that those developing energy plans should be part of the environment where such projects will be realized. This governance structure is designed to fulfill that principle.

An essential condition for achieving the goals of the vision is the expansion of the electricity infrastructure. In several parts of the region, the main energy grid will be extended into currently underserved areas to improve access and capacity.

Another important feature depicted on the vision map is the presence of protected natural areas, particularly in Friesland and Drenthe. These include forests, lakes, and other ecologically significant landscapes. The aim is to protect these areas as vital components of regional landscape identity. However, this protection does not equate to blanket exclusion from energy development. Instead, the creation of spatial planning principles that uphold ecological values while allowing for the integration of carefully designed energy projects is proposed.

Territories ArgiEnergy Cooperatives

- Coastal Energy Belt
- Future of the Gas Field
- The Energy Village
- Natural Energy
- Energy Farm
- Pasture Power
- Social Energy

Legend

- Headquarter AECO and Community Center
- Community Center
- De-centralized Wind Energy Production
- De-centralized Solar Energy Production
- From Gas to Hydrogen production
- Existing Main Grid
- - - Expansion Grid
- Protected nature areas
- Protected water areas
- Urban areas



Figure 42: Vision map new Governance structure

AECO territories

The central role of the new cooperative structure is to manage both landscape identity and energy planning. For this purpose, it is essential to define the territories in a way that reflects distinct local characteristics. Therefore a territorial division is proposed, based on the three interrelated dimensions of the landscape identity transition: landscape, energy, and people.

In terms of the landscape dimension, land-use types are categorized into pastures, non-irrigated arable land, complex cultivation patterns, urban areas, and natural zones. This classification is then layered with data from the energy dimension, particularly proximity to the existing energy grid and the delineation of gas field areas. The latter is significant due to the socio-economic degradation often associated with these zones, which are central to the vision's goal of improving regional well-being.

The third layer considers socio-economic conditions, with a particular focus on disadvantaged areas. Here, two indicators are used: low income levels and low population density. These factors provide a more nuanced understanding of vulnerability and help to prioritize areas most in need of equitable development.

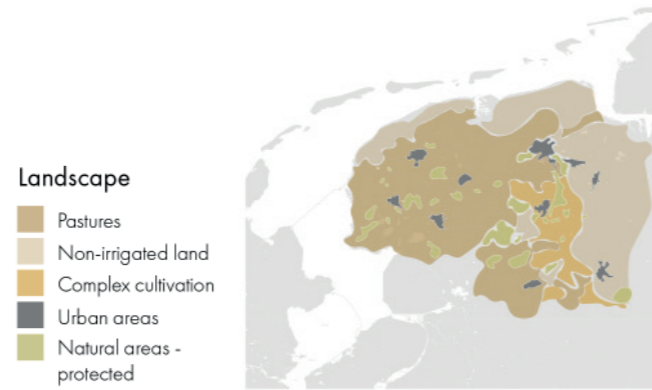


Figure 43: Different landscape types (PDOK, n.d.)



Figure 44: Energy disadvantages areas (PDOK, n.d.)

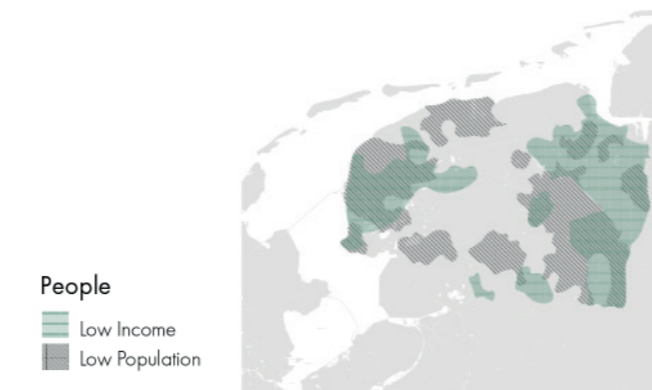


Figure 45: Social disadvantage areas (PDOK, n.d.)(CBS, n.d.)

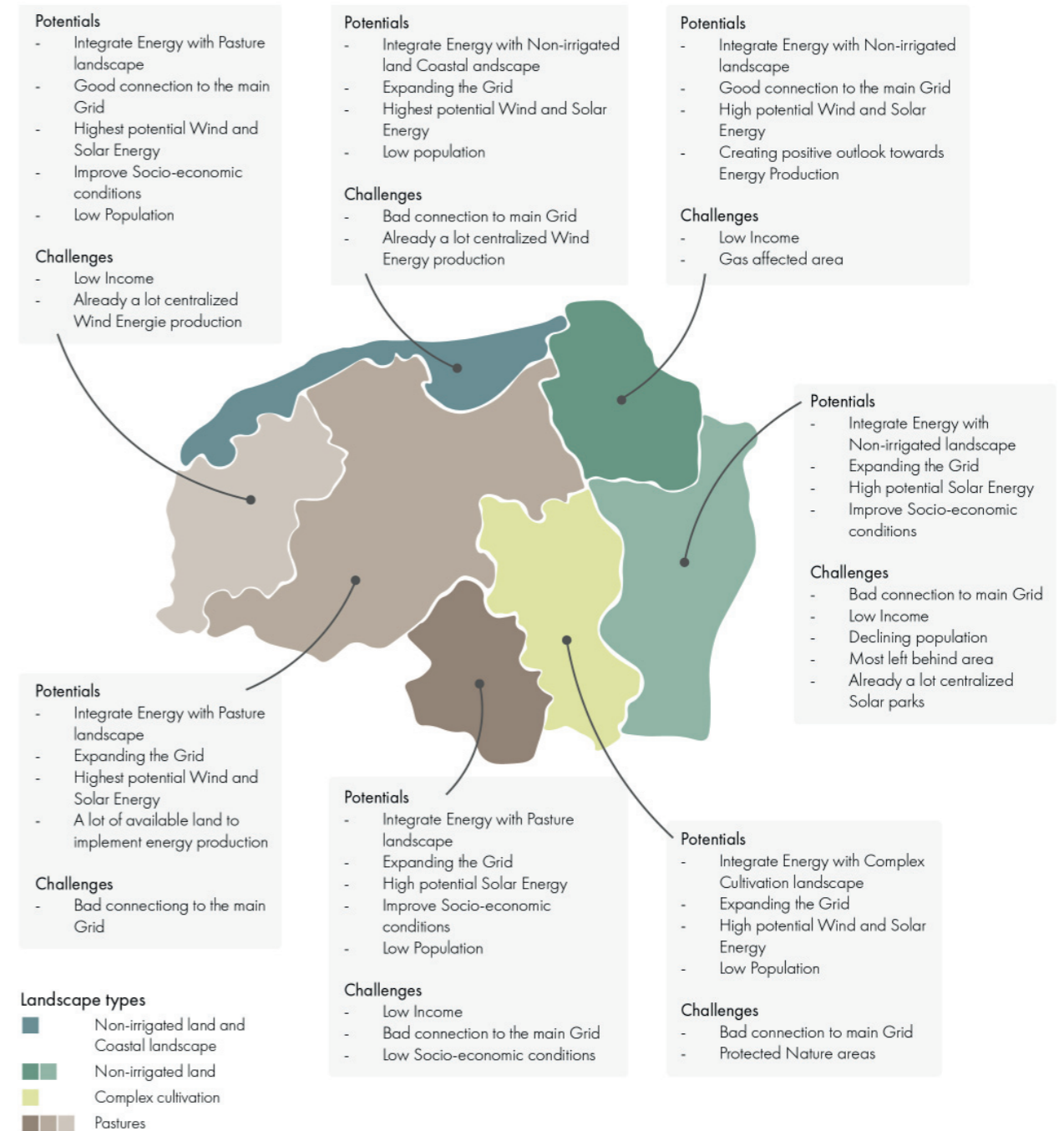


Figure 46: Potentials and Challenges in the different Territories

AECO: New cooperative

A new way of governance

The proposed vision introduces a new cooperative model, the AgriEnergy Cooperative (AECO), as a strategic response to current limitations in landscape and energy governance. Based on an analysis of existing bottom-up structures, two primary organizational types have been identified: energy cooperatives and agricultural collectives. By integrating the strengths of both, AECOs are designed to combine the resources, expertise, and knowledge from these domains, thereby enabling a more comprehensive and effective governance model rooted in both agricultural and energy sectors.

Functioning as a bottom-up structure, AECOs provide a mechanism through which local citizens can actively shape the energy landscape of their surroundings. The current governance framework often marginalizes local voices in decision-making processes. This new cooperative structure is intended to invert that dynamic, granting communities the capacity to initiate, plan, and execute energy projects within their own territories.

Each AECO operates under a democratic governance structure, comprising a council of multidisciplinary experts who act in support of the respective territory's community interests. AECOs maintain a central headquarters and a network of community centers. These centers serve as platforms where residents can formulate energy plans and present them to the AECO council. The cooperative then facilitates the

implementation of these plans by providing access to technical knowledge, organizational capacity, and other necessary resources.

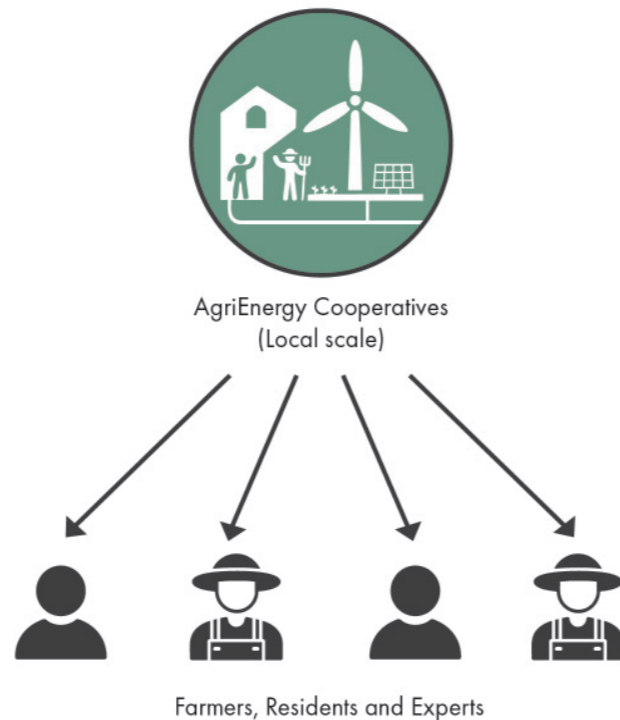


Figure 47: New AgriEnergy Cooperatives, AECO

Sub goal 1: Enhanced participation in decision-making

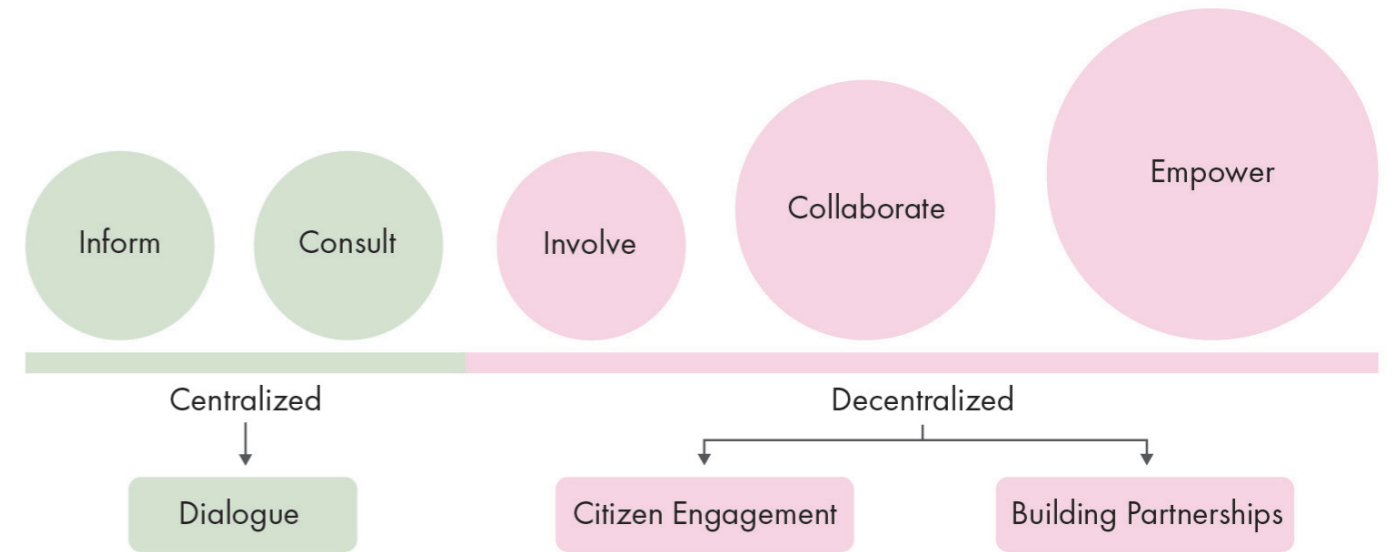


Figure 48: Participation on different modes (IAPP, 2024)

One of the core objectives derived from the vision's values is the empowerment of rural communities, to be realized through a participatory governance model. This is operationalized through the Spectrum of Participation (IAPP, 2024), which outlines various levels of civic engagement. The aim is to transition towards higher modes of participation, collaboration and empowerment, thus fostering more meaningful engagement and stronger partnerships across societal levels.



Figure 49: Participation of rural residents and farmers in new energy production projects

Sub-goal 2: Decentralized energy initiatives

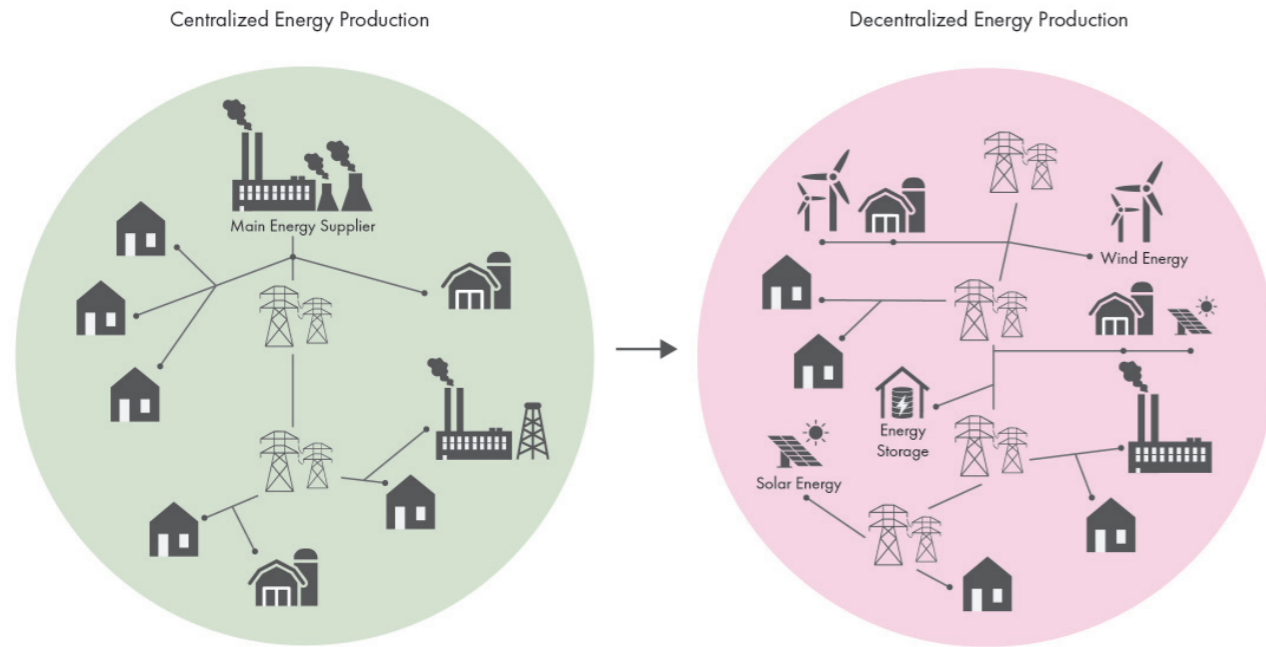


Figure 50: From a centralized to a renewable decentralized energy production

The second objective focuses on the decentralization of energy systems. Presently, energy production is characterized by a centralized model dominated by governments and large energy companies. This structure often results in a spatial mismatch, where energy is produced in one location but consumed elsewhere, contributing to social and spatial inequities.

The proposed decentralized model aims to realign production, distribution, and consumption within the same geographic context. This approach contributes to spatial justice by ensuring that local communities derive tangible benefits from the energy systems

situated in their environment. Such a model is expected to enhance local economic development and increase public acceptance of energy projects.

Sub-goal 3: Integrated and multifunctional land-use

A third essential goal involves promoting integrated and multifunctional land-use as a strategic response to the current fragmentation between energy infrastructure and its surrounding environment. Multifunctional land-use refers to the coexistence of multiple socio-economic and ecological functions within the same spatial area. Cultural landscapes inherently exhibit multifunctionality by simultaneously supporting ecological habitats, agricultural productivity, regulatory functions, and social values.

Existing energy infrastructures, such as large-scale solar and wind installations, often disrupt the visual and ecological continuity of the landscape. This sub-goal advocates for the integration of energy infrastructure in a way that respects and reinforces the landscape's identity. A proposed implementation strategy includes the development of a design catalogue, which offers guidance on combining landscape typologies with various forms of energy infrastructure, while incorporating factors such as biodiversity and ecosystem services. The outcome is a synchronized and cohesive landscape, where energy generation is embedded in a manner that strengthens rather than detracts from regional identity.

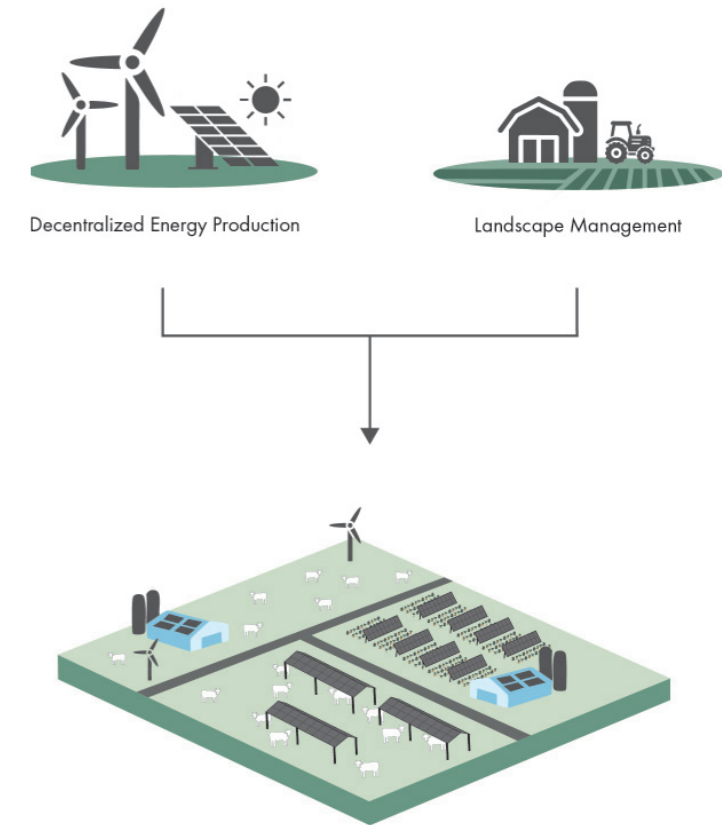


Figure 51: Integrated and multifunctional land-use

Harmonizing landscape, energy & people

The overarching vision is structured around three principal values: just Landscape Identity Transition – ensuring that the voices, rights, and interests of rural communities, as well as the intrinsic value of the landscape itself, are recognized and embedded in governance processes.

Fair Distribution of Burdens and Benefits – aiming for a more equitable spatial and social distribution of the costs and gains associated with the energy transition.

Empowerment of Rural Communities – facilitating meaningful participation in energy-related decision-making to support local autonomy and resilience.

These values are operationalized through three sub-goals: participation in decision-making, decentralized energy initiatives, and integrated multifunctional land-use. To implement these goals, the AECO model is proposed as a framework that leverages the synergies between existing agricultural and energy-based organizations. AECOs are spatially organized into distinct territories, each with unique socio-cultural and environmental characteristics that guide localized management of energy and landscape planning. Within each territory, community centers serve as focal points for citizen engagement, allowing for the co-design of energy projects that reflect local needs and conditions. These projects are then supported by the cooperative's expertise and resources.

The systemic transformation from the existing centralized model to this localized and participatory approach is illustrated through schematic diagrams (Figures 52 and 53), which visualize the shifts in spatial and governance dynamics enabled by the AECO structure.

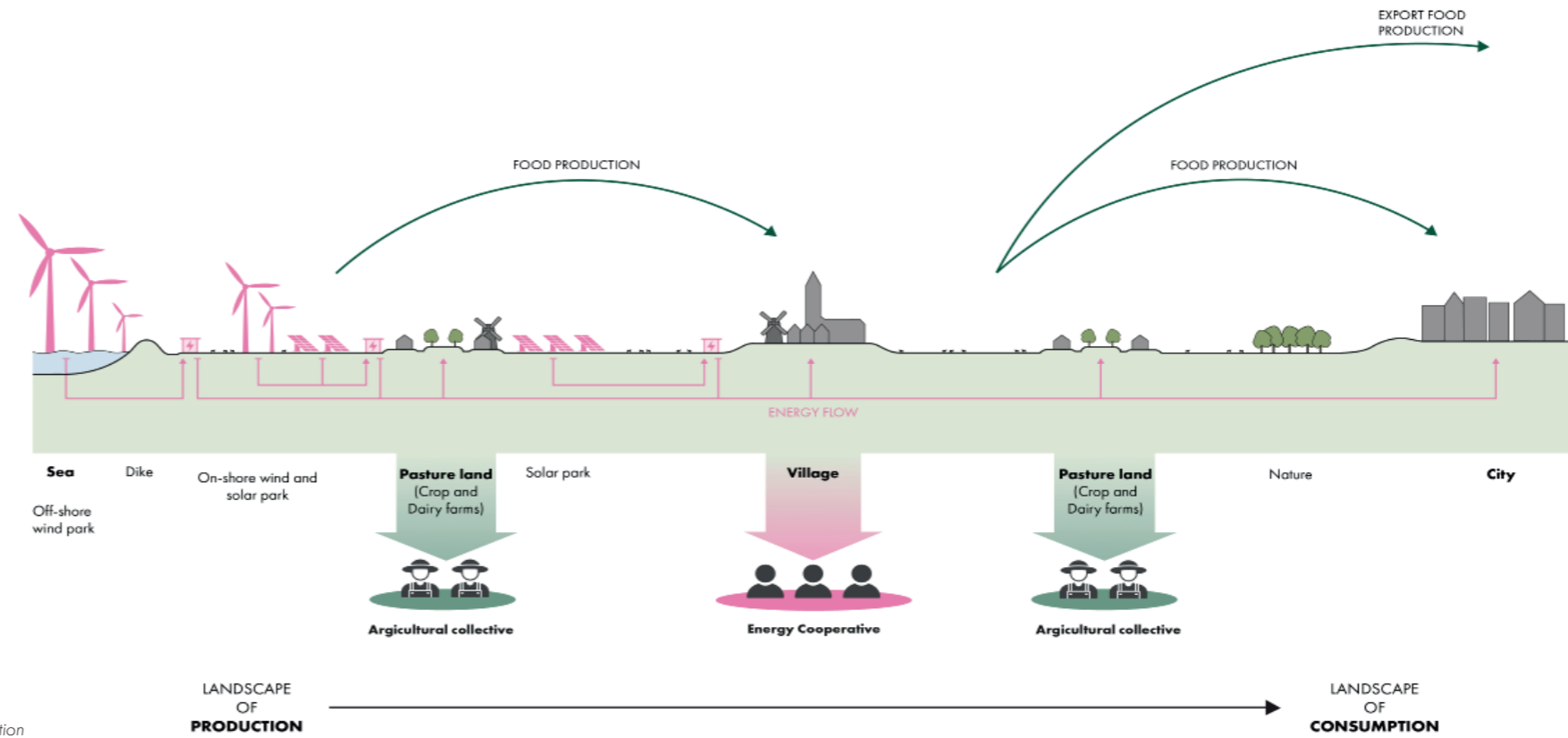


Figure 52: Systemic section of existing situation

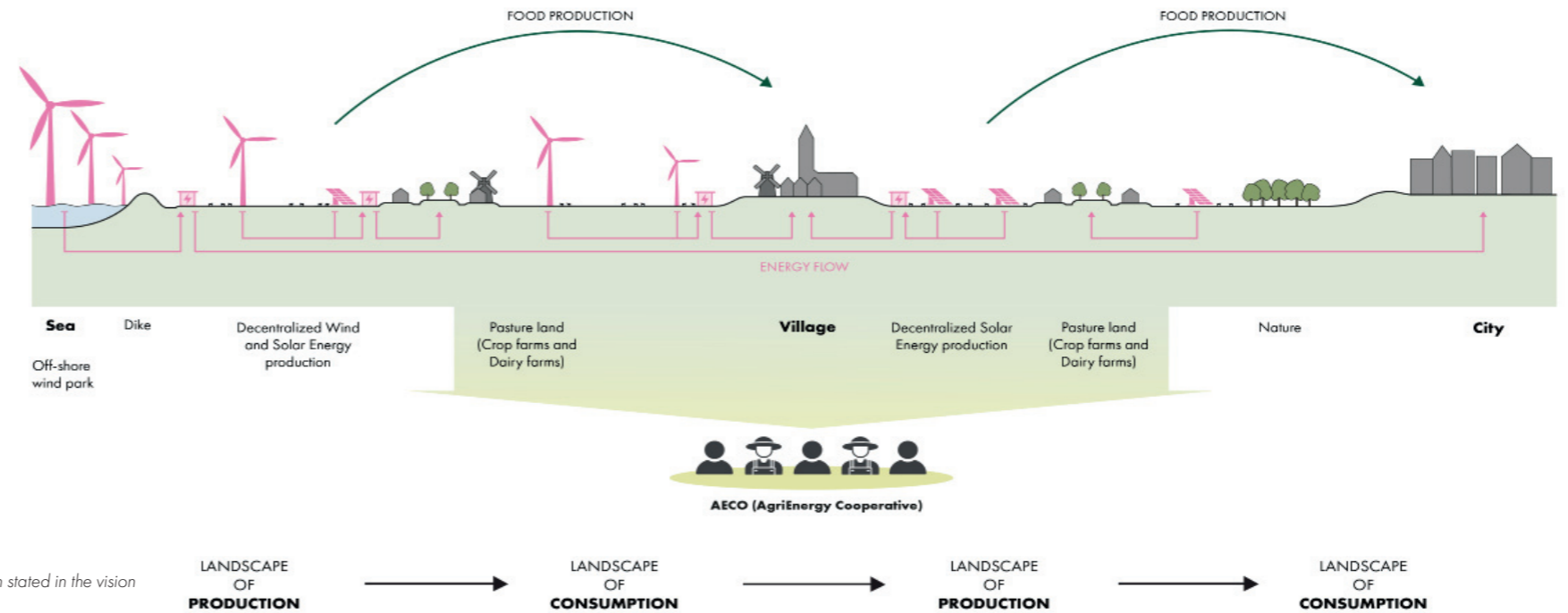


Figure 53: Systemic section of new situation stated in the vision

CHAPTER 4 STRATEGY

Spatial Principles
Catalogue
Positioning Policies
Positioning Stakeholders
AECO: Governance & Structure
Timeframe & Transition
Testing the AECO Process - Pilot

Governance and spatial interventions

In order to realise the plans and ambitions from the vision, a strategy has been constructed. We will cover a number of topics, centered around the spatial implementation and the governing system of the proposed new cooperative. An important factor to realising plans is convincing other parties of your ideas and how it may benefit them. An overview of all involved stakeholders has been made, complemented by a positioning of existing policies. The strategy is then presented within a timeframe, visualizing the different steps and phases that are part of the execution of our plans.

Our vision and strategy is grounded on the idea that the local community should have the ability to shape their environment. In other words, to not be dependent on governing bodies that shape their environment without their involvement. It is important to note that the spatial interventions that are presented in this segment do not mirror the forcing nature of the current governing system. The elements in this segment act as suggestions or recommendations to what is possible for this region as a result of our vision.

In fact, a very relevant consequence of approach we propose is the possibility for coexistence of multiple futures. This strategy enables communities to shape their environment. Each territory and community is different, as will the outcomes be. This matter will be further examined in the Conclusion & Discussion chapter.

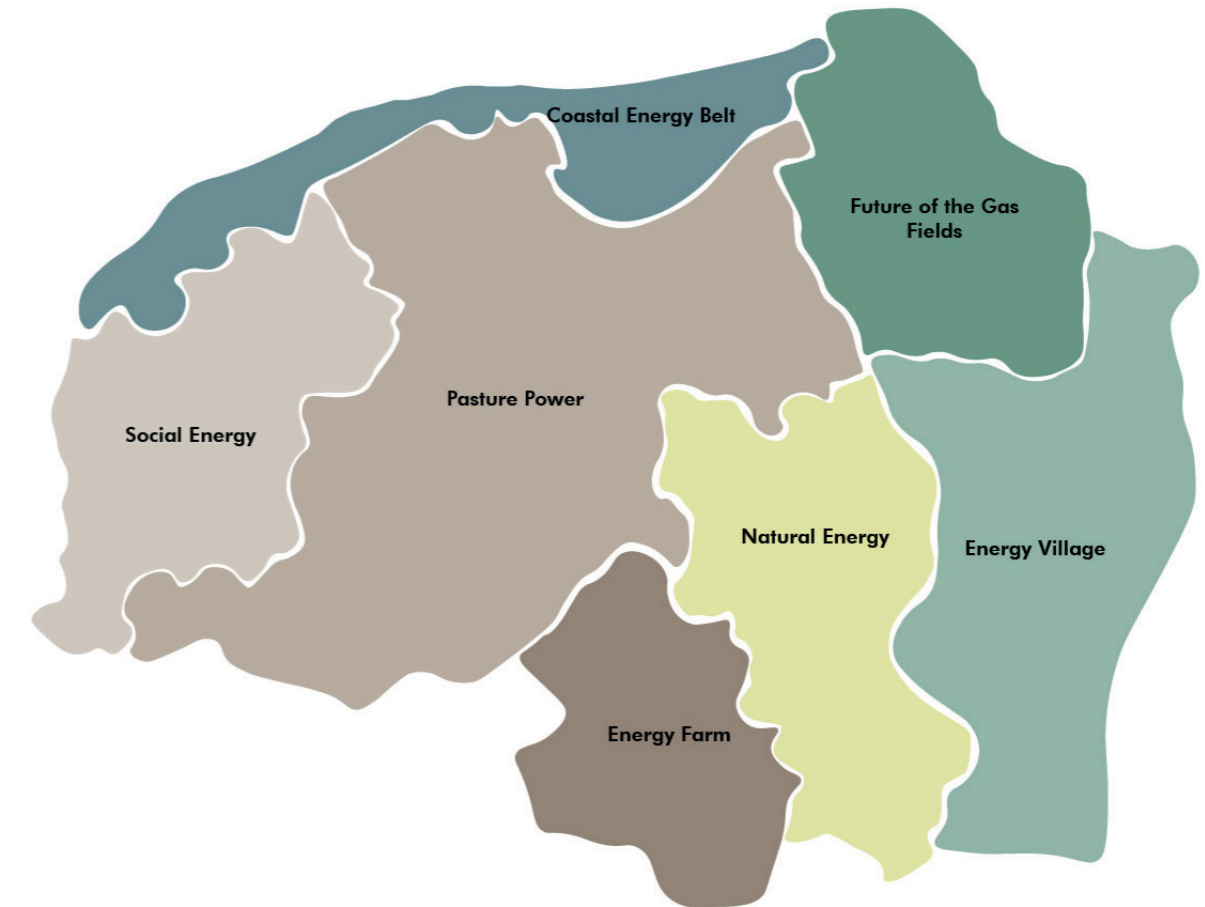


Figure 54: Division of territories

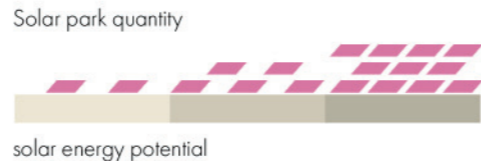
Spatial principles

This segment presents scenario's for each territory. The spatial principles should be interpreted as possible spatial designs, resulting from the proposed new way of governing. The main goal of these principles is to reflect the goals that have been set in the vision, such as fair distribution and just landscape identity transition.

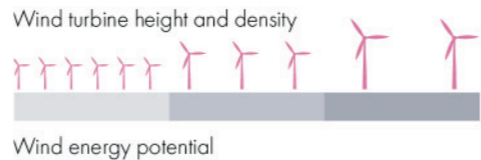
The spatial principles cover several elements that could be used as a design tool while designing the energy landscape. This includes energy strips along villages, typologies for integrated land-use of agriculture and energy, grid extension, energy storage and community centers.

The following pages present the spatial principles for each territory.

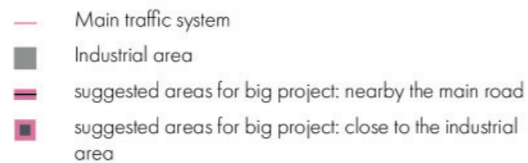
1. Capacity of solar park



2. Capacity of windturbine



3. Relation between project and infrastructure



4. Location for energy storage and grid



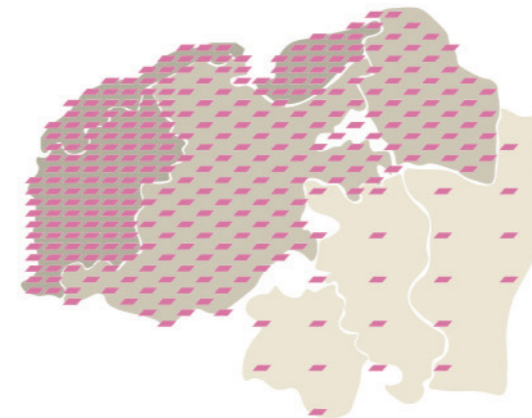
5. Culture identity protection



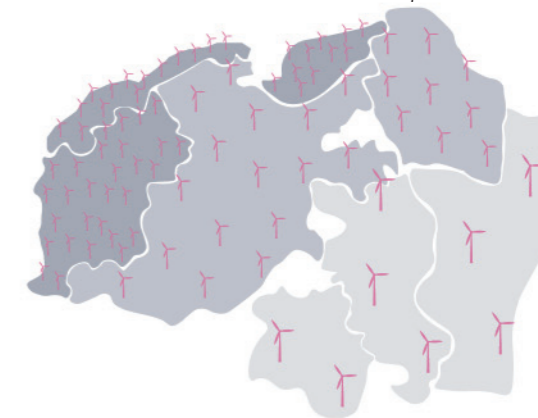
6. Nature protection



1



2



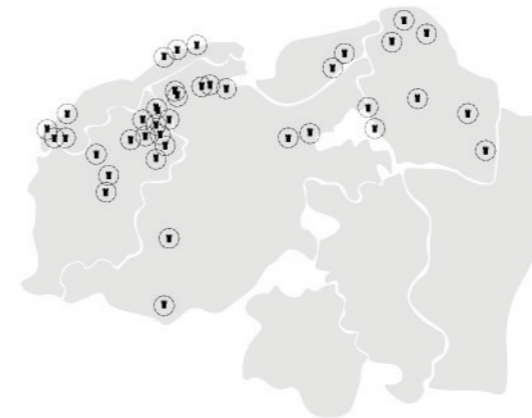
3



4



5



6



Figure 55: General spatial principles for northern Netherlands

Catalogue

AECO's, as we envision, are local landscape managing organisations. Residents from the surrounding area can ask for help with their energy projects. The AECO provides this through resources and knowledge. Basically, it is a form of spatial planning. To streamline the execution of energy projects and the organisation of AECO as a whole, we have designed a tool for the implementation of energy projects into the landscape. This is the catalogue. The catalogue combines different categories of energy infrastructure with different land-use typologies. As a result, an integrated land-use typology is created.

To extend this strategy, we have created an overview of spatial interventions for every territory.

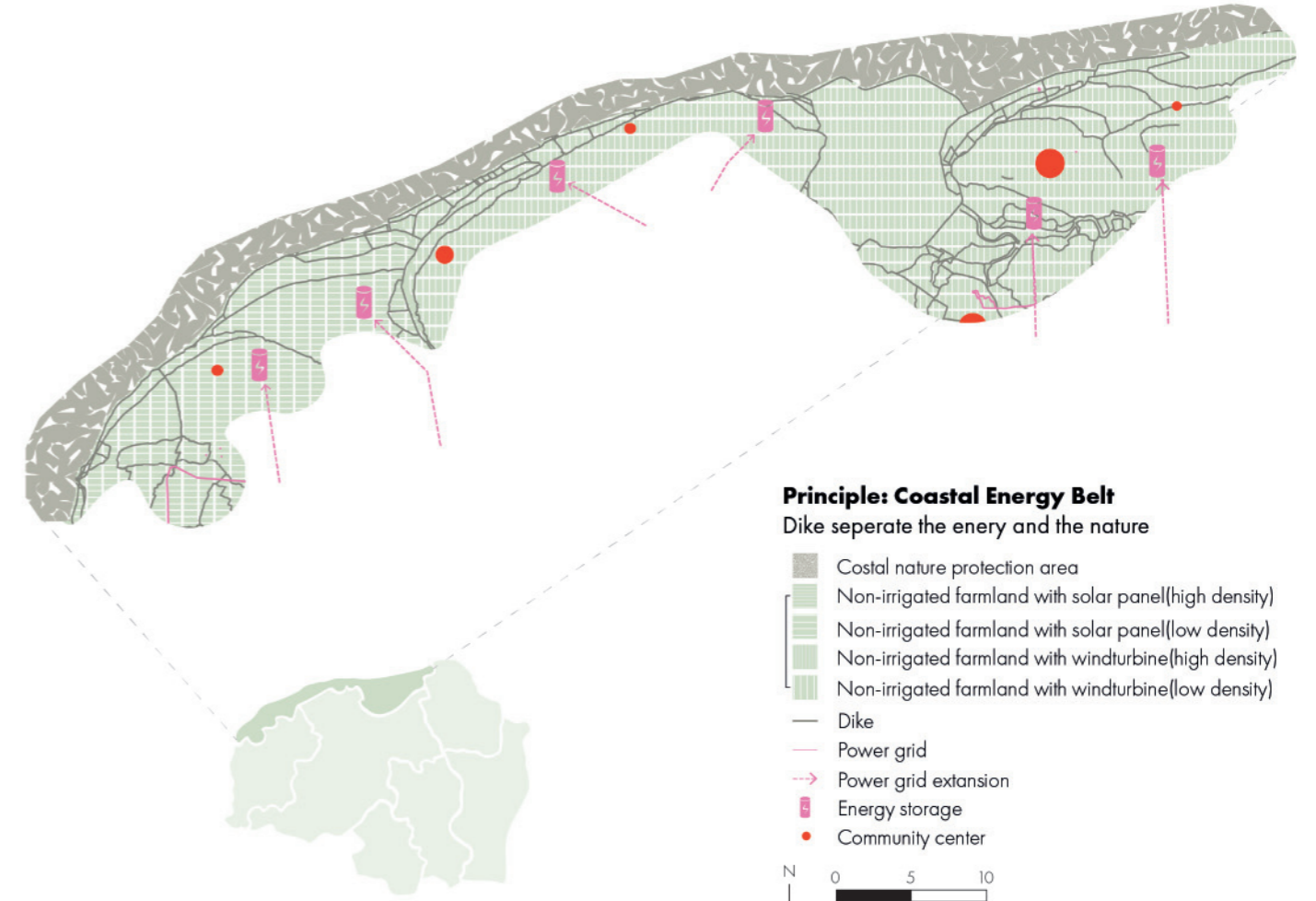
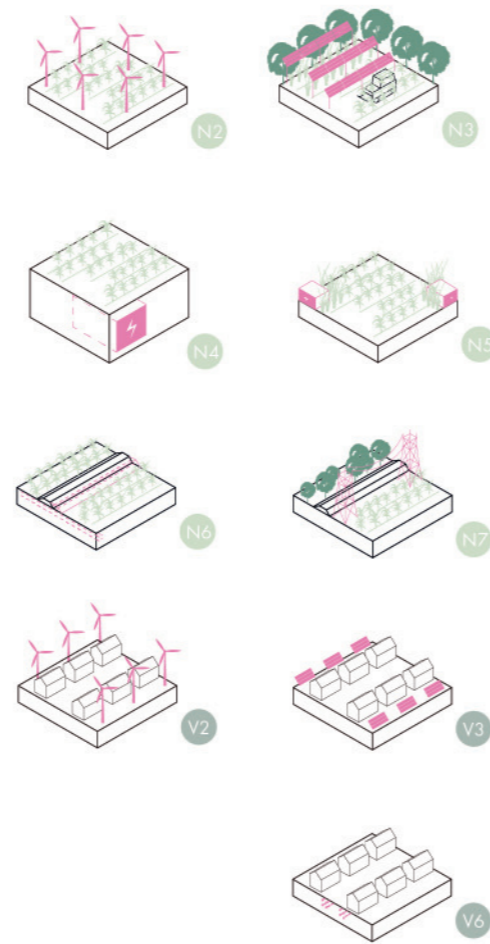
Figure 56: Catalogue for agri-energy spatial interventions

		ENERGY INFRASTRUCTURE							LEGEND								
		Wind turbine (high)	Wind turbine (low)	Solar Panel	Energy storage (underground)	Energy storage (scattered)	Energy grid (underground)	Energy grid	Chapter 4 Strategy								
LANDSCAPE TYPE	Pasture								P1 big windturbine low density distribution in pasture	P2 small windturbine high density distribution in pasture	P3 solar park in pasture, surrounded by agriforestry	P4 big underground energy storage in pasture	P5 small energy storage covered by plants	P6 underground grid combined with dike in pasture	P7 grid combined with green grid and linear infrastructures		
	Non-irrigated farmland								N1 big windturbine low density distribution in farmland	N2 small windturbine high density distribution in farmland	N3 solar park in farmland, surrounded by agriforestry	N4 big underground energy storage in farmland	N5 small energy storage covered by tall crops	N6 underground grid combined with dike in farmland	N7 grid combined with green grid and linear infrastructures		
	Multi cultivation farmland								M1 big windturbine low density distribution in multi-cultivation area	M2 small windturbine high density distribution in multi-cultivation area	M3 solar park in multi-cultivation area, differentiated by cultivation type	M4 big underground energy storage in multi-cultivation area	M5 small energy storage covered by different plants	M6 underground grid combined with dike in multi-cultivation area	M7 grid combined with green grid and linear infrastructures		
	Nature																
	Costal area																
	Gas affected area(industrial)								G1 big windturbine in gas affected (industrial) area	G2 small windturbines surround the gas affected (industrial) area	G3 solar panel combined with industrial infrastructure	G5 small storage scattered in gas affected (industrial) area					
	Village														V2 small windturbines in village	V3 solar panels on the roof	V4 solar panels surround the village, forming energy park

Coastal Energy Belt

The territory 'coastal energy belt' benefits from a very high potential for wind and solar energy production. It is however not very well connected with the main energy grid. The landscape is mainly composed of non-irrigated agricultural land and dikes defining the coastal edge. The built areas are mostly small villages with low population.

The main strategy for this territory is to strengthen the identity of the dikes while implementing more energy projects in comparison with other territories. There is a strong potential for sharing of newly generated resources with other AECO governed territories.



Principle: Coastal Energy Belt
 Dike separate the enery and the nature

- Coastal nature protection area
- Non-irrigated farmland with solar panel(high density)
- Non-irrigated farmland with solar panel(low density)
- Non-irrigated farmland with windturbine(high density)
- Non-irrigated farmland with windturbine(low density)
- Dike
- Power grid
- Power grid extension
- Energy storage
- Community center

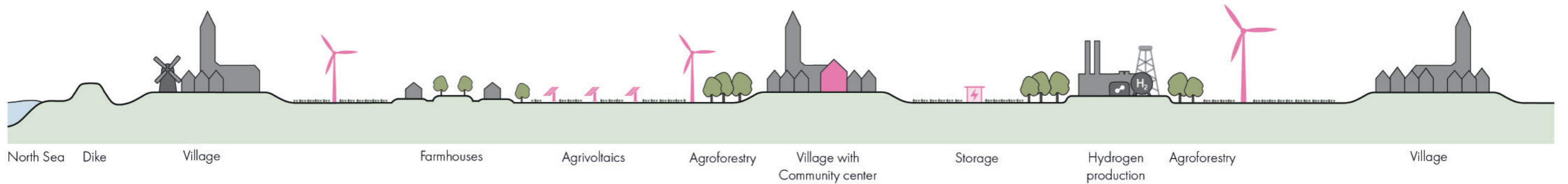
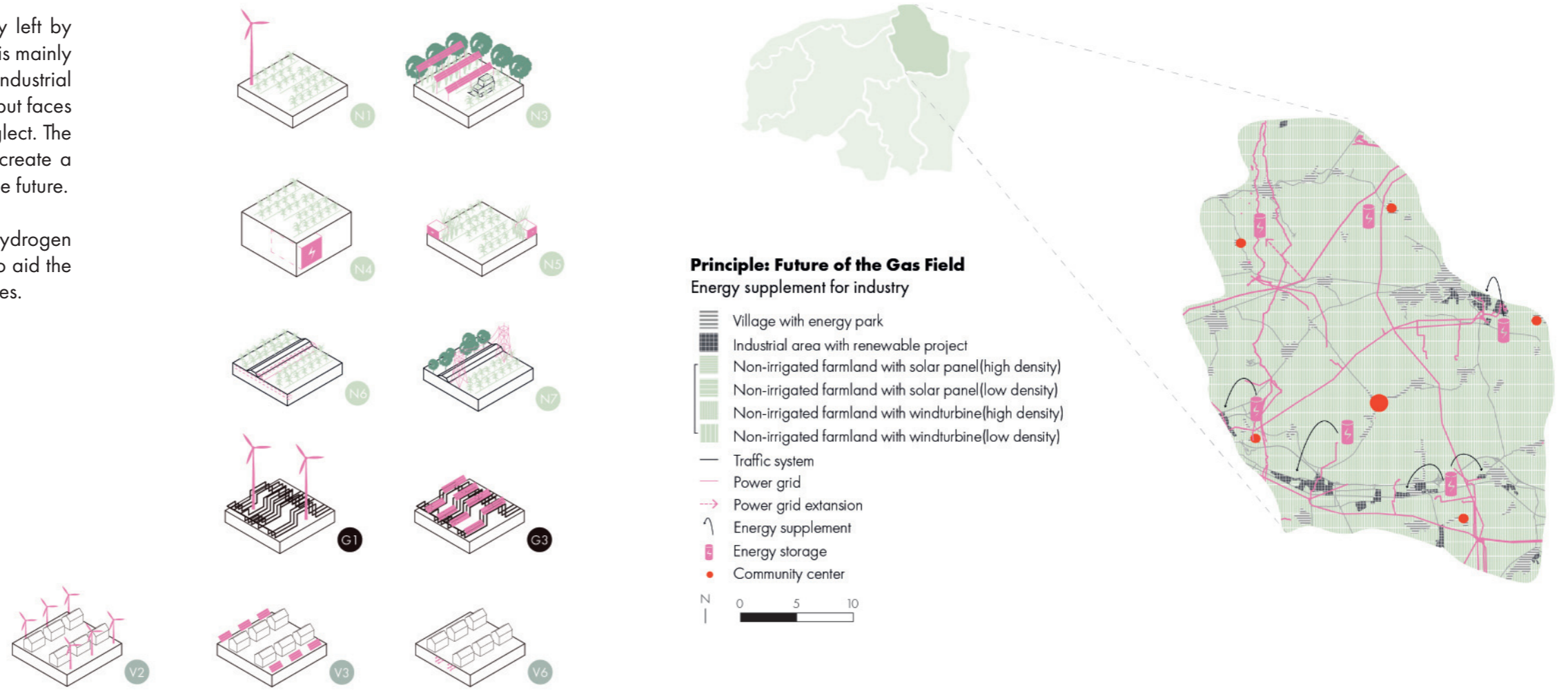
N
 0 5 10



Future of the Gasfield

This territory is a remnant of the bitter legacy left by Groningen gas fields amongst the residents. It is mainly composed of non-irrigated landscapes and industrial areas. It has a good connection to main Grid but faces issues of low income and socio-economic neglect. The main aim for the gas affected territory is to create a positive outlook towards energy transition in the future.

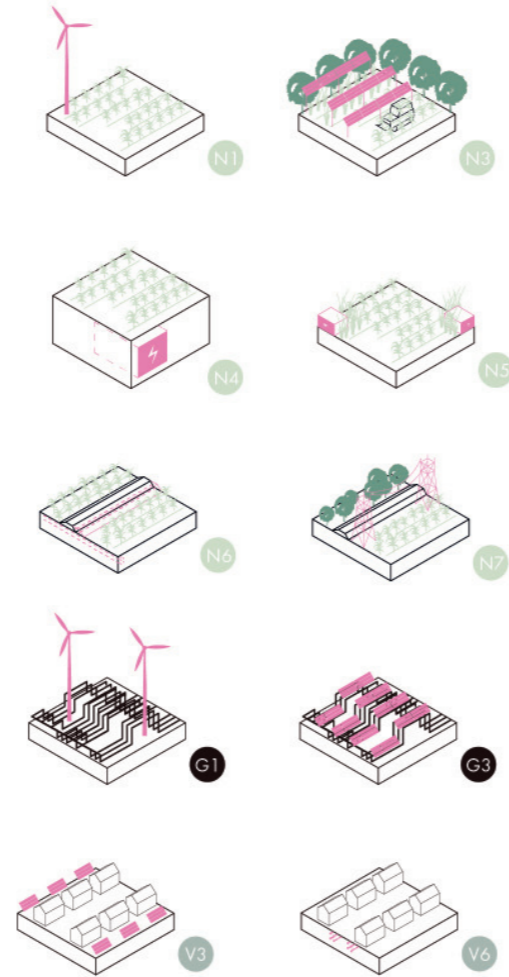
Existing plans to convert the gas industries into hydrogen industries could be utilized to an advantage to aid the functioning of the new AgriEnergy co-operatives.



Energy Village

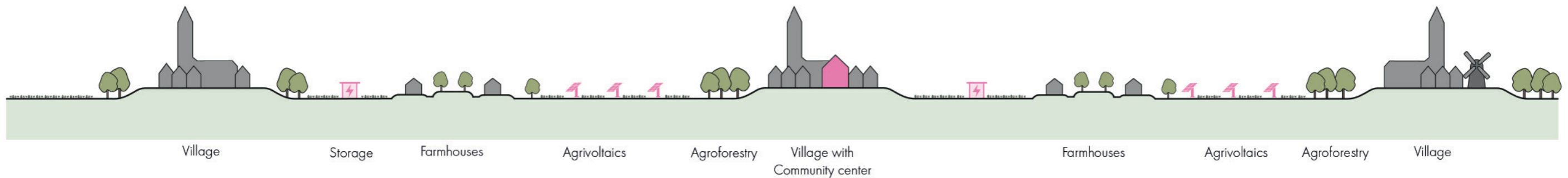
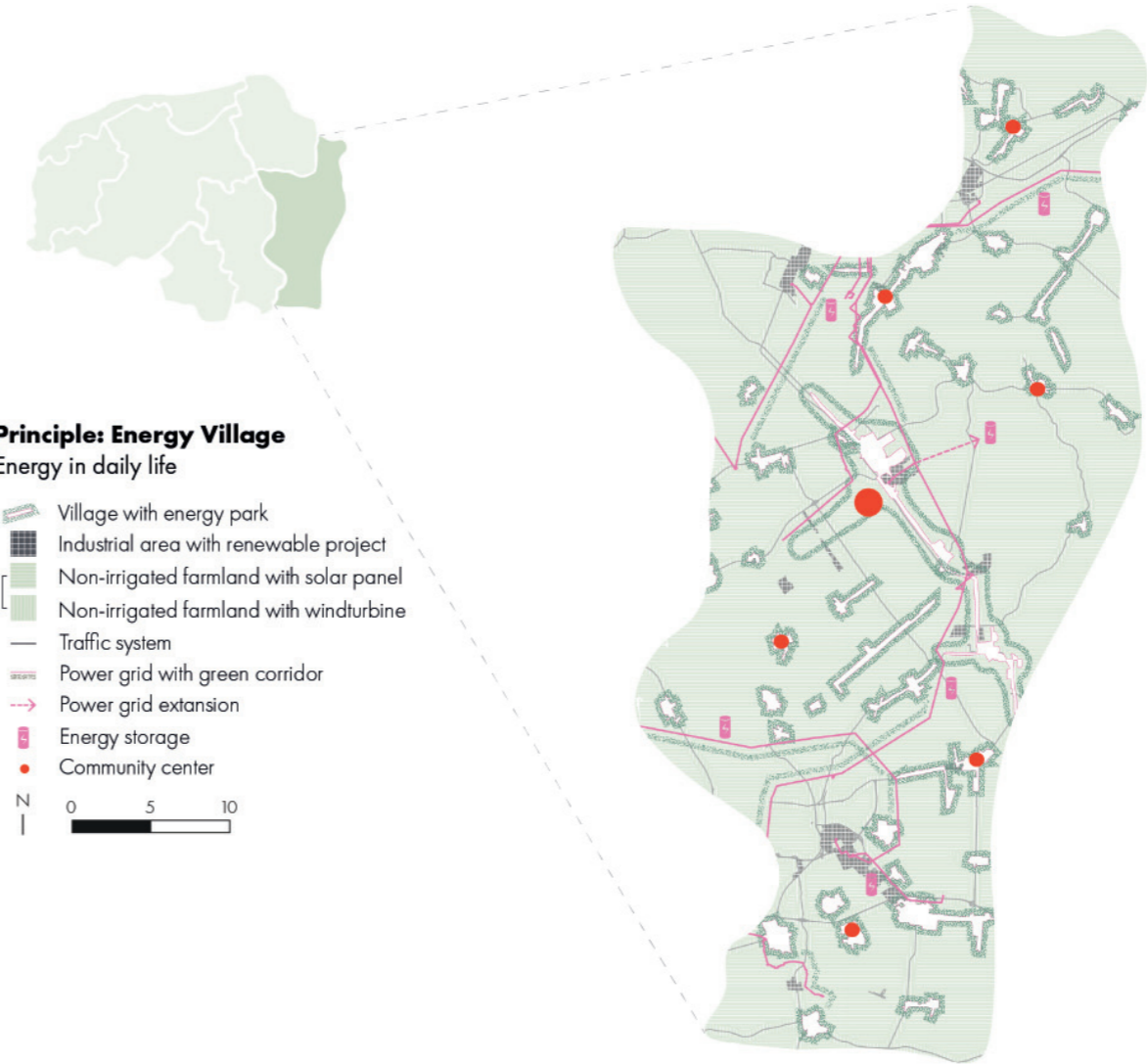
The energy village territory is comprised mainly of non-irrigated agricultural land. This is also one of the most socio-economically deprived areas of the country. The region of east Groningen has been facing depopulation which is further projected to fall by 16 percent by 2040 (Ministrie van EI&I, 2017). In addition, the region has very low income amongst all territories. It lacks a good connection to the energy grid.

Key strategies here is to focus on improving the everyday lives of rural residents through strengthening the energy landscapes. Energy parks surrounding the villages are introduced to create a gentle transition from the village environment into the hybrid farm and energy landscapes. Improving socio-economic conditions through involvement in energy projects can significantly enhance public acceptance, especially when local communities directly benefit from these initiatives. Surrounding energy projects with biodiverse landscapes and increasing diversity in the environment not only supports ecological health but also boosts community support.



Principle: Energy Village Energy in daily life

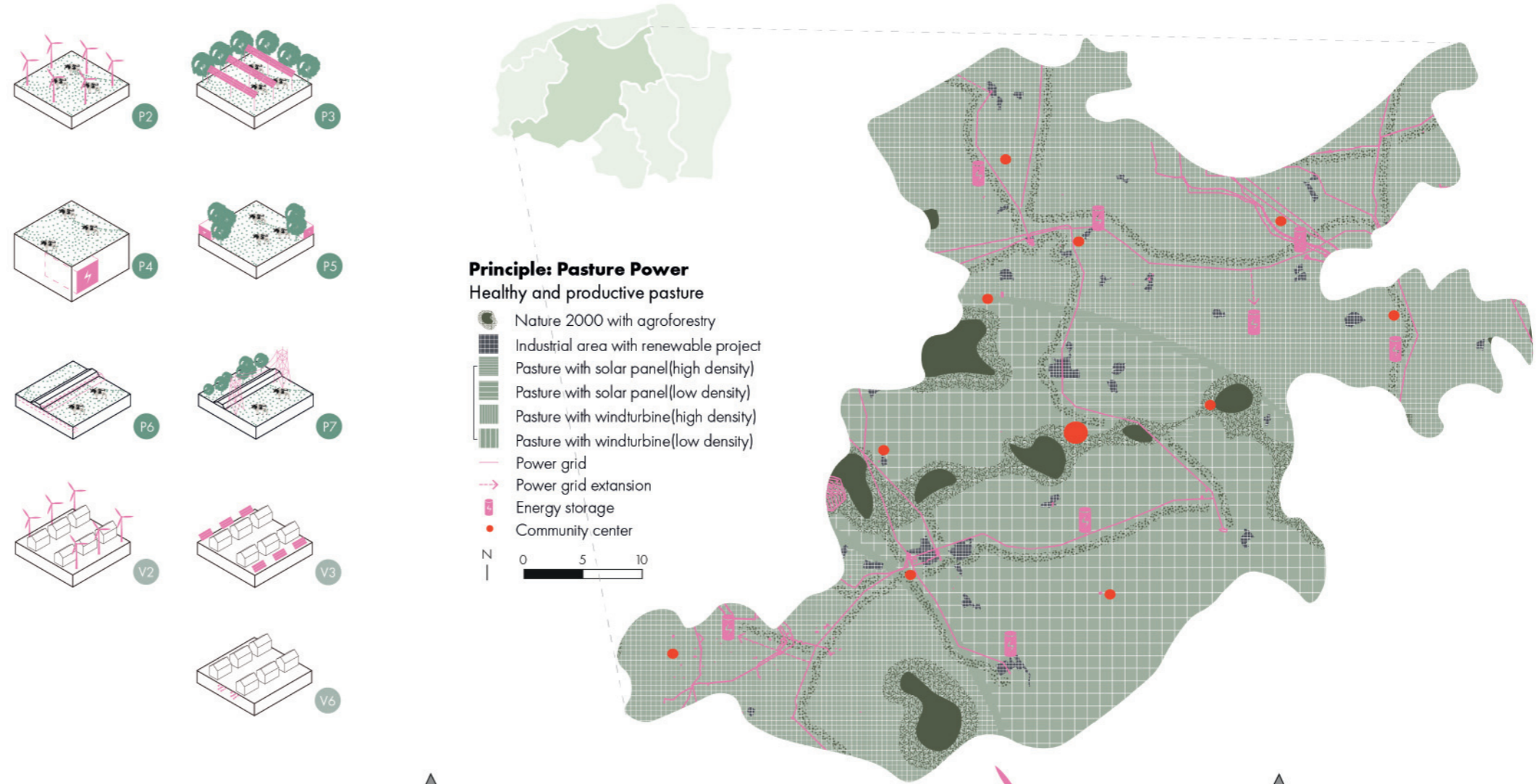
- Village with energy park
 - Industrial area with renewable project
 - Non-irrigated farmland with solar panel
 - Non-irrigated farmland with wind turbine
 - Traffic system
 - Power grid with green corridor
 - Power grid extension
 - Energy storage
 - Community center
- N
0 5 10



Pasture Power

The 'Pasture power' territory is characterized by an open pasture landscape, offering ample space for multifunctional land use. Despite having one of the highest potentials for wind and solar energy production in the country, the area is poorly connected to the main electricity grid. The pastures also face several challenges due to its monotonous land use. There is a strong potential to revitalize the land in a sustainable manner through new energy projects.

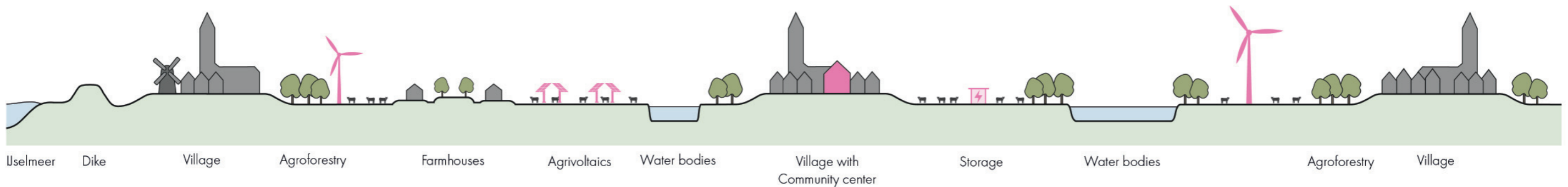
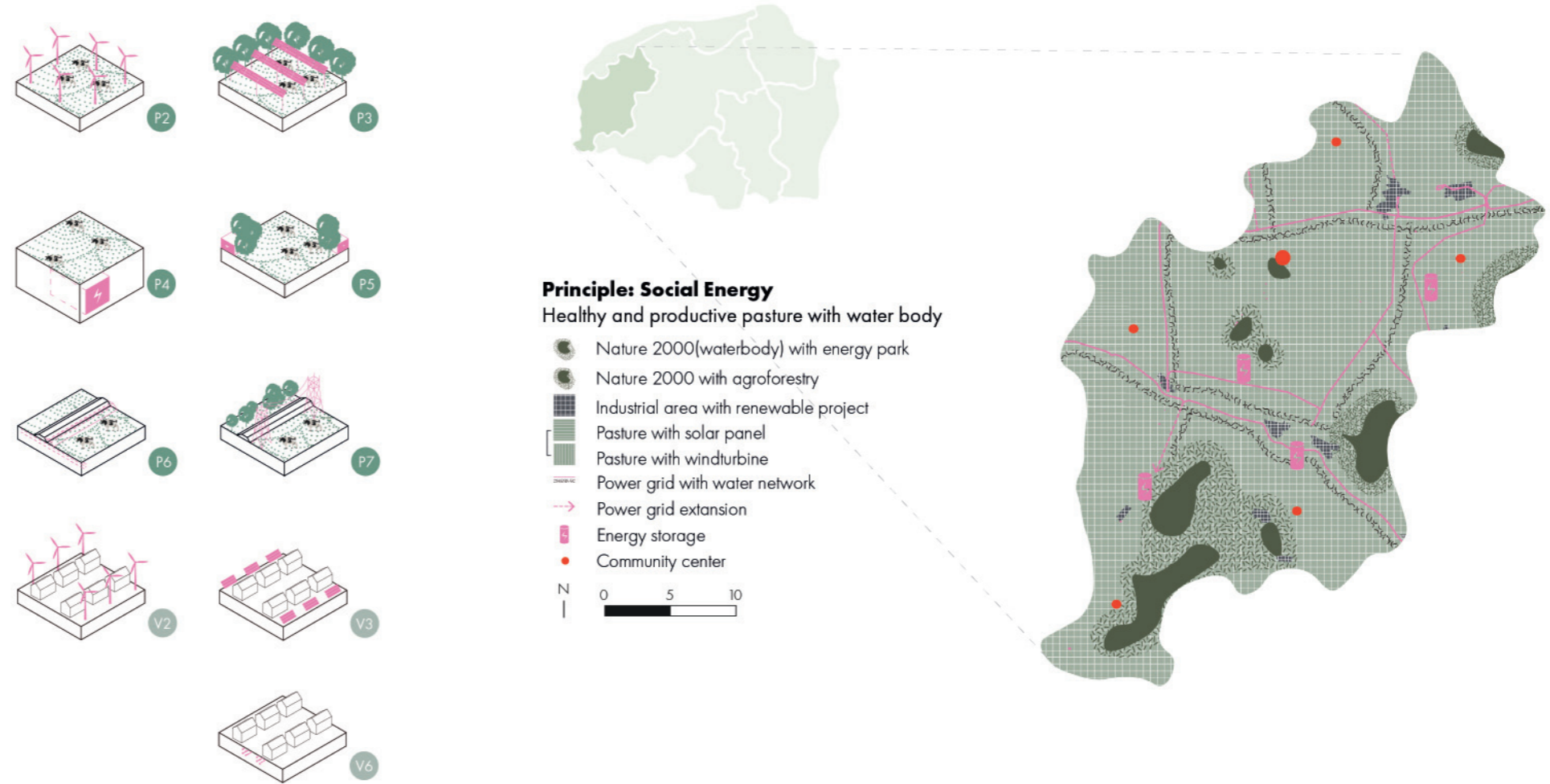
The primary strategy for this territory includes creating healthy and productive pastures that promote a multifunctional land use. A natural belt is identified and strengthened with the introduction of biodiverse areas along the energy grid.



Social Energy

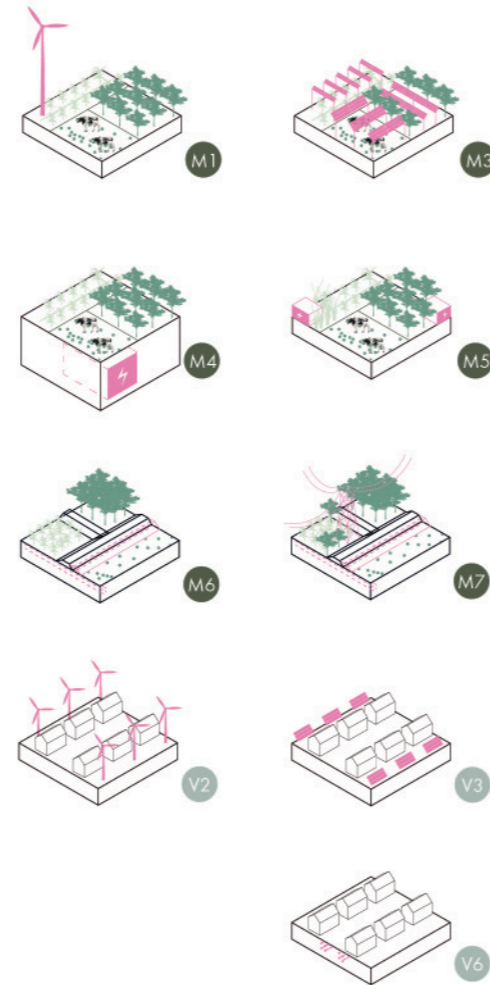
The 'Social energy' territory is characterized by expansive pasture landscapes, along with protected nature areas and water bodies. It has a strong connection to the national electricity grid, making it technically suitable for integrating new energy projects. Additionally, the area has a relatively low population density and low income rates, challenges that can be mitigated through introduction of new energy projects.

There is a high potential for locating renewable energy projects to serve not only as a climate strategy but also as a tool for social cohesion. With the highest potential for both wind and solar energy production in the country, there is a strategic opportunity to simultaneously advance national energy goals and improve local socio-economic conditions. Primary aim for this territory is to create healthy and productive pastures with multifunctional land use while strengthening natural areas and waterbodies.



Natural Energy

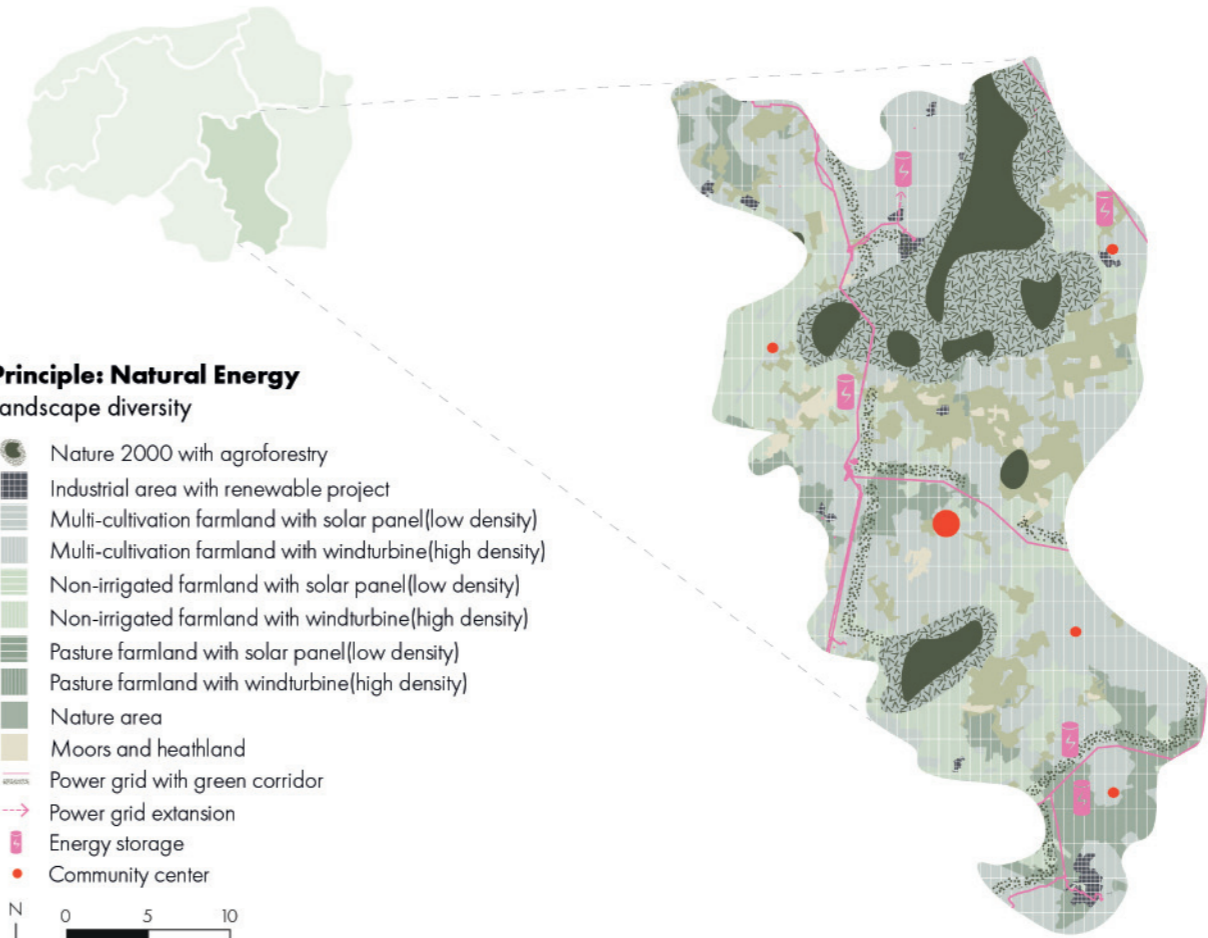
The aim for the 'Natural Energy' territory is to strengthen and preserve its natural zones and diverse landscape types, with particular attention to its complex cultivation landscape, and enhancing its ecological value and regional biodiversity. This territory consists of a mosaic of agricultural and natural zones, contributing to a unique landscape identity. However, its potential for new energy projects is limited by a weak connection to the national electricity grid, posing infrastructural challenges. Despite the challenges, the emphasis on reinforcing natural systems provides an opportunity to align ecological preservation along with new energy projects.



Principle: Natural Energy

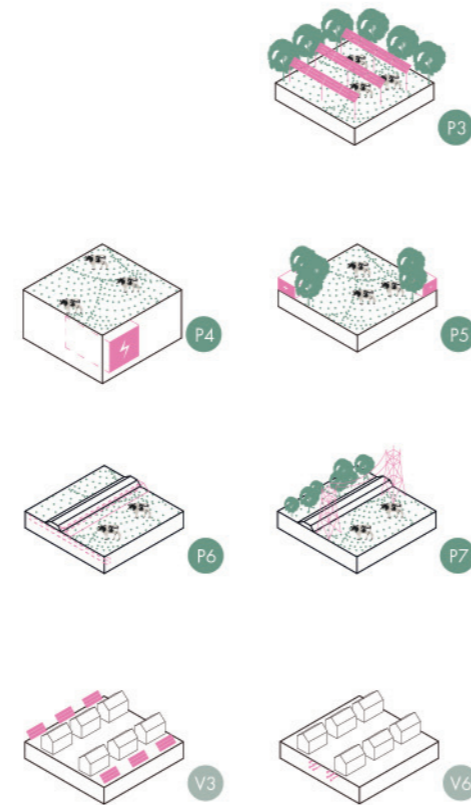
Landscape diversity

- Nature 2000 with agroforestry
 - Industrial area with renewable project
 - Multi-cultivation farmland with solar panel (low density)
 - Multi-cultivation farmland with windturbine (high density)
 - Non-irrigated farmland with solar panel (low density)
 - Non-irrigated farmland with windturbine (high density)
 - Pasture farmland with solar panel (low density)
 - Pasture farmland with windturbine (high density)
 - Nature area
 - Moors and heathland
 - Power grid with green corridor
 - Power grid extension
 - Energy storage
 - Community center
- N 0 5 10



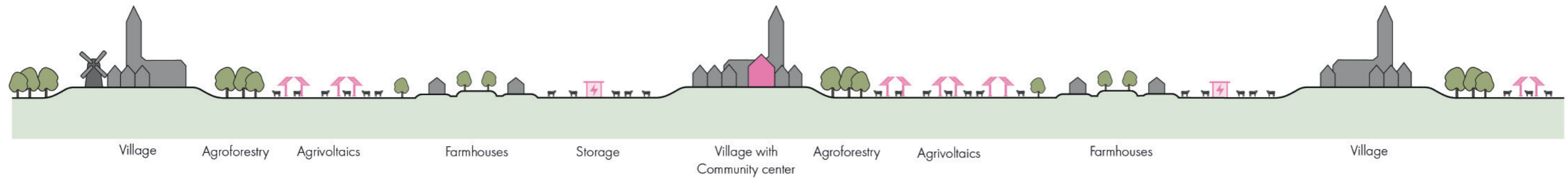
Energy Farm

The 'Energy Farm' territory is predominantly defined by a pasture landscape, offering vast open spaces suitable for spatial interventions. The area however suffers from a poor connection to the national electricity grid, which poses a technical challenge for the execution of large-scale energy infrastructure. The region is also characterized by a low population density and lower-than-average income levels, indicating socio-economic vulnerability. The primary aim for this territory is to use renewable energy as a catalyst for socio-economic improvement—providing employment opportunities, stimulating local economies, while also strengthening the natural areas along the grid.



Principle: Energy Farm
Nature 2000 in farmland

- Nature 2000
- Village with energy park
- Industrial area with renewable project
- Pasture with solar panel
- Pasture with windturbine
- Traffic system
- Power grid
- Power grid extension
- Energy storage
- Community center



Positioning policies

Governing body	Policy	Content	How	Overlap	Conflict	Solution
EU	Green deal	<ul style="list-style-type: none"> - No net emissions of greenhouse gases by 2050 - economic growth decoupled from resource use - no person and no place left behind 	<p>Social Climate Fund: support for structural measures and investments in energy efficiency and renovation of buildings, clean heating and cooling and integration of renewable energy</p> <ul style="list-style-type: none"> - measures and investments should support the most vulnerable groups 	<p>Social Climate Fund is useful for financing our AECO's</p>		
	Nature 2000	<p>Network of protected natural areas</p>	<ul style="list-style-type: none"> - Areas may not shrink in size - Not allowed to realise projects that have significant consequences for the area 	<p>Our strategy aims to preserve or even strengthen the qualities of natural areas</p>		
	Common Agriculture Policy	<ul style="list-style-type: none"> - Support farmers and improve agricultural productivity - help tackle climate change and the sustainable management of natural resources - maintain rural areas and landscapes - keep the rural economy alive by promoting jobs in farming, agri-food industries and associated sectors 	<ul style="list-style-type: none"> - Financing to farmers - Providing high-speed technologies, improved internet services and infrastructure to rural citizens - Funding for: <ul style="list-style-type: none"> - environment and climate change - community led local development approach (LEADER) - 'smart villages': strengthen socio-economic fabric of rural areas (modernisation of farms, investments in small-scale local infrastructure and connectivity projects, village renewal, knowledge development, knowledge sharing, and bottom-up initiatives) 	<p>Both LEADER and smart villages funds are useful for stimulating rural development</p>		
National government	Climate accord	<ul style="list-style-type: none"> - Integral approach to combining climate plans and agricultural wants and needs - Citizens can be active in new projects - Participation is mandatory in decision-making process (Omgevingswet) 	<p>SDE subsidy: financing for energy projects</p> <p>Omgevingswet: participation is mandatory. The kind of participation depends on the kind of project, mostly either 'obligation to state reasons' or 'notification of projectplans'</p>	<p>Energy subsidies can be useful</p>	<p>Norms for mandatory participation are very low. No power to local residents</p>	<p>Improving norms for mandatory participation</p>
	RES Friesland	<p>3 TWh in 2030</p> <ul style="list-style-type: none"> - Production of renewable energy and organising local ownership - Process- and project participation, as well as landscape integration 	<ul style="list-style-type: none"> - Determining potential areas mostly task of municipalities - Grid operator is involved early in the process, so the grid can be extended at the right places 	<p>Involving grid operator early in the process can be useful</p>	<p>In our vision it is the task of the AECO, not the municipality</p>	<p>Decision-making should be less government oriented</p>
	RES Groningen	<p>Ambition production of renewable energy: 5,7 TWh in 2030</p>	<p>Various methods for local ownership energy projects, several municipalities have funding available for this</p> <p>Aim is 50% ownership overall</p> <p>Decision-making: municipalities discuss with citizens</p>	<p>50% local ownership is pretty good, we can aim higher though</p>	<p>In our vision it is the task of the AECO, not the municipality</p>	<p>Decision-making should be less government oriented</p>
	RES Drenthe	<p>Ambition production of renewable energy: 3,5 TWh in 2030</p>	<p>Conditions for new energy projects:</p> <ul style="list-style-type: none"> - multifunctional land-use or local consumption - Combining other climate mitigating solutions - Stimulating biodiversity <p>'Drenthe energy table': collaboration and discussion of provincial government, municipalities, waterboards, nature associations, agricultural collectives, entrepreneurs, energy cooperatives</p>	<p>Some good principles for energy projects</p>	<p>Energy cooperatives and agricultural collectives are at the 'energy table', their influence doesn't seem to be very high though</p>	<p>Decision-making should be less government oriented, improving influence energy cooperatives and agricultural collectives (in other words: AECO)</p>

Figure 57: Overlapping and conflicting elements of existing policies (European Commission, 2021), (European Environment Agency, n.d.), (Paneva, V., 2021), (Ministerie van Economische Zaken en Klimaat, 2021), (Ministerie van Infrastructuur en Waterstaat, 2025), (Westra & Stuurgroep RES Groningen, 2021), (Poepjes et al., 2021), (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021)

Synthesis of existing policies

Policies are an integral part of governing. In the vision a different approach to the governance of the energy transition is proposed. Therefore, an overview of relevant policies relating to the current system of the energy transition is presented. Existing policies often complement the approach, meanwhile some are conflicting.

Various policies from the European Union complement our the approach. For example the Common Agriculture Policy. This policy is focused on the support of farmers and improvement of agricultural productivity, as well as maintaining rural areas and landscapes. These intentions are put into practice through direct financial support for farmers, funding for environment, climate change and community led local development (Paneva, V., 2021).

Another European policy, Nature 2000, is a bit more complicated to position. Nature 2000 is a network of protected natural areas. Areas may not shrink in size and it is also not allowed to realise projects that have 'significant consequences' for the area (European Environment Agency, n.d.). As presented in the catalogue, the spatial implementation of energy projects does not necessarily avoid natural areas. The aim is to integrate energy in natural landscape is such a way that is strengthens the landscape as a whole. Therefore, it is important to motivate that the implementation of energy projects does not have significant consequences for the area.

Regarding national policies, most ambitions relate to aims for expanding renewable energy into the energy system, for which subsidies are in place (Ministerie van Economische Zaken en Klimaat, 2021). These subsidies can improve the financial resources of the AECO's, leading to more possibilities for local energy projects. Another national policy is the 'Omgevingswet', which states that participation is mandatory in the decision-making process of building projects (Ministerie van Infrastructuur en Waterstaat, 2025). The kind of participation depends on the kind of projects, but in most cases the mode of participation is very low on the Spectrum of participation. Often the participation process only consists of 'obligation to state reasons' or 'notification of project plans'. Reflecting the Omgevingswet to the vision, it is evident that the ambitions on participation do not mirror each other. Therefore, improvement of the norms for mandatory participation is needed, especially project regarding the change of landscape identity.

A very important policy category regarding the energy transition on regional level are the Regional Energy Strategies. In case of the region of the Northern Netherlands, three RES are at play, one for each province. For the most part, these policies are focused on ambitions for renewable energy production. Despite very minimal depth on the matter, the RES do present the ambition to make participation a more integral part of the decision-making process. Nevertheless, the current

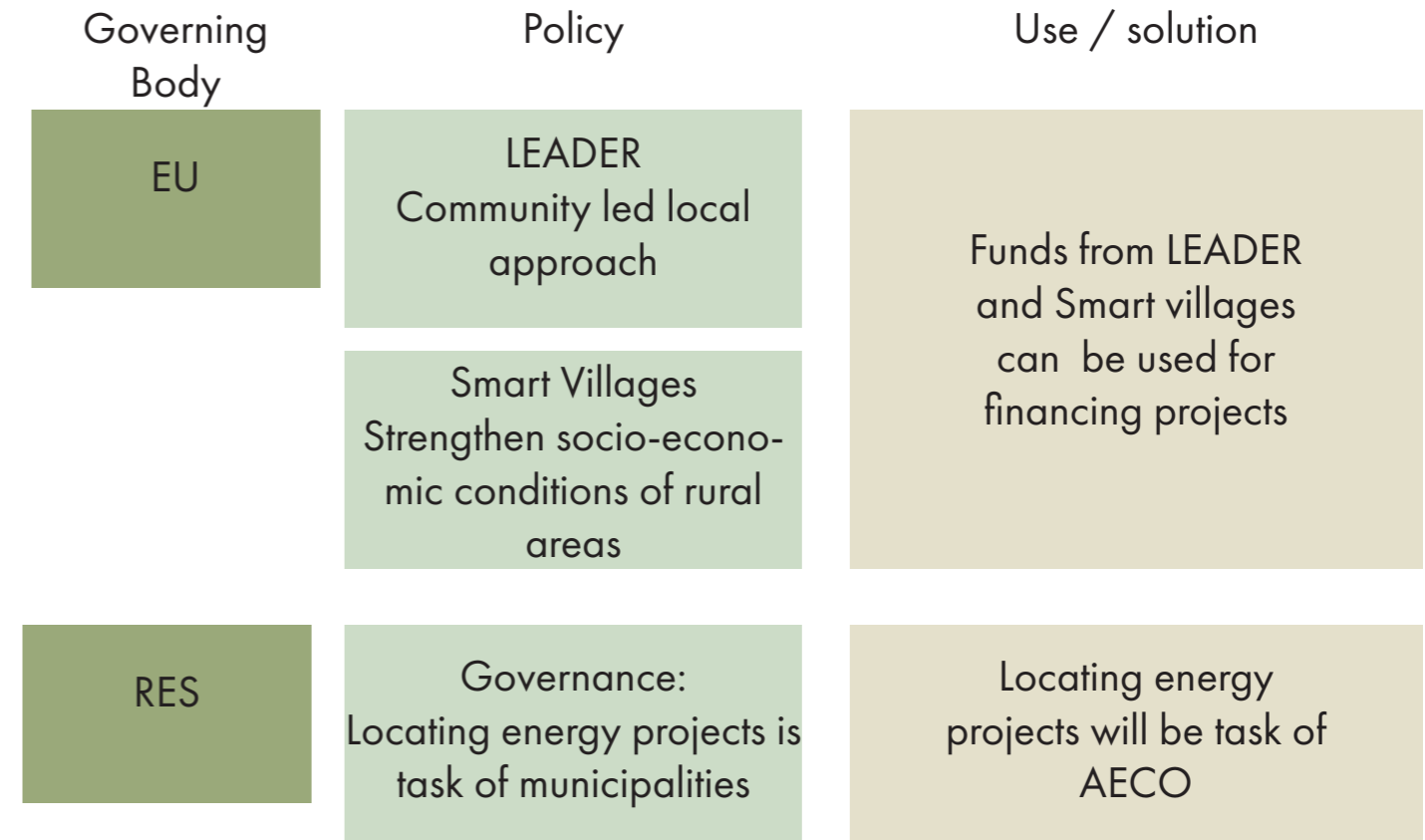


Figure 58: Important take-aways from existing policies (European Commission, 2021), (Westra & Stuurgroep RES Groningen, 2021), (Poepjes et al., 2021), (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021)

approach is still that municipalities and the provincial governments have the right to decide on where to locate energy projects (Westra & Stuurgroep RES Groningen, 2021), (Poepjes et al., 2021), (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021).

Concludingly, the aim is to convert the decision-making process of energy projects less government based, the RES propose. Furthermore, multiple funds and subsidies for both renewable energy production and the support of farmers and rural communities can be utilised. Existing energy cooperative often find their limitations in the

financing of their projects. Therefore, intensive financial support from governments can be very beneficial for the operation of AECO's.

Positioning stakeholders

Identifying and profiling of stakeholder in the identity transition of the Northern Netherlands

Key stakeholder groups concerned with the identity transition of the new energy landscapes are identified and their interests and attitudes are mapped in the figure. The stakeholder identification is based on analysis in the previous chapters. This is the first step towards building the structure of the new co-operatives.

	Stakeholder	Interests	Problem Perception	Attitude towards the vision	Power	Resources
PRIVATE SECTOR	Energy Companies	Production/ sale of renewable energy	Indifferent towards landscape management. Profit oriented	Negative	Production Power	Financial, Knowledge
	National Grid Operator (TenneT)	Maintenance and expansion of grid	Indifferent. Congestion of grid due to new projects	Fence sitters	Control over energy transfer	Infrastructure, knowledge
PUBLICLY OWNED CORPORATIONS	Regional Grid Operators (Stedin, Liander)	Distribution of electricity to consumers	Indifferent	Fence sitters	Control over energy transfer	Infrastructure, knowledge
	EU	Setting and achieving sustainability goals	Positive towards energy transition and landscape transformation	Positive	Control over international goals and policies	Finance, policies, collaborations
	National Government	Achieving energy goals	Decentralized projects difficult to manage	Neutral	Ability to make policies and plans	Finance, policies, collaborations
GOVERNMENT	Provincial Government	Achieving energy goals	Decentralized projects difficult to manage	Neutral	Control over plans and policies	Finances, policies, knowledge
	Municipal Government	Want to achieve goals and best for citizens	Have vision plans but need more citizen engagement	Positive	Control over local planning policies	Subsidies, policies, collaboration
	Energy Cooperatives	Producing Energy for there own	Positive towards renewable energy shifts. Lack of land and finances	Positive	Knowledge and connections in villages	collaboration and high will power
CIVIL SOCIETY AND INSTITUTIONS	Agriculture Collective (boeren natuur)	Sustainable management of farming landscapes	Engage positively in the landscape transformation	Positive	Collective with land owning people	Expert knowledge
	Institutions (University of Groningen)	Knowledge production and research	New areas for research and experimentation	Positive	Research infrastructure and experts	knowledge, collaboration
	Urban Residents	Better energy prices	Indifferent	Neutral	Voting power	collaboration
CITIZEN GROUPS	Rural Residents	More power in decisions, Independence from energy companies	Transformation of surrounding landscape	Positive	Voting power, collaboration	Knowledge of rural environment, networks
	Farmers	Extra source of income, more future proof	Less farmland, change of landscape	Fence sitters	Ownership of Land	Land, on-ground knowledge

Figure 59: Stakeholder identification and profiling

Shifting power

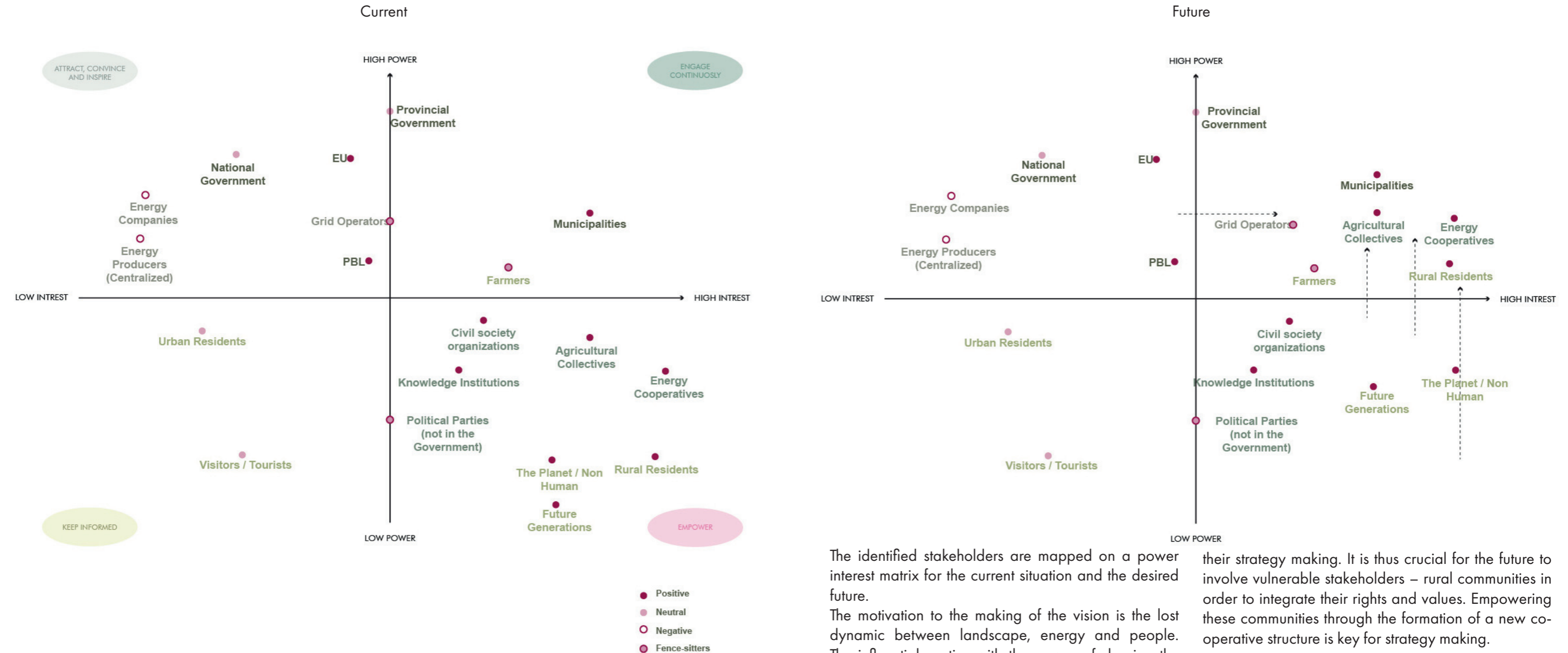


Figure 60: Power and interest matrix – Now and Future (Bryson, 2004)

The identified stakeholders are mapped on a power interest matrix for the current situation and the desired future. The motivation to the making of the vision is the lost dynamic between landscape, energy and people. The influential parties with the power of shaping the landscape do not consider the question of identity in

their strategy making. It is thus crucial for the future to involve vulnerable stakeholders – rural communities in order to integrate their rights and values. Empowering these communities through the formation of a new co-operative structure is key for strategy making.

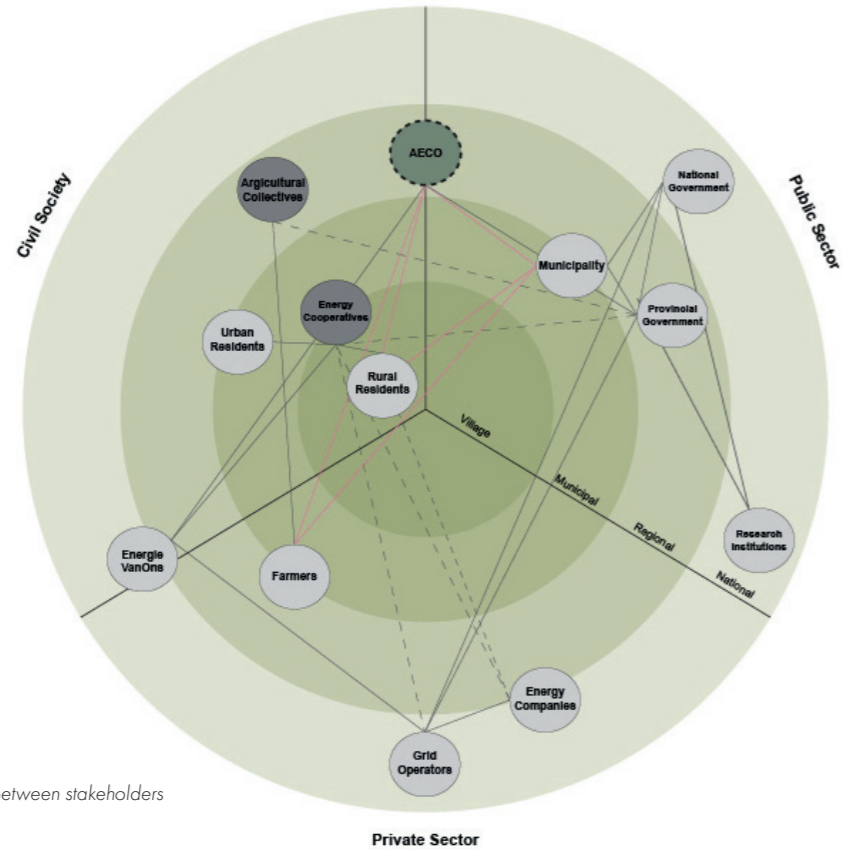


Figure 61: Conflicts and synergies between stakeholders

Step towards the new cooperative approach

Conflicts and synergies between stakeholders at various scales, mapped in the diagram above show the gaps in collaborations between local communities and decision making bodies at the regional scale.

The new AgriEnergy cooperative structure thus needs to include a chain of exchanges at multiple scales starting from the local cluster of villages to a national scale. Collaboration between interested residents and farmers forms the backbone of the new cooperative.

Direct collaboration with local governments would ensure trust building among citizens whereas collaborations on larger scales focus on exchange of knowledge and funds. It is also imperative for the goals and policies to be set at the local level and then scaled up.

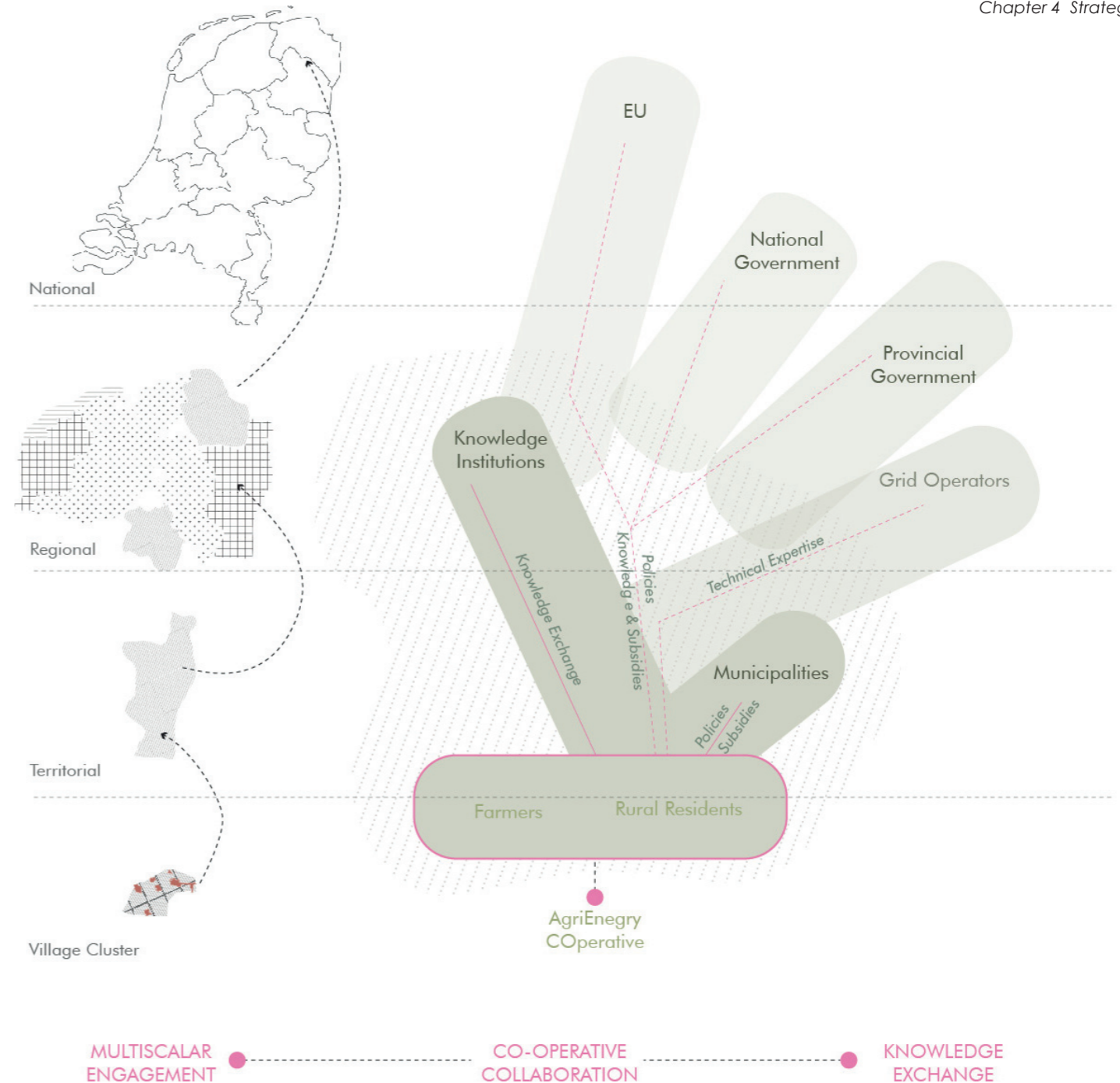


Figure 62: Stakeholder synthesis as a basis for new governance structure

AECO: Governance & Structure

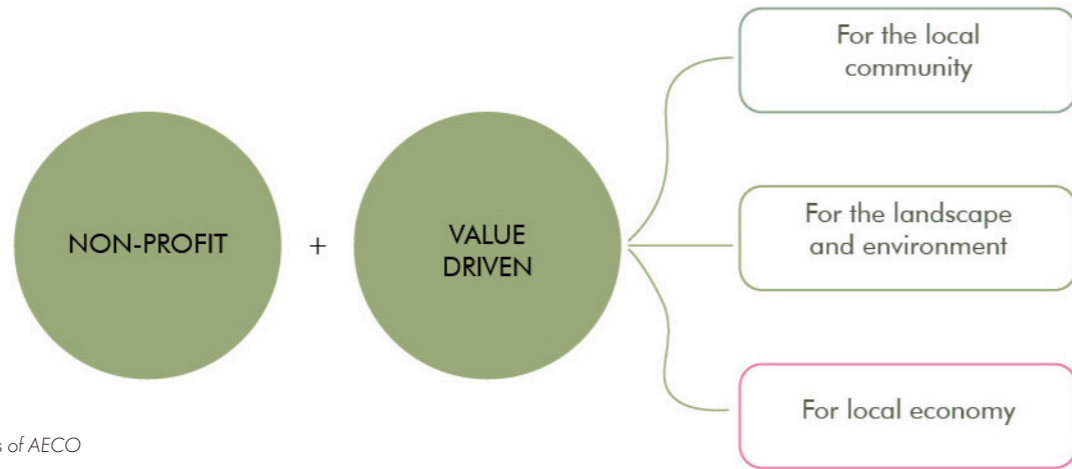


Figure 63: Values of AECO

Preamble

The cooperative declares that it has as its common goal to enable residents, farmers and organizations in the area of the territories to participate individually and/or collectively in the sustainable energy landscape transition of the territories. 'A new landscape identity is created together'.

The principles here are socially responsible and transparent entrepreneurship; creating added value for the participants and ensuring the continuity of the cooperative; promoting cooperation between residents, farmers, municipalities and organisations and stimulating local prosperity and well-being.

(Adopted from Pekela Duurzam, 2013)

Management of new energy landscapes, setting policies and finances and ensuring participation are the main goals for the AgriEnergy cooperative. Spatially AECO is responsible for common governance of land for new energy projects and setting up of community centres in every village cluster.

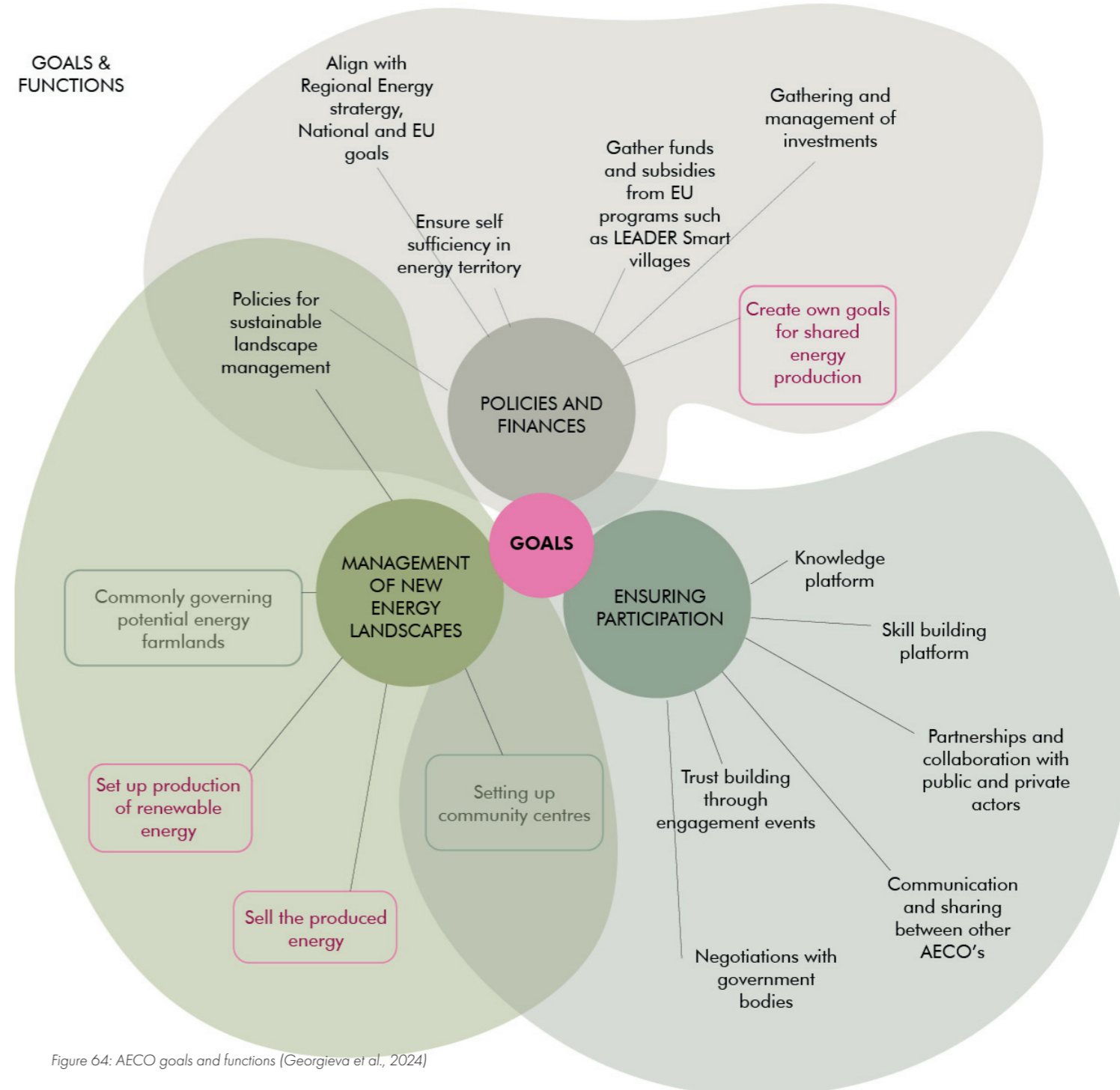


Figure 64: AECO goals and functions (Georgieva et al., 2024)

Governance structure

AECO has two scales of contact for its members – first at the community center for each cluster of villages and second, a main center per territory that connects all the community centres together and also aids in exchange with other territories. The community centres are directly connected to members and manage land, energy flows, local events and communication with municipalities at the local scale. The main centres are imagined as knowledge hubs that are connected to research institutions, regional, national and international governments and also to private sources for additional funding. These centres are also responsible for knowledge creation about energy landscape management to share it with all the communities in the territory. Members of the board are elected representatives.

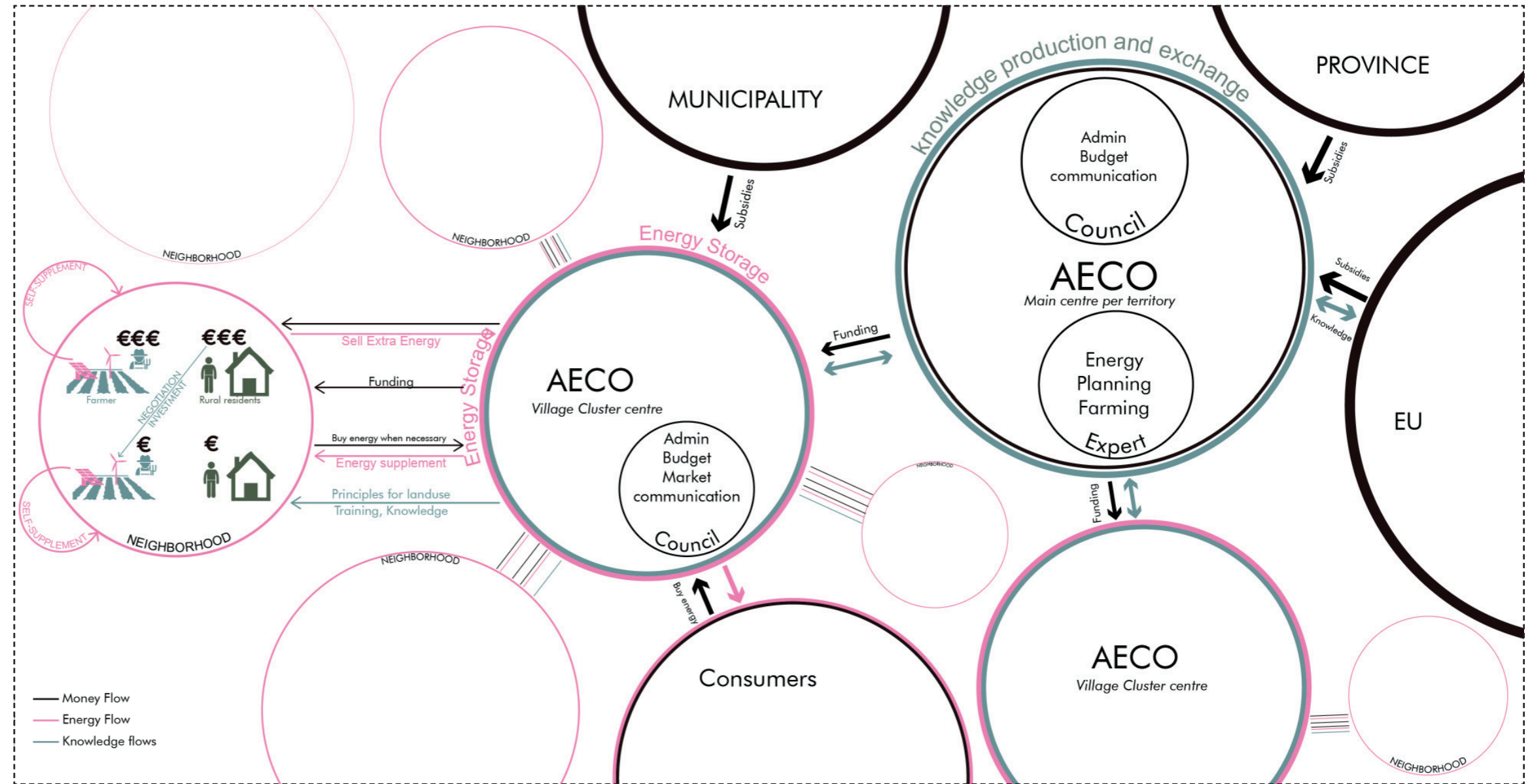
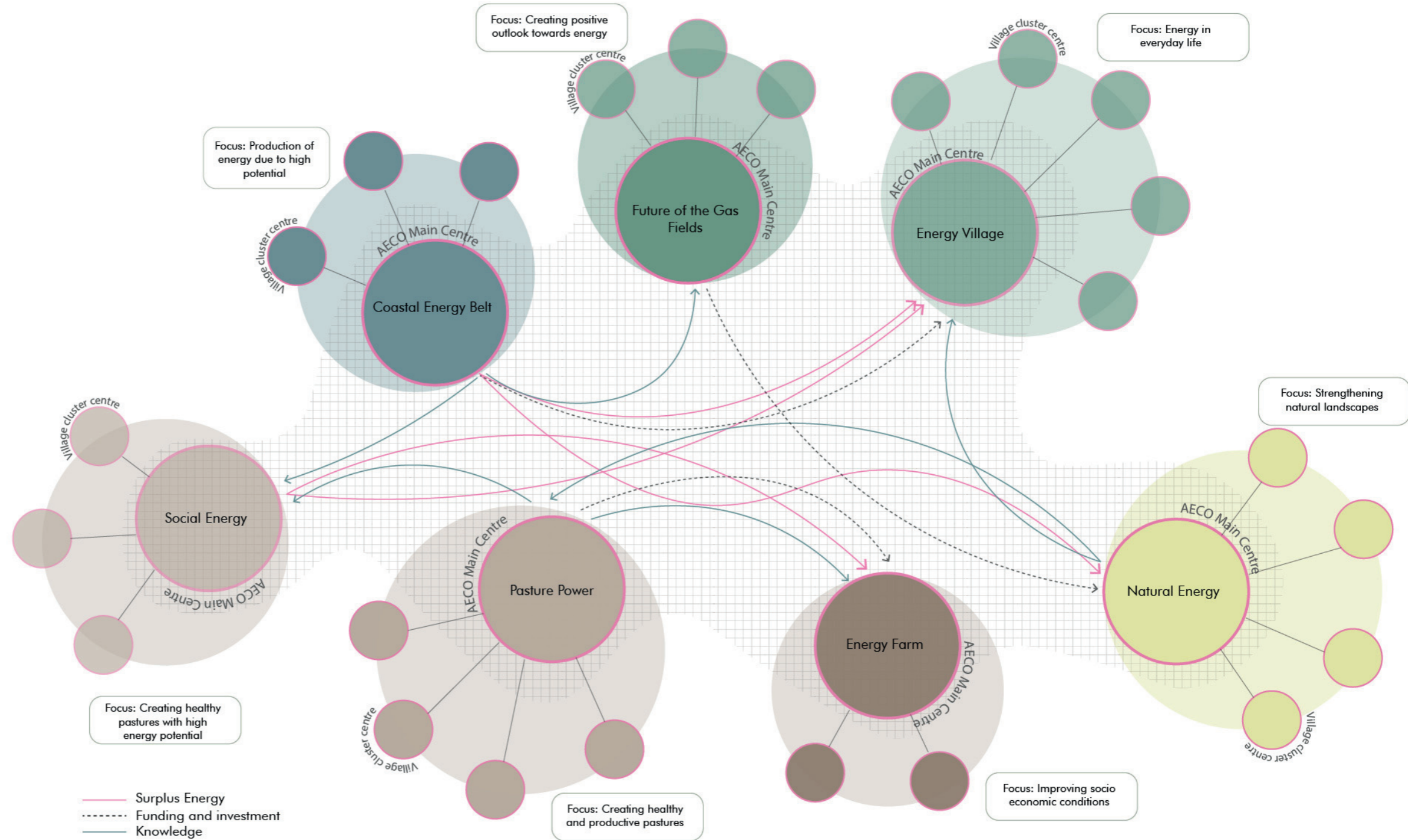
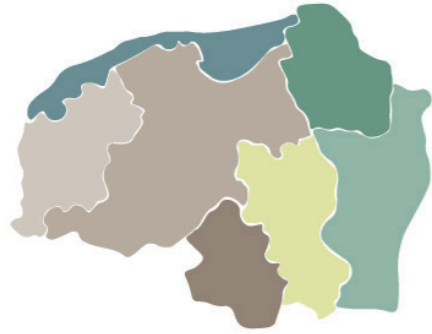


Figure 65: AECO governance structure

Exchange between AECO's



Each of the territories is based on landscape types, energy potential and socio economic conditions which makes it unique. The functions of AECO within each territory will thus differ slightly to manage the unique landscapes. Each territory also has distinct strengths and weaknesses which can be managed by sharing the flows of knowledge, energy and money within the region. The diagram on right shows anticipated flows between the AECO with their areas of focus to create a stronger sense of collaboration and community at the regional scale.

Figure 66: Exchange of knowledge, money and energy between AECO territories

Timeframe & Transition

How is our strategy placed in a timeframe? We imagine that the AECO can be fully operational in 25 years time, with 2050 as horizon. The transition of landscape identity shifts from a centralized to a decentralized approach, high power for governments and energy companies towards empowerment of the local community, a fossil fuel based energy system to a renewable energy based system and ultimately from an unsynchronized to a synchronized dynamic between landscape, energy and people. We observe that this transition is already happening, through the emergence of energy cooperatives and also existing policies containing guidelines and ambitions for participation in decision-making processes. To accelerate the transition, our strategy comes in play. This leads to more local leadership, higher levels of participation, higher acceptance of energy projects, more implementation of energy projects and also an integrated approach to combining landscape and energy projects. Ultimately, our goals will be achieved, creating a just landscape identity transition.

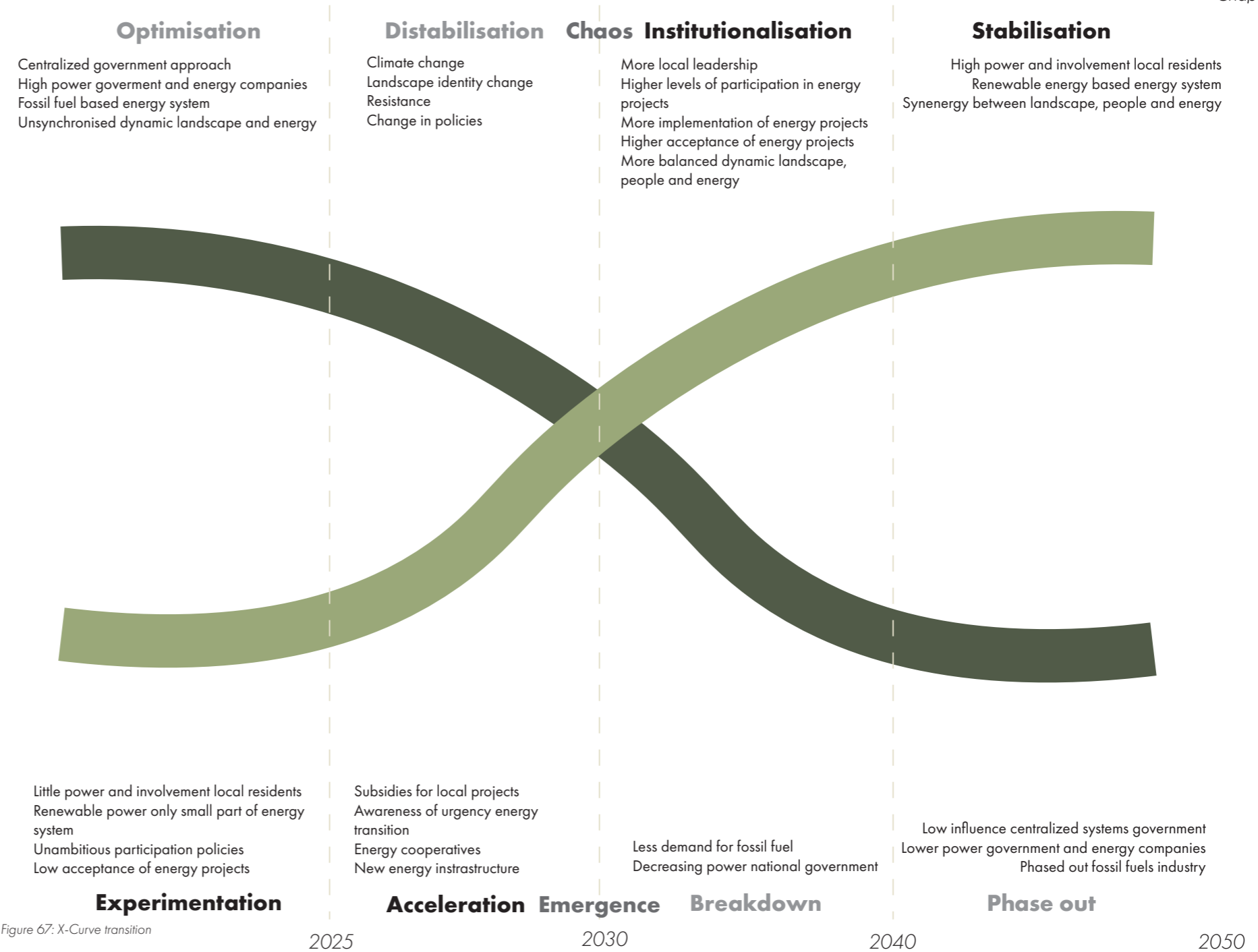


Figure 67: X-Curve transition

2025

2030

2040

2050

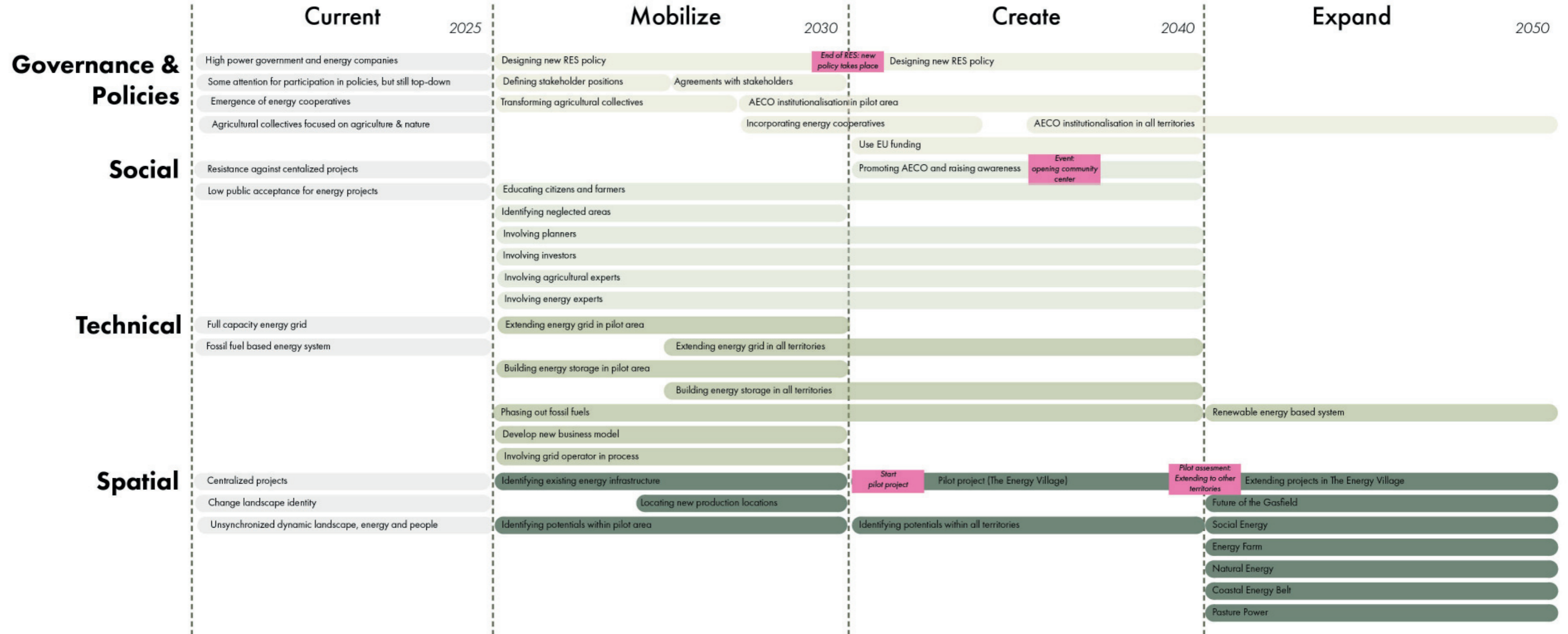


Figure 68: Timeline of the transition

Testing the AECO process - Pilot



Figure 69: Location of Energy village territory

Selection of area

The functioning and implementation of energy landscapes through the cooperative approach of AECO is demonstrated using the case of Stadskanal and the cluster of villages surrounding it. The territory 'energy village' consists of the most neglected areas in east Groningen. These areas face low socio-economic status and declining population. The landscape is mostly composed of non-irrigated farmlands with some of the oldest villages in the region.

Aim

The primary strategy for the 'energy village' is to improve everyday living conditions through the cooperative energy landscape building process. Participation in energy projects that improve socioeconomic conditions can greatly increase public support, particularly when those projects directly benefit local people. Energy parks surrounding the villages are introduced to create a gentle transition from the village environment into the hybrid farm and energy landscapes.

The main spatial functions of AECO – setting up of community centres and governance of energy farms are demonstrated in the following pages through the story of resident of Nieuw Weerdinge, who wishes to collaborate to create a new energy farm.

Process

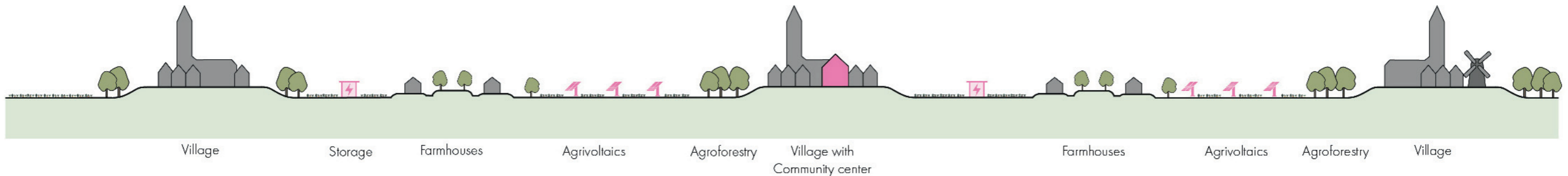
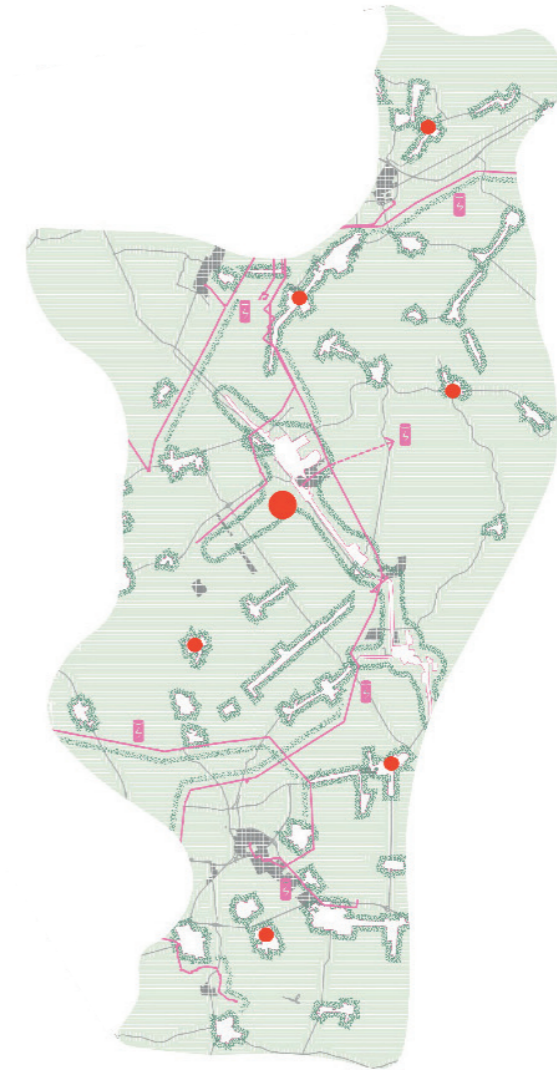
Any member who wishes to be involved in the energy transition process through AECO can locate themselves, find a role and collaborator through the decision tree for AECO participants. Members wishing to initiate an energy farm are equipped with a map of potential areas and AECO governed land in the region, along with a catalogue of interventions suitable for their needs.

Principle: Energy Village

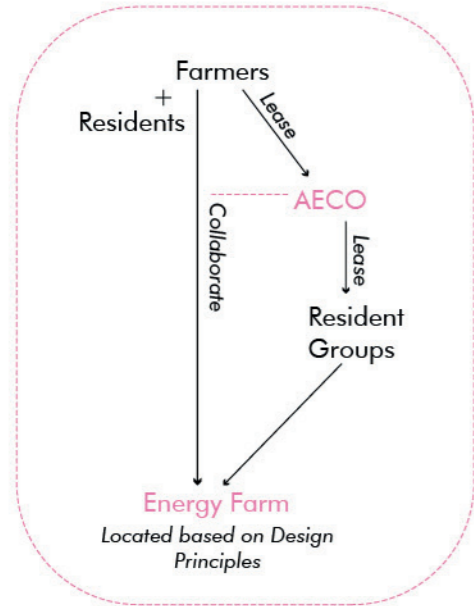
Energy in daily life

- Village with energy park
 - Industrial area with renewable project
 - Non-irrigated farmland with solar panel
 - Non-irrigated farmland with windturbine
 - Traffic system
 - Power grid with green corridor
 - Power grid extension
 - Energy storage
 - Community center
- N
0 5 10

Figure 70: Spatial Development Strategy – Energy village



How does one participate?



Governance of Land

I have leased my land to AECO. Anyone can set up a solar farm here!



Farmer

Hey Marco! Do you know my neighbour Clark saved almost 60% on his energy bills last year. I am thinking of transitioning to better power sources for my home and office

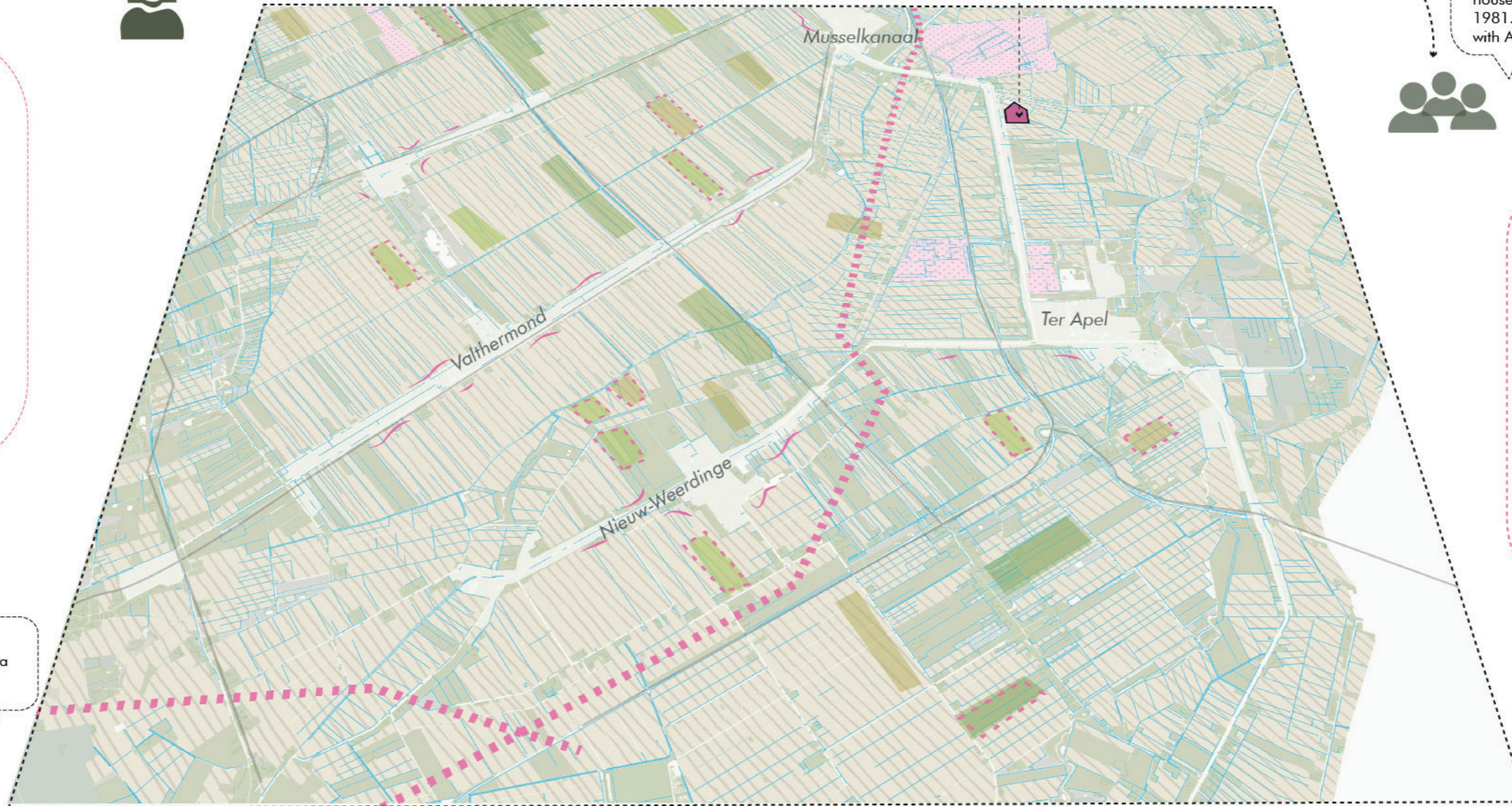


Village Resident

That's great news Laura! I have been a part of the AgriEnergy cooperative for 3 years. Have you heard of them? You must visit the community centre and you will surely find a way! You could even own an energy farm.



Village Resident



Community centre
AECO Representative

Our village house is housed in a former so-called Finnish school. After the then primary school left the building in 1980, the first village house activities were developed in 1981. We are glad to share the space with AECO



Village Organisation, Ter Apel
Source: GroningenDorpen



Setting up community centres

Figure 71: Process of participation and spatial governance elements of AECO

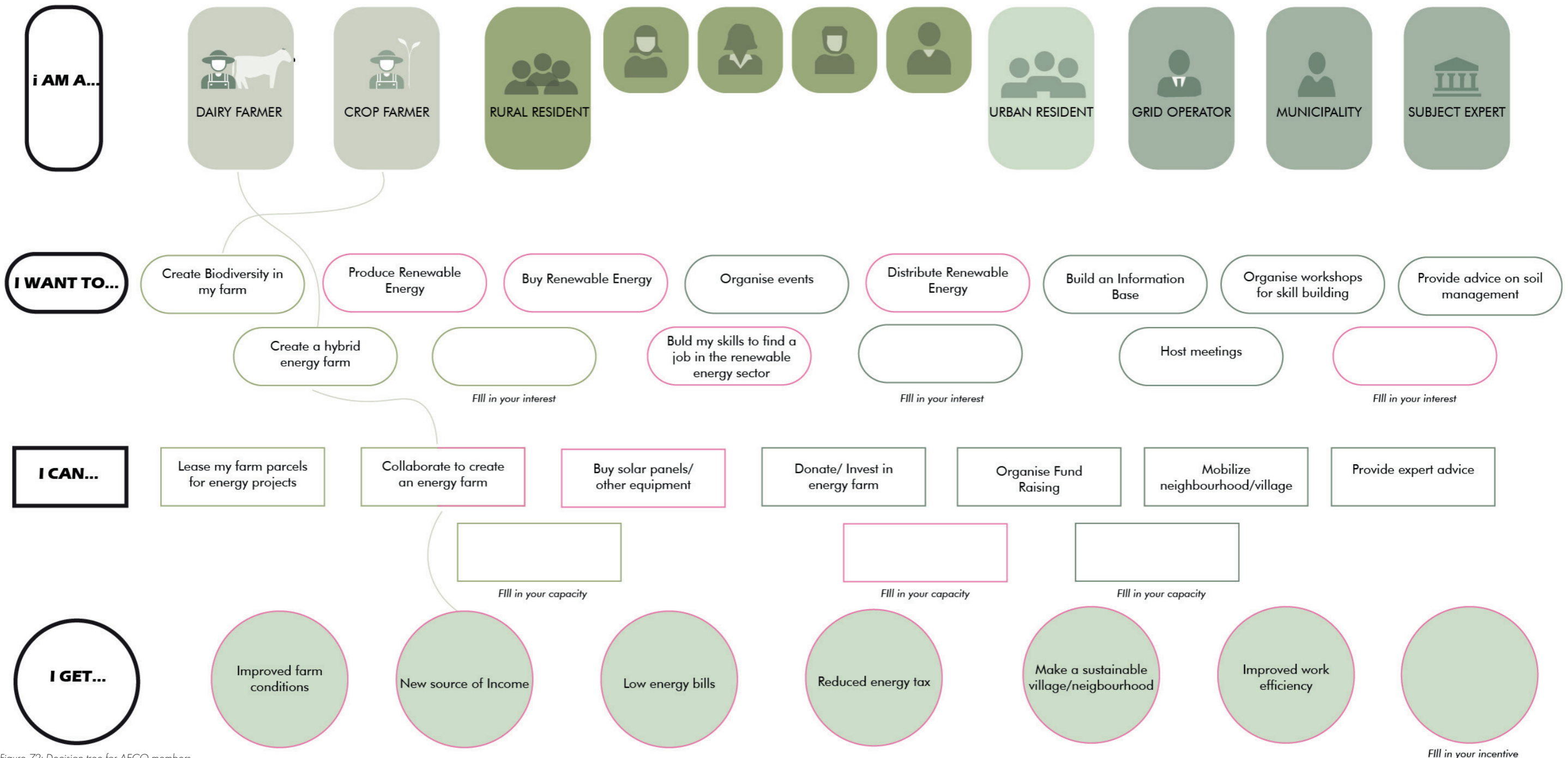


Figure 72: Decision tree for AECO members

Nieuw Weerdinge

A new agro-voltaic farm is set up in Nieuw Weerdinge as a collaboration between a resident and a land owning farmer facilitated by AECO. The land fits well within the solar potential of the territory. It is a part of the deal to surround the farm with a belt of biodiverse plant species and connect it to the village energy park as a corridor. Map and catalogue on the right show how AECO equips its members in decision-making

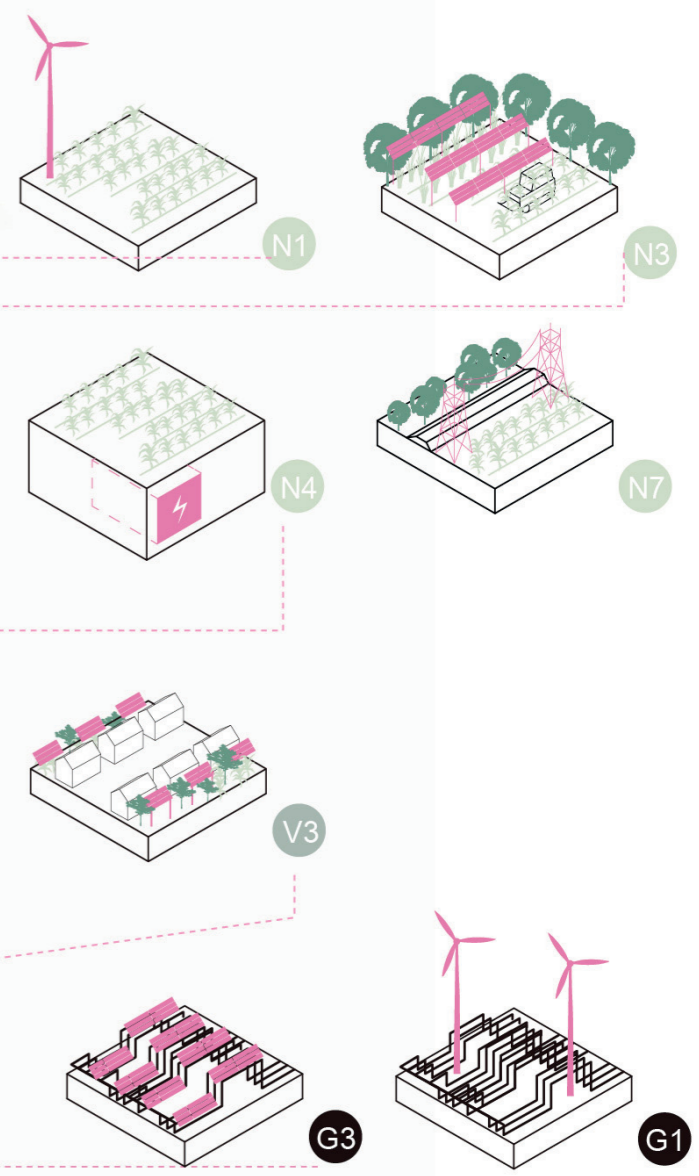
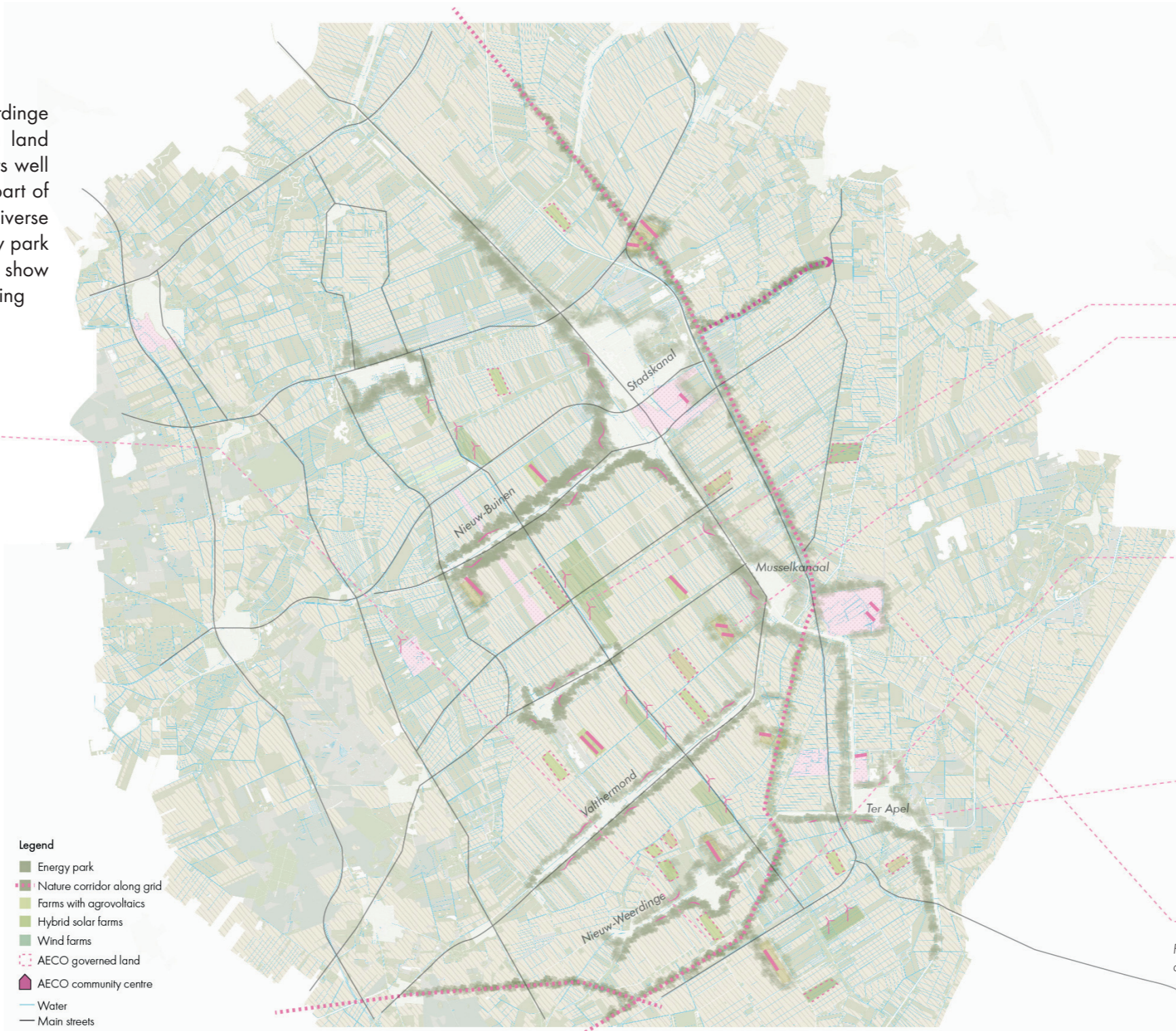
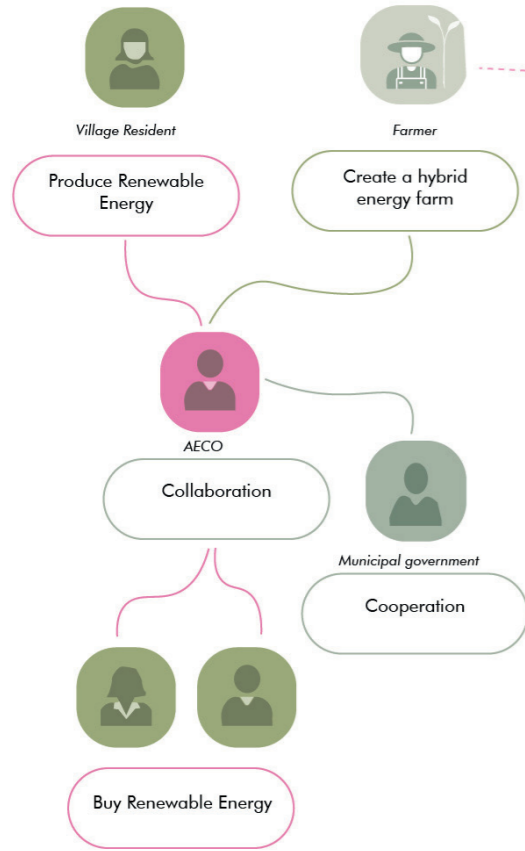


Figure 73: Demonstrating Implementation of solar energy farm using stakeholders and spatial catalogue, principles

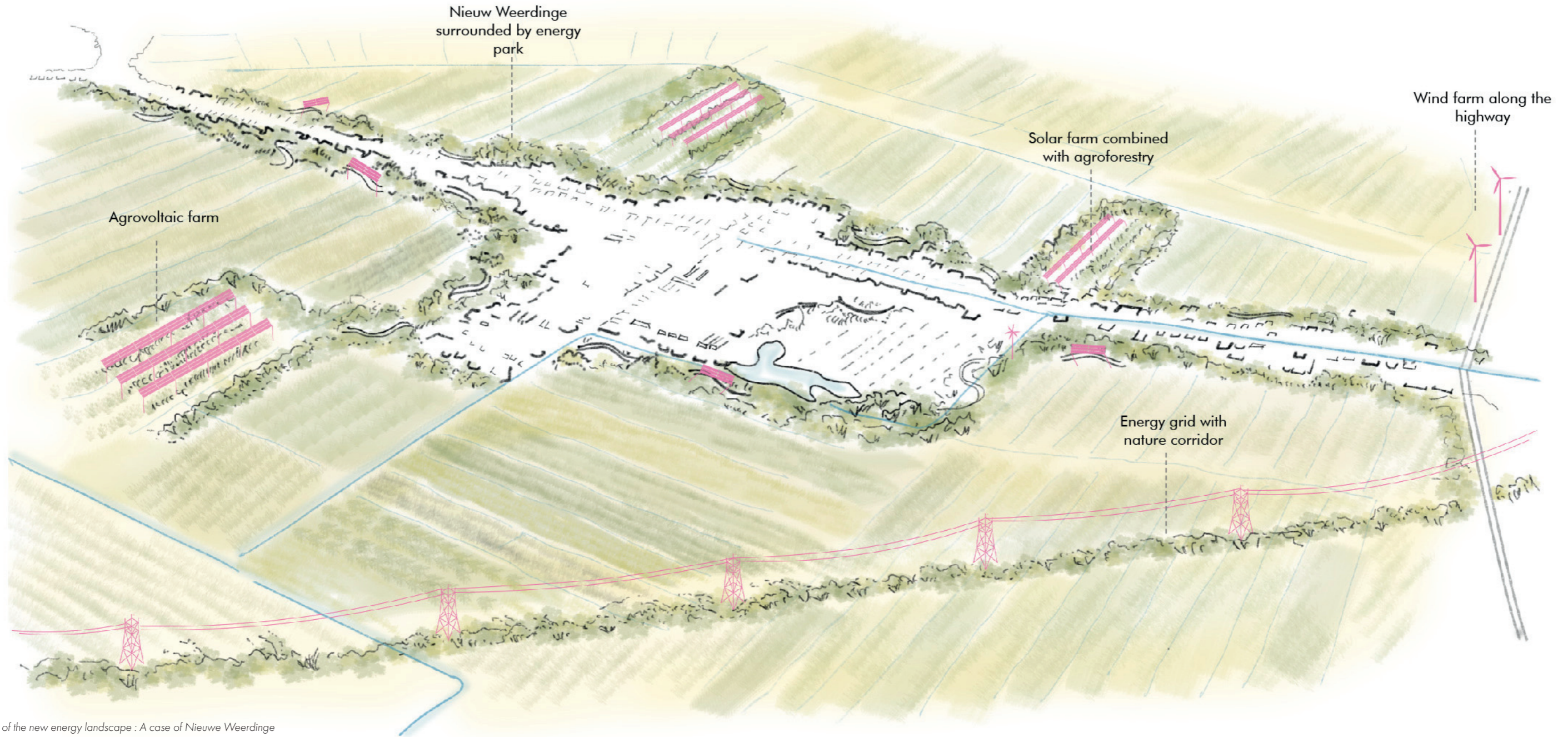


Figure 74: View of the new energy landscape : A case of Nieuwe Weerdinge



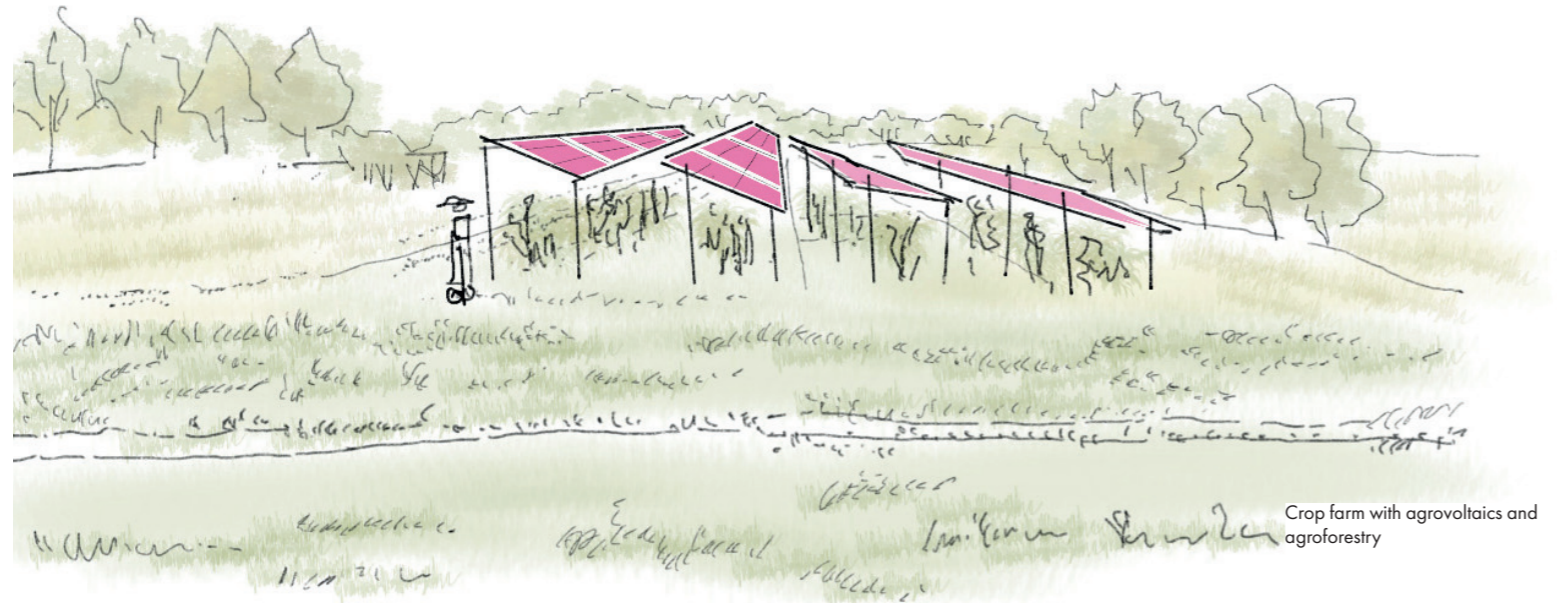
Figure 75: View showing before and after conditions of the village edge

The formation and operationalization of the AgriEnergy cooperatives is an important marker in the landscape transition process. The Netherlands has traditionally followed a collaborative 'Polder' model for consensus in decision making. Setting up of the new cooperatives would strengthen the participatory ideologies and extend it to intangible aspects such as identity making. Identity here is advocated as a public good. This contextual rootedness of the cooperative approach would make it easy to scale up the AECOs to other agricultural regions of the country forming a strong network.

Demonstration of the AECO process through the case of the 'Energy village' gave an insight into its implementation in the most urgent region which can then be applied to other regions. Exploring the trust building process through events and citizen engagement activities is a key function of the cooperative which is not demonstrated within the scope of this report. The Democratizing just sustainability transitions (DUST) project presents critical challenges in citizen participation (Georgieva et al., 2024) which inform the functions and process of AECO. Accessibility to the decision making process and enhancing knowledge regarding sustainability transitions is demonstrated through the setting up of community centres and main regional centres in every AECO governed territory. Empowering citizens through knowledge building and improving the access to participation thus ensures a landscape for all.



Crop farm before



Crop farm with agrovoltaics and agroforestry

Figure 76: View showing before and after conditions of a crop farm

Timeframe pilot area

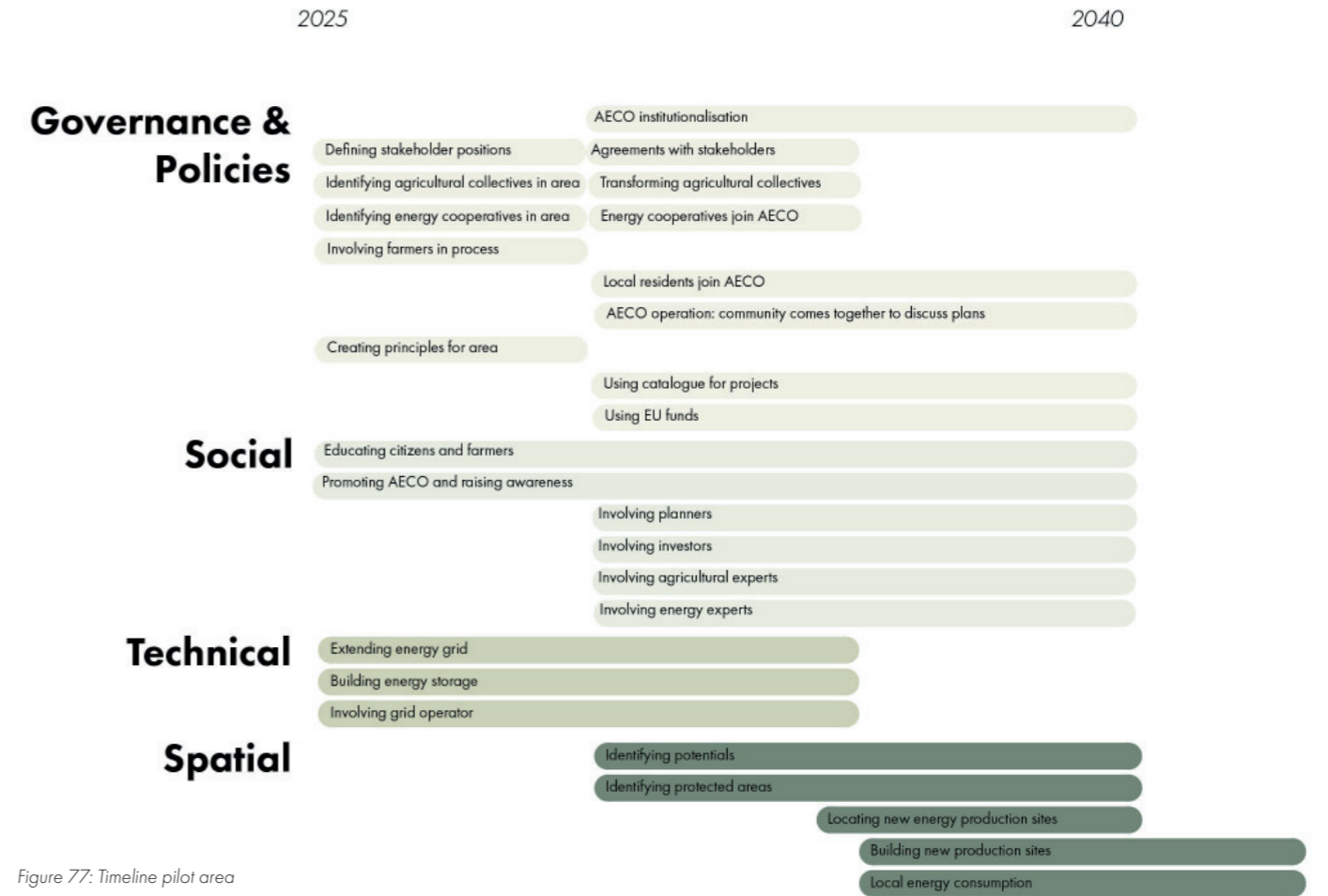


Figure 77: Timeline pilot area

CHAPTER 5 CONCLUSION & REFLECTION

Conclusion - New energy landscapes
Reflection

Conclusion - New energy landscapes

Main research question

How can we manage the production of renewable energy in rural parts of north Netherlands while ensuring a fair identity transition of the regional landscape?

Sub-questions

What are the existing and proposed energy plans for the region of North Netherlands, and how do landscape and energy currently relate to each other?

What elements make up the landscape and how this shapes the identity of the landscape? How can these elements be respected more in the future?

How do citizens and other actors think about energy projects? And which bottom-up organisations are already in place regarding land and energy? How can citizens be involved in the decision-making process?

This report finds its origin in the observed conflict of the centralized approach to renewable energy implementation in the rural landscape of the Northern Netherlands. The rural community, often marginalized in spatial and policy-making processes, is increasingly confronted with a rapidly transforming landscape that poses a threat to their place identity. Most of the renewable energy projects are often implemented in a top-down manner following a Decide-Announce-Defend (DAD) model (Komendantova 2021 as cited by Psarra et al 2024). Decisions in this case are made without meaningful involvement of the local residents which leads to resistance towards sustainability transitions in many cases.

To better understand the region's landscape identity, a qualitative analysis was conducted focusing on land-use typologies. The study revealed that the region is largely composed of agricultural areas, primarily dedicated to dairy and crop farming. The settlement pattern is characterized by a dispersed network of villages and a limited number of urban centers. The visual identity of the region is strongly shaped by its agricultural practices, land and water management, and particularly its open, expansive character.

An assessment of stakeholder concerns provided insight into the widespread lack of public acceptance regarding renewable energy projects. Many of these concerns are closely tied to perceived disruptions to landscape identity. Additionally, existing bottom-up structures—such as energy cooperative and agricultural

collectives were analyzed for their potential role in facilitating a more inclusive energy transition. There is a clear need of citizen involvement in decision-making process. Institutional tendencies of centralisation and hierarchy, in siting of energy projects, should be replaced by co-production, as follows from common pool resources theory. Co-production is the key to respecting landscape values, furthering justice, and achieving community acceptance (Wolsink 2017)

Findings from this analysis form the foundation for a new approach aimed at restoring the dynamic relationship between landscape, energy, and people. Central to the proposed vision are three core values: a just transition of landscape identity, equitable distribution of the burdens and benefits of the energy transition, and the empowerment of rural communities. To achieve these aims, AgriEnergy Cooperative (AECO) is established. It that bring together the resources and expertise of existing energy cooperatives and agricultural collectives for holistic management of future energy landscapes. Primary functions of the cooperative structure are to ensure grassroots participation, management of the energy landscapes and build policies and finances for the implementation of energy projects. This model of governance is supplemented with a set of design principles and guidelines tailored to the needs of each of the identified territories.

A key aspect of the AECO model is its inclusive governance structure: all residents within a given territory would have the opportunity to join the cooperative and the ability to actively participate in the decision-making process.

In conclusion, the current governance model for renewable energy projects in the Northern Netherlands is overly centralized, leading to significant resistance from rural communities—many of which are already socio-economically vulnerable. To ensure a more equitable, participatory, and spatially integrated energy transition, this report advocates for the implementation of a new cooperative governance model. Through the AECO framework, communities are not only given a voice but also real agency to shape their environments, promoting a more balanced and democratic distribution of renewable energy development.

Evaluation through SDG framework

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, represent a comprehensive global agenda. These 17 goals encompass a wide range of economic, social, and environmental dimensions and serve as a framework for governments, organizations, and communities to pursue sustainable development collectively.

This vision for a new energy landscape focuses on a new way of governance. A cooperative approach under AgriEnergy cooperatives is grounded in three primary goals: promoting participation in decision-making, facilitating decentralized energy initiatives, and supporting integrated and multifunctional land-use strategies.

The vision directly contributes to the advancement of several SDGs. By transitioning from fossil fuels to renewable energy sources, the project enhances environmental sustainability and public health, contributing to Goal 3 (Good Health and Well-being). The development of decentralized wind and solar infrastructure makes clean and affordable energy accessible to rural populations, fulfilling Goal 7 (Affordable and Clean Energy).

Moreover, the project stimulates local economic development by creating employment opportunities

in renewable energy production and infrastructure, aligning with Goal 8 (Decent Work and Economic Growth). It encourages innovation in energy systems and community-driven technological solutions, further supporting Goal 9 (Industry, Innovation and Infrastructure). By ensuring that rural residents are central to energy governance and benefit-sharing, the project addresses regional disparities, promoting social equity in line with Goal 10 (Reduced Inequalities).

In addition, the formation of a local Agri-Energy community fosters stronger, more resilient societies, contributing to Goal 11 (Sustainable Cities and Communities). The integration of sustainable energy production with agricultural practices through multifunctional land-use reduces environmental impact and promotes efficient resource use, supporting Goal 12 (Responsible Consumption and Production). As the project displaces fossil fuel usage, it directly contributes to climate change mitigation under Goal 13 (Climate Action).

Furthermore, the land-use strategies embedded in the project contribute to preserving ecosystems and biodiversity, reinforcing Goal 15 (Life on Land). The collaborative nature of the initiative, bringing together rural residents, farmers, and local institutions, embodies the spirit of Goal 17 (Partnerships for the Goals), emphasizing the importance of cooperation in achieving sustainable outcomes.

In conclusion, the proposed rural energy transition project is not only a transformative step toward local empowerment and sustainable energy production but also a concrete and practical contribution to the realization of multiple interconnected Sustainable Development Goals.

	PARTICIPATION IN DECISION MAKING	DECENTRALISED ENERGY INITIATIVES	INTEGRATED AND MULTIFUNCTIONAL LAND USE
3 GOOD HEALTH AND WELL-BEING	●		●
7 AFFORDABLE AND CLEAN ENERGY	●	●	
8 DECENT WORK AND ECONOMIC GROWTH		●	
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE			●
10 REDUCED INEQUALITIES	●	●	
11 SUSTAINABLE CITIES AND COMMUNITIES		●	●
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	●	●	
13 CLIMATE ACTION		●	●
15 LIFE ON LAND			●
17 PARTNERSHIPS FOR THE GOALS	●		

Figure 78: Sustainable Development Goals achieved by goals of the Vision (THE 17 GOALS | Sustainable Development, n.d.)

Evaluation through a localised framework

While the SDG's are an important tool for evaluation at the global scale, it is also important to evaluate the on ground impacts with indicators closer to the local context.

In order to evaluate the vision, it is important that the synergies between the three components of identity – landscape, energy and people be achieved. While this can be quantified easily with the number of members in the cooperative or the amount of projects implemented by the cooperative, a more nuanced evaluation could be conducted to understand the synergies between the three components.

Socially, the project's success could be assessed through changes in de-population trends, improvement in citizen well-being and satisfaction, and increased involvement of youth and active community leaders. Particular attention could be given to the degree to which residents are able to access participatory roles in visioning and policy-making processes for their own landscapes.

From a governance perspective, indicators could include increase in locally initiated policies, the active involvement of municipal and provincial governments in landscape transitions, and improved public access to knowledge related to sustainability and energy transitions.

Economically, the project could be evaluated based on its contribution to local economic vitality, including job creation, cooperative revenue growth, and the formation or expansion of community-based energy and agricultural initiatives.

Environmentally, key indicators could include the rise of multifunctional land use—where agricultural, energy, and ecological functions coexist—and there is a measurable increase in biodiversity within the landscape.

Collectively, these indicators aim to capture the potential multi-layered impact of the project and support the just, participatory, and integrated identity transition.

Impact

The proposed strategy would quite possibly have a big impact on societal dynamics. By changing the governing system of energy projects, the focus shifts towards a bottom-up structure. For citizens this will mean a chance to be an integral part of the decision-making process, but with this also comes a lot of responsibility. Ideally, the new approach will create a more harmonious relation between the rural community and the energy transition. Equal opportunities to access the process and fair distributions of the burdens and benefits of the energy projects are important factors in this harmony.

The position of the rural community towards the new approach would most likely be benevolent. They are not the only stakeholders in the landscape and energy system, though. In order to convince other stakeholders, the most relevant benefits for each group of stakeholders are outlined. Increased public acceptance is a possible outcome of our proposal, this seems to be in line with the ambitions of governments. Additionally, stimulating the rural economy is not only beneficial for the rural regions themselves, but it is also of interest to governments.

Furthermore, a seemingly neutral category, urban residents, can also benefit from a more just energy system. The new approach will ideally lead to more affordable energy prices. For the farmers, the energy transition in itself has already many benefits. By incorporating energy projects into their portfolio, they add an extra source of income, which makes their enterprises more financially sustainable, as well as

aligning with the climate action. Often farmers struggle to implement energy projects because of financial limitations or lack of knowledge. Involving farmers in the new cooperative can enable them to implement energy projects, and also supporting their local environment is beneficial.

The new governing system has a democratic character, as citizens are empowered to decide on energy projects. To such a direct democracy are also downsides. Mainly inefficiency and instability might limit the AECO operation. When AECO's eventually grow and expand, so will the different voices and opinions on various matters. When a lot of opinions and views have to be taken into consideration, decision-making processes might take a very long time. Decision making is also challenging in this scenario as knowledge and expertise of all the stakeholders is varied and can lead to new conflicts that have not been anticipated in the scope of this report.

Scaling up of the AECO approach of working together of agriculture and energy cooperatives is also relevant for other rural agricultural landscapes in the country. This upscaling could possibly expand to other modes of energy production and heat production such as biomass, hydrogen, geothermal and aquathermal energy in a decentralised manner.

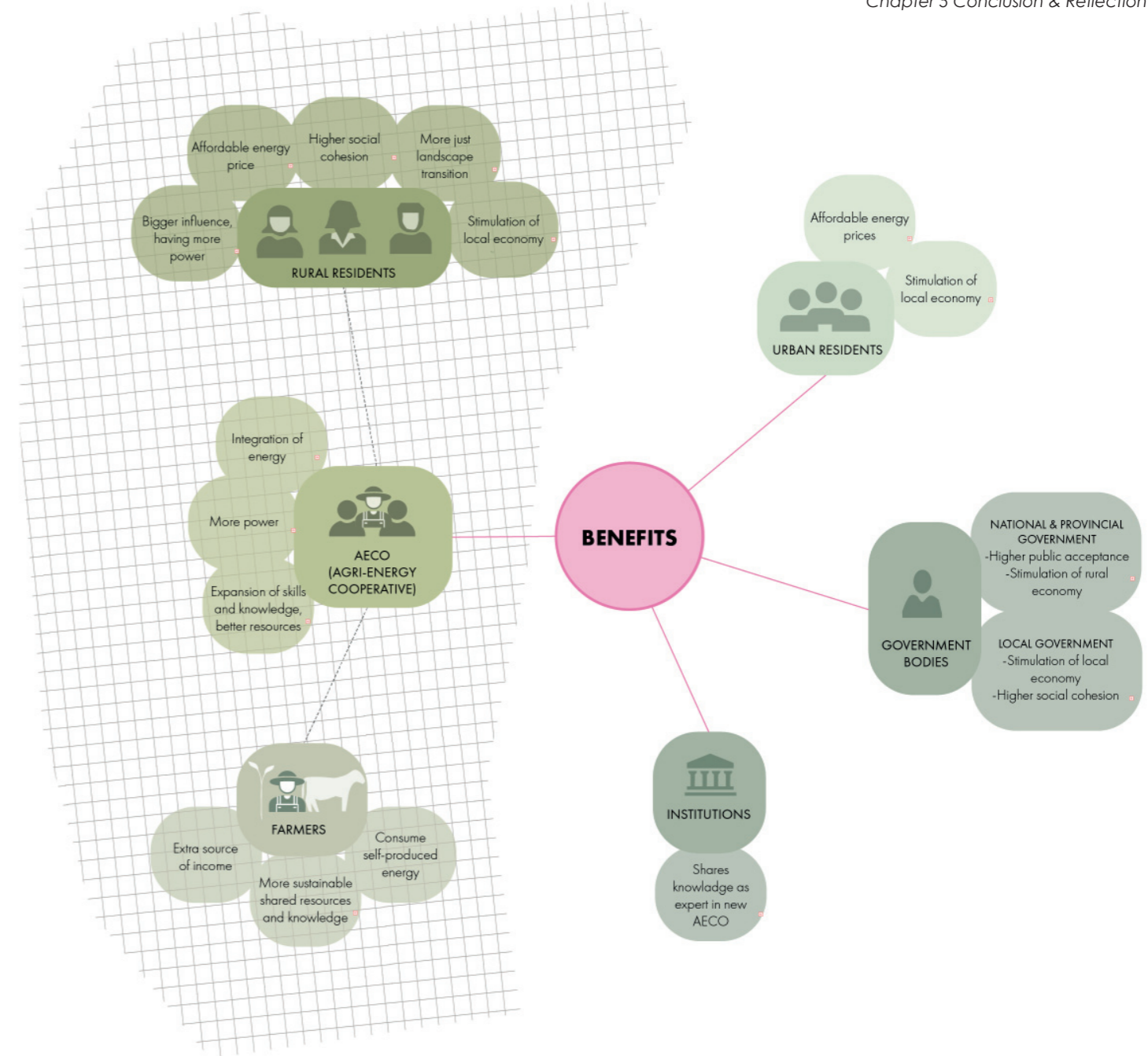


Figure 79: Benefits for Stakeholders

Reflection

Group reflection

Reflecting on the moral side of the strategy, a couple elements can be noted. The most important ethical note of this strategy is the attention to spatial justice and participation. Through the implementation of these concepts the needs and rights of the rural community and the landscape are respected in an integrated approach. In order to shape a vision on how to manage the landscape identity transition in a more fair way, it was important to view the identity of the landscape as a public good. The identity of the landscape is a good that is available to all, and is a substantial aspect of the well-being of the rural community. The identity of the landscape is defined through the existence and experience of people, land and also memory and spirit. This recognition is an integral part of the vision to create an integrated landscape.

As part of the analysis, the rural community, especially in the northern region, are vulnerable in various ways. For example, multiple parts of the regions are disadvantaged in areas such as income and energy affordability. This community has also faced neglect in other energy related policies and projects, leading to a loss of trust in the government. In this strategy, the rural community is empowered as they are enabled to produce their own energy, improving both income and energy affordability.

By giving local residents power over their environment, their inherent rights and dignity are respected. It is

recognised that the spatial consequences of the energy transition on the landscape without the approval of the residents of the respective landscape, is basically a violation of their right of a healthy environment. This will lead to a more prosperous rural community, as well as a broader positive outlook for citizens in general.

By transitioning the governing system to a democratic and participatory structure, public acceptance will increase. As a result, the implementation of energy projects will accelerate leading to positive mitigation of climate change, which is eventually beneficial for the greater good.

Meanwhile, an important characteristic of the strategy is the absence of fixity or closure. The strategy allows for multiple temporalities and rhythms, as does it also allow for multiple possible futures. The strategy enables communities to shape their environment. Each territory and each community is different, as will the outcomes be. Consequently, this strategy embraces uncertainty and free emergence in decision-making processes. AECO's are a platform where governing strategies, spatial guidelines and input from residents meet, it is a place where divergent visions and speculative imaginaries are shaped.

Lastly, it is significant to reflect on the role of the planner in this strategy. An important element of our strategy is recognition that planners can research a certain area

of societal group, but it is impossible to fully understand the complex dynamics of these areas and communities at the regional scale. This applies especially for ontological concepts such as place identity. The strategy is designed in such a way that citizens have a primary role in shaping their environment, while planners take a more modest position. This strategy, therefore, cultivates humility and solidarity in planners. Ultimately, the goal is to increase the health of rural societies, fostering shared welfare and social cohesion within these communities.

Limitations

The scope of this research had several limitations that could inform future investigations. While the study addresses the social, spatial, and governance dimensions of the energy transition in detail, it engages with a systemic understanding of the landscape in terms of geology, hydrology, climate, and biodiversity at a basic level. Incorporating these dimensions in future work could support a more integrated approach, particularly in aligning ecological systems with technological infrastructures. The project includes a basic understanding of different agricultural land uses, but it does not extend to examining agricultural production and consumption flows. Exploring these flows and the circular nature of agricultural economy could enable a more coherent alignment with energy systems and spatial planning. Additionally, while the cooperative governance model proposed in

this study offers a foundational framework, future researchers could further develop it by tailoring cooperative structures to specific locations. A more in-depth analysis of the heterogeneity of village and farming communities—regarding demographics, socio-economic dynamics, and local knowledge systems—could yield more context-sensitive and effective strategies for implementing just and inclusive energy transitions.

Individual reflections

Shreya Rajmane - 6167780

Designing for the regional scale through a collaborative group work approach was a challenging yet eye opening journey. There is undoubtedly a clear need to design for transition communities, especially when the communities face vulnerability due to changes in their environment. The rural community in northern Netherlands formed an insightful case to understand regional design through a community lens. Our vision advocated for a democratic approach towards new energy landscapes, where the community is seen as a co-designer and co-producer. The community for the regional scale however remained homogenous. It was indeed challenging to address the heterogeneity of the rural and the farming community within the scope of our strategy and vision. A key conceptual shift was rethinking identity—not as something to preserve, but as dynamic entity driven by communities, even a public good. This perspective, shaped by the methodology lectures, helped ground our design process in deeper understanding.

Media analysis proved to be a great tool to enter a project especially at this scale which requires an investigative approach. It became a turning point, opening up the narratives shaping public perception and regional development. Another pivotal moment for me was systemic design. Unlike smaller-scale projects that often focus on specific details, regional design requires a systemic understanding. We began to see the landscape as a “system of systems,” shaped and controlled by another layer of systems—the stakeholders who often have conflicting interests.

While there is a vast body of literature on energy landscapes, we noticed a gap in how spatial aspects are addressed. The most challenging part of the project was defining the borders of territories in our vision. Particularly because a landscapes

approach required us to think through natural and physical factors that transcend administrative boundaries. At the same time, the project demanded thinking about borders through a community lens. Here we extended the Mchargian method of layering to include social factors such as income and de-population that highlighted the urgencies in the region. In my opinion it was thus a systemic way of defining territorial boundaries for the AgriEnergy co-operatives.

In an attempt to build from existing initiatives, our project combined the existing agriculture and energy cooperatives to work towards the common goal of identity transition. A lingering question that I would like to carry forward in my future work is thus, how much should be left to the communities and how I can ground my role as planning and design expert? What is the correct balance between top down and bottom-up approaches? This question poses a dilemma for me as a practitioner as I constantly search for ways to think of these problems in the context of the global south.

Entering the project through the community lens provoked a bottom-up way of thinking that helped us craft bottom-up strategies to large scale problems. Although I have engaged with community based design practice in the past, this scale provided new lenses and scales of thinking which will inform my work in the future. It reinforced the idea that approaching regional design requires us to wear multiple hats: that of a researcher, investigator, designer, policymaker and most importantly a catalyst. Each perspective adds value and can help ground my role in shaping meaningful, long-term transitions.

Roos van der Knaap - 5281059

This quarter has been a valuable learning experience, both academically and personally. Having never worked on this regional scale before, we encountered new challenges related to the complexity of spatial governance and the relationship with various stakeholders. Despite these challenges, the project significantly deepened my understanding of developing a regional vision and strategy as a discipline shaped by spatial, political, and social dynamics. Also mainly because we were fortunate to have the support of SDS and Methodology classes, which continuously provided us with valuable information and helped us with the necessary tools for our project.

One of the most challenging aspects was the integration of a new governance model into our strategy. We explored the introduction of cooperative structures with a bottom-up approach. Designing such a governance model was complex, particularly because it required a departure from conventional top-down planning. None of us had prior experience with these mechanisms, which made the process intellectually demanding but also highly rewarding. In doing so, I realized that regional design scale is not simply about spatial interventions; it is deeply embedded in governance structures and institutional change.

Working with the concept of community involvement posed another layer of difficulty. Understanding the hopes and dreams of communities in a regional design process is a nuanced task. It requires active engagement, empathy, and iterative communication. While it is inherently challenging to fully understand the lived experiences of diverse community members, I believe it is possible through continuous dialogue, participatory design methods, and a willingness to step outside of our own perspectives. This project made it

clear that design cannot be imposed from above if it is to be sustainable and just, it must be co-created.

It was big shift to work this quarter fully in groups, this was initially difficult. We struggled to find a shared vision and rhythm, especially in the early stages. But over time, especially after the midterm, we developed a more fluid and effective way of working together. Many discussions on the vision and strategy have taken place and there was a collective hesitation to take leadership. Interestingly, I am not someone who naturally takes the lead in group settings, yet I found myself stepping into this role more frequently due to the passive nature of our group dynamics. Although this was outside my comfort zone, it gave me important insights into group collaboration and my own capabilities in a positive way.

In reflecting on the broader implications of this project, I have come to appreciate the scale of regional design as both a technical and deeply human processes. Its outcomes are shaped not only by spatial logic but by governance models, stakeholder interaction, and long-term societal values. Regional design must navigate tensions between top-down frameworks and bottom-up desires, between spatial efficiency and social justice. Our attempt to address these tensions through a new cooperative governance illustrates the potential of design to act as a mediating tool between diverse interests and scales.

In sum, this project has broadened my understanding of regional design and its interdisciplinary nature. It taught me that design on this scale requires humility, adaptability, and a willingness to engage with complexity, not just in the territory, but also within ourselves.

Hongyue Kang - 6263461

I've always stayed within my comfort zone, focusing on tasks I excel at and enjoy. In Quarter 1, urban-scale research, design, and hand-drawing were my strengths. Quarter 2's neighborhood-scale projects came even more naturally to me. Preferring to work alone, I avoided group collaboration and quietly completed my assignments. However, Quarter 3 was a complete departure from my comfort zone—a challenging yet rewarding exploration. Though the process was often painful and confusing, the outcome was gratifying. I learned to navigate difficulties and grew significantly.

Our research revealed the importance of designing for transitional communities. In Europe, energy production and consumption are becoming decentralized, with greater public influence. To understand their hopes and dreams, we analyzed news reports and interviews, finding that these communities are undergoing both energy and identity transitions. Since this shift is ongoing, regional identity will continue evolving. Our goal was to assist communities in managing their energy transition while guiding regional identity toward a more desirable direction.

In case studies, we noted that energy cooperatives empower communities in production and consumption but often overlook landscape factors. By integrating agricultural cooperative models, we developed a new organizational approach.

As a former architecture student, regional design—especially energy-centric planning—was entirely unfamiliar. Initially, I struggled to connect energy transition, community needs, and policy with spatial design. Midterm feedback criticized our early cooperative concept as “fake,” highlighting our difficulty in grounding ideas and linking them to space. This

stalled our vision map progress.

Post-midterm, we studied existing energy cooperatives' structures and operations, which helped refine our Agri-Energy Cooperative model. We defined its management, spatial implementation, and rules to ensure balanced identity and energy transitions. The resulting vision map outlined the cooperative's scale, governance, and infrastructure needs. Our strategy translated this macro vision into actionable steps for rural energy production and usage.

Our team's biggest breakthrough was learning to communicate and collaborate effectively. Challenges included:

Introversion: I feel like all four members are introverted, making meetings draining our energy. And also different workflows hindered early efficiency.

Divergent Goals: Initially, our objectives varied widely—even our instructor noted we were the least aligned group. This led to repeated changes in site, theme, and community focus before the midterm.

Grateful for my straightforward, resilient teammates, we addressed workload issues post-midterm, fostering a productive dynamic. Personally, I shifted from passive participation to proactive problem-solving. Sometimes when progress stalled, I took initiative to drive momentum.

Previously, I idealized teams with a clear leader and compliant members. Instead, ours evolved organically: each member stepped up as a leader at different stages, with others supporting.

While large-scale regional design and energy topics may not interest me long-term, I'm grateful Quarter 3 pushed me beyond my limits. It taught me new skills and better collaboration—proof that growth lies outside comfort zones.

Hugo Lock - 5055652

Shaping a regional development strategy through the scope of the rural community has been very interesting. After initiating the research and design process by establishing a conflict of interests in the energy transition, it has been very useful to have a better understanding of the positioning and the multi-scalarity of the different interests of stakeholders. The rural community is a less powerful group that is very much affected by the energy transition. It has been helpful to be able to recognize this vulnerability. By envisioning a better future for this community, a more nuanced and just strategy has been shaped. Important elements that reflect the attention to the welfare and well-being of the rural community are the notion of spatial justice and participation.

It has been very interesting to learn about the concept of spatial justice. In our process, we started with the 'loss' of identity of the landscape and how this affected the residents of the respective landscape. Initially, we already felt a certain sense of injustice and unfairness. When I was introduced to the concept of spatial justice, its relation to our project became very clear. For example the notions of fair distribution and equal opportunities, which are explained in the report. Also viewing the identity of the landscape as a public good that belongs to everyone, has been substantial in our process towards a just strategy. Thinking about the arrangement of the landscape, decision-making and transition-processes on a more abstract level has helped me to shape values and goals for the vision for a better future.

Involving the most vulnerable communities in a transition process that is as impactful as the energy transition, is critical. Very often, in case a community is not involved, public resistance increases, which hurts everyone in the end. Therefore, I think, the transition process should be more

democratic and accesible for local engagement. We have implemented a high mode of participation in our project, by collaborating with and involving the rural community. Recognizing that this should result in less distrust in governing bodies, less public resistance and an increase in rural welfare is very important in this aspect.

To understand the hopes and dreams from the rural community, the first step is to make way for the community to express their hopes and dreams. In the case of the new cooperative we create a platform where the views and opinions of citizens can be expressed. For this matter, it is important to recognize that the identity of the landscape can not be easily interpreted for a outsider, as the identity of the landscape is a ontological concept, which is an integral part of the being of the respective people. So, as a planner of this proposed new cooperative, to engage the most vulnerable communities it is important to create a platform where the outcome is not fixed. The cooperative has a lot of freedom in our strategy. As a result, many possible outcome and futures can be imagined. In this way, we have created a platform where there is space for the hopes and dreams of the rural community.

Bibliography

BoerenNatuur. (n.d.). Collectieven | BoerenNatuur. *Boer En Natuur*. <https://www.boerenatuur.nl/collectieven/>

Breukers, S., & Wolsink, M. (2007). *Wind energy policies in the Netherlands: Institutional capacity-building for ecological modernisation*. *Environmental Politics*, 16(1), 92–112. <https://doi.org/10.1080/09644010601073838>

CBS. (2020, December 18). *Hoe wordt de Nederlandse bodem gebruikt? - Nederland in cijfers 2020*. CBS. <https://longreads.cbs.nl/nederland-in-cijfers-2020/hoe-wordt-de-nederlandse-bodem-gebruikt/>

Centraal Bureau voor de Statistiek. (2023). *Landbouw; gewassen, dieren en grondgebruik naar regio*. Retrieved from <https://www.cbs.nl/nl-nl/cijfers/detail/80780ned>

Cermak, A. (2024b, October 21). *What is climate change?* - NASA Science. NASA Science. <https://science.nasa.gov/climate-change/what-is-climate-change/>

De Boer, J., & Zuidema, C. (2015). *Towards an integrated energy landscape*. *Proceedings of the Institution of Civil Engineers - Urban Design and Planning*, 168(5), 231–240. <https://doi.org/10.1680/udap.14.00041>

De Jong, J., & Stremke, S. (2020b). *Evolution of Energy Landscapes: a regional case study in the Western Netherlands* [Article]. *Sustainability*. <https://doi.org/10.3390/su12114554>

Dutch news. (2018, September 11). *Some wind farm protesters are radicalised, says counter terrorism unit*. <https://www.dutchnews.nl/2018/09/some-wind-farm-protesters-are-radicalised-says-counter-terrorism-unit/>
Energie samen. (n.d.). <https://energiesamen.nu/alles-over-energiecooperaties>

Energy transition. (n.d.-b). TU Delft. <https://www.tudelft.nl/en/eemcs/research/energy-transition#:~:text=The%20energy%20transition%20is%20one,an%20accelerated%20electrification%20of%20society.>

European Commission. (n.d.-b). *LEADER Toolkit*. https://ec.europa.eu/enrd/sites/default/files/leader_clld-explained_en.pdf

n.d (20 mei 2024 maandag). *Friesland moet zelfvoorzienend zijn met het opwekken van energie: hoe realistisch is dat?*. Leeuwarder Courant.nl. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=-news&id=urn:contentItem:6C2N-CFP1-JC71-C3K5-00000-00&context=1519360>.

Georgieva, N., Ferry, M., Marcin Dąbrowski, Thomas Verbeek, Verena Balz, Gisela Garrido Veron, Odilia Van Der Valk, Adam Drobniak, Artur Ochojski, Adam Polko, Marcin Baron, Piotr Rykala, Grzegorz Trefon, Tihomir Videman, Anna Grebe, Remina Aleksieva, Donka Todorova, Elin Cedergren, Leneisja Jungsberg, . . . Rachel Maguire. (2024). *Factors impacting the scale and quality of participation of least engaged communities in deliberative governance of transition policies*. In DUST (V1.0 Final, p. 130) [Report]. https://www.dustproject.eu/_files/ugd/fedab5_84628791ce4b4b79aa2af19c8d0fe932.pdf

Hier.nu. (n.d.). *Lokale Energie Monitor 2022*. HIER. <https://www.hier.nu/lokale-energie-monitor-2022>

Hofslot, G. (2024, February 8). *'Those windmills are beautiful. But not with us'*. Daily newspaper of the North.

Janssen, A., Beers, P., & van Mierlo, B. (2022). *Identity in sustainability transitions: The crucial role of landscape in the Green Heart*. *Environmental Innovation and Societal Transitions*, 42, 362–373. <https://doi.org/10.1016/j.eist.2022.01.008>

Molnarova, K., Sklenicka, P., Stiborek, J., Svobodova, K., Salek, M., & Brabec, E. (2012). *Visual preferences for wind turbines: Location, numbers and respondent characteristics*. *Applied Energy*, 92, 269–278. <https://doi.org/10.1016/j.apenergy.2011.11.00>

Michaelson, L., Rozelle, M., Sarno, D., & Federation of International Association for Public Participation. (2024c). *IAP2 Spectrum of public participation*. https://cdn.ymaws.com/www.iap2.org/resource/resmgr/pillars/iap2_spectrum_2024.pdf

Ministerie van Economische Zaken en Klimaat. (2023, March 28). *Klimaatakkoord - Klimaatakkoord*. <https://www.klimaatakkoord.nl/>

Ministerie van Infrastructuur en Waterstaat. (2025b, February 25). *De Omgevingswet*. Rijksoverheid.nl. <https://www.rijksoverheid.nl/onderwerpen/omgevingswet>

Ministerie van Volksgezondheid, Welzijn en Sport. (2020, February 28). *Dorpsleven tussen stad en land*. Publicatie | Sociaal En Cultureel Planbureau. <https://www.scp.nl/publicaties/publicaties/2017/03/30/dorpsle->

ven-tussen-stad-en-land

Moroni, S., De Franco, A., & Department of Architecture and Urban Studies, Polytechnic University of Milan, Italy. (2024). *Spatial justice: A fundamental or derivative notion?* In *City, Culture and Society*. <https://www.sciencedirect.com/science/article/pii/S1877916624000286>

NOS. (2023, January 27). *Meer energiearmoede, maar compensatiemaatregelen hebben erger voorkomen*. <https://nos.nl/artikel/2461476-meer-energiearmoede-maar-compensatiemaatregelen-hebben-erger-voorkomen>

Oudes, D., & Stremke, S. (2020). *Climate adaptation, urban regeneration and brownfield reclamation: A literature review on landscape quality in large-scale transformation projects*. *Landscape Research*, 45(7), 905–919. <https://doi.org/10.1080/01426397.2020.1736995>

Over ons | *Local4Local*. (n.d.). *Local4Local*. <https://www.local4local.nu/over-ons/>

Paneva, V. (2021b, March 19). *LEADER/CLLD - the European Network for Rural Development (ENRD) - European Commission*. The European Network for Rural Development (ENRD) - European Commission. https://ec.europa.eu/enrd/leader-clld_en.html

Paneva, V. (2021d, May 26). *Smart Villages - the European Network for Rural Development (ENRD) - European Commission*. The European Network for Rural Development (ENRD) - European Commission. https://ec.europa.eu/enrd/smart-and-competitive-rural-areas/smart-villages_en.html

Paster, R. (2024, September 25). *Construction of wind farm at Eemshaven can continue, but tensions are increasing within provincial coalition*. *Rtvnoord*. <https://www.rtvnoord.nl/politiek/1215657/aanleg-windmolenpark-bij-de-eemshaven-kan-doorgaan-maar-spanning-loopt-op-binnen-provinciale-coalitie>

Pekela Duurzaam. (n.d.). <https://www.pekeladuurzaam.nl/>

Plata, J. a. R. (2020). *Urban planning, urban design, and the creation of public goods*. In *Encyclopedia of the UN sustainable development goals* (pp. 899–905). https://doi.org/10.1007/978-3-319-95717-3_82

Poepjes, S., Wassink, B., & Regiegroep Regionale Energie Strategie RES Fryslân. (n.d.-b). *REGIONALE ENERGIE STRATEGIE FRYSLÂN*. In *RES 1.0 FRYSLÂN*. https://frieseenergietafel.nl/files/res-1.0_res-fryslan_nl_def_digitaal.pdf

Polman, H. (23 mei 2023 dinsdag). *Karakteristieke agrarische landschap Drenthe onder druk*. *Dagblad van het Noorden*. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=news&id=urn:contentItem:6897-CS51-JC6P-V3T8-00000-00&context=1519360>.

Polman, H. (2021, January 27). *Project developer: keep all options open for green energy*. *Daily newspaper of the North*.

Prior, M., Vladev, L. (2024, March 25). *Tractors gather at Parliament in farmer go-slow protest*. *BBC News*. <https://www.bbc.com/news/science-environment-68655661>

Psarra, I., Van Ulsen, B., Turhan, E., & Van Der Schoor, T. (2024). *Exploring residents' perspectives on local energy transition in Northern Netherlands*. *International Journal of Urban Sustainable Development*, 16(1), 282–298. <https://doi.org/10.1080/19463138.2024.2379334>

Sijmons, D., Van Dorst, M., & Feddes, Y. (2014). *Landschap en energie: ontwerpende verkenningen naar de rol van het landschap in de energietransitie*. Ministerie van Infrastructuur en Milieu.

Stremke, S., & Schöbel, S. (2019b). *Research through design for energy transition: two case studies in Germany and The Netherlands*. *Smart and Sustainable Built Environment*, 8(1), 16–33. <https://doi.org/10.1108/sas-be-02-2018-0010>

Stroeken et al. (2021). *Rapportage van de CoP Windenergie en Landschapskwaliteit: Windturbines in levend landschap*. (n.d.-b). https://nvtl.nl/wp-content/uploads/2021/06/windenergie-levend-landschap-200521_df.pdf

Sutherland, L.-A., Peter, S., & Zagata, L. (2015). *Conceptualising multi-regime interactions: The role of the agriculture sector in renewable energy transitions*. *Research Policy*, 44(8), 1543–1554. <https://doi.org/10.1016/j.respol.2015.05.013>

THE 17 GOALS | Sustainable Development. (n.d.). <https://sdgs.un.org/goals>

The Natura 2000 protected areas network. (n.d.-b). European Environment Agency. <https://www.eea.europa.eu/themes/biodiversity/natura-2000/the-natura-2000-protected-areas-network>

- The European Green Deal. (2021b, July 14). European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
- Upham, P., Oltra, C., Boso, A. (2015). Towards a cross-paradigmatic framework of the social acceptance of energy systems. <https://www.sciencedirect.com/science/article/abs/pii/S221462961500064X>
- Vaals. (2022, October 18). *Beleidsplan Integrale schuldhulpverlening 2022 – 2025*. Lokale Wet- En Regelgeving. <https://lokaleregelgeving.overheid.nl/CVDR682433>
- Van Essen, H. (2023b, October 23). *Hoe wordt in Nederland bepaald waar windmolens komen te staan?* KlimaatHelpdesk. <https://www.klimaathelpdesk.org/answers/hoe-wordt-in-nederland-bepaald-waar-windmolens-komen-te-staan/#:~:text=Dit%20zijn%20onderzoeken%20die%20de,preciezer%20de%20effecten%20te%20bepalen.>
- Vreeker, R. (2004b). *Urban multifunctional land use and externalities*. ideas.repec.org. <https://ideas.repec.org/p/wiw/wiwsa/ersa04p346.html#:~:text=Multifunctional%20land%20use%20can%20generally,intensifying%20the%20use%20of%20space>
- Werkbureau RES-regio Drenthe & JongRES Nederland. (2021b). *Regionale Energie Strategie (RES) 1.0*. In *RES-regio Drenthe*. <https://www.energievoordrenthe.nl/documentenoverzicht/besluitstukken/default.aspx#-folder=1937725>
- Westerink, J., Termeer, C., & Manhoudt, A. (2020). *Identity Conflict? Agri-Environmental Collectives as Self-Governing Groups of Farmers or as Boundary Organisations*. *International Journal of the Commons*, 14(1), 388–403. <https://doi.org/10.5334/ijc.997>
- Westra, H. & Stuurgroep RES Groningen. (2021b). *Samenwerken aan een beter leefklimaat in onze regio*. In *RES 1.0 Groningen*. https://resgroningen.mett.nl/home_old1731490708/over+de+res/achtergrondinformatie/handlerdownloadfiles.ashx?idnv=1990181
- Wolsink, M. (1999). *Wind power and the NIMBY-myth: Institutional capacity and the limited significance of public support*. *Renewable Energy*, 21(1), 49–64. [https://doi.org/10.1016/S0960-1481\(99\)00130-5](https://doi.org/10.1016/S0960-1481(99)00130-5)
- Wolsink, M. (2007). *Planning of renewables schemes: Deliberative and fair decision-making on landscape issues instead of reproachful accusations of non-cooperation*. *Energy Policy*, 35(5), 2692–2704. <https://doi.org/10.1016/j.enpol.2006.12.002>

Wolsink, M. (2010). *Near-shore wind power—Protected seascapes, environmentalists' attitudes, and the technocratic planning perspective*. *Land Use Policy*, 27(2), 195–203. <https://doi.org/10.1016/j.landuse-pol.2009.04.004>

Wolsink, M. (2019). *Co-production in distributed generation: Renewable energy and creating space for fitting infrastructure within landscapes*. *Landscape Research*, 43(4), 542–561. <https://doi.org/10.1080/01426397.2017.1358360>

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). *Social acceptance of renewable energy innovation: An introduction to the concept*. *Energy Policy*, 35(5), 2683–2691. <https://doi.org/10.1016/j.enpol.2006.12.001>

Wang, N., Verzijlbergh, R. A., Heijnen, P. W., & Herder, P. M. (2023). *Incorporating indirect costs into energy system optimization models: Application to the Dutch national program Regional Energy Strategies*. *Energy*, 276, 127558. <https://doi.org/10.1016/j.energy.2023.127558>

Waslander, L. (9 maart 2023). *Tweedeling provincie door focus op energie*. *Dagblad van het Noorden*. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=news&id=urn:contentItem:67R7-RH01-DYNS-J2JR-00000-00&context=1519360>.

Waslander, L. (11 april 2024). *De leefbaarheid van Groningen onder druk*. *Dagblad van het Noorden*. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=news&id=urn:contentItem:6BS9-Y571-DYNS-J02V-00000-00&context=1519360>.

(23 mei 2023). *'Woningbouw, zonnepanelen en uitkoop boerderijen zetten Drents landschap onder druk'*. *Symposium moet tot oplossingen leiden*. *Dagblad van het Noorden.nl*. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=news&id=urn:contentItem:6897-YNR1-DYP3-30FK-00000-00&context=1519360>.

Zwagerman, M. (27 september 2024). *Er kan in Nederland geen windmolen meer bij; Column Marianne Zwagerman*. *De Telegraaf.nl*. <https://advance-lexis-com.tudelft.idm.oclc.org/api/document?collection=news&id=urn:contentItem:6D2D-K1H1-JBNJ-208F-00000-00&context=1519360>.

List of figures

Introduction

Figure 1: Renewable energy production and consumption in the Netherlands (PDOK, n.d.)(Climate Monitor, n.d.)

Figure 2: Land use of the Netherlands (CBS, 2020)

Figure 3: Agricultural land types in the Netherlands (PDOK, n.d.)(CLC, 2018)

Figure 4: Focus area of conflict between landscape and energy transition (PDOK, n.d.) (CLC, 2018.) (Polman, 2023)(Leeuwarder Courant, 2024) (Daily newspaper of the North, 2024) (Polman, 2021) (Daily newspaper of the North, 2023) (Waslander, 2024) (Hofslot, 2024) (Paster, 2024)(Dutch-news, 2018)

Figure 5: Solar potential of the Netherlands (PDOK, n.d.)

Figure 6: Wind potential of the Netherlands (PDOK, n.d.)

Figure 7: Socio-economic status (Vaals, 2022)

Figure 8: Low income and High energy costs (NOS, 2023)

Figure 9: Focus region – provinces of Friesland, Drenthe and Groningen

Figure 10: Conflict of existing governance and land use (Google Earth, n.d.)(BBC, 2024)

Figure 11: Sketch – Typical rural landscape in northern netherlands

Methodology

Figure 12: Methodological Framework

Figure 13: Key theories used in the report (Moroni, S., De Franco, A., 2024), (Duquenoy, S., 2021), (Vreeker, R., 2004), (Upham et al., 2015), (Plata, J., 2020), (Michaelson et al., 2024)

Figure 14: Conceptual Framework (Przybylinski, S., 2023), (European Commission, n.d.), (Vreeker, R., 2004), (Upham et al., 2015), (Michaelson et al., 2024)

Analysis

Landscape x People

Figure 15: Sketch – Typical rural landscape in northern netherlands

Figure 16: Built environment and infrastructure in Netherlands (PDOK, n.d.)(Volksgezondheid Sport, 2020)

Figure 17: Agricultural landscape types in the North of the Netherlands (PDOK, n.d.)(CLC, 2018)

Figure 18: Nature landscape in the North of the Netherlands (PDOK, n.d.)(CLC, 2018)

Figure 19: Visual characteristics of the Landscape

Landscape x Energy

Figure 20: Sketch- Configuration energy infrastructure on landscape types

Figure 21: Distribution of existing energy infrastructure (PDOK, n.d.)(CLC, 2018)

Figure 22: Impacts on landscape in different energy periods (De Jong, J., & Stremke, S., 2020)

Figure 23: Guidelines for implementation of solar parks (Stremke, S., & Schöbel, S., 2019)

Figure 24: Guidelines for implementation of windturbines (Stremke, S., & Schöbel, S., 2019), (Stroeken et al., 2021)

Figure 25: RES regions in The Netherlands (Wang et al., 2023)

Figure 26: Current government structure (Van Essen, H., 2023)

Energy x People

Figure 27: Sketch - Participation in decision making

Figure 28: Groups concerned with landscape identity transition

Figure 29: Population distribution in relation to wind and solar energy projects (PDOK, n.d.)(CLC, 2018)

Figure 30: Citizen opinions on energy transition Perspectivity, n.d) (Perlaviciut and Squintani, 2019) (Gerdt van Hofslot., 2024) (Lammert Waslander, 2024)

Figure 31: Media analysis key articles (Gerdt van Hofslot., 2024) (Hilbrand Polman, 2023) (Lammert Waslander, 2023)

Figure 32: Community concerns, hopes and dreams (Perspectivity, n.d) (Perlaviciut and Squintani, 2019) (Wolsink, 2011)

Figure 33: Location of Energy Cooperatives (Hier.nu, n.d.)

Figure 34: Structure of Energy Cooperatives (Energie Samen, n.d.)

Figure 35: Territories of Agricultural Collectives (BoerenNatuur, n.d.)

Figure 36: Structure of Agricultural Collectives (BoerenNatuur, n.d.)

Figure 37: Disconnectedness of energy cooperatives and agricultural collectives

Figure 38: Swot analysis

Figure 39: Systemic section of existing situation

Figure 40: Evolution of relationships among people, energy and landscape (Canonvannederland, n.d.) (Rtvnoord, 2016) (ESCP, 2024) (Boxtel, Juffermans, 2015) (ondergroningen, n.d.) (Revolve, 2022) (Westmill Solar Co-operative, n.d.) (Rog, n.d.) (Som Energia, n.d.)

Vision

Figure 41: Values of the Vision

Figure 42: Vision map new Governance structure

Figure 43: Different landscape types (PDOK, n.d.)

Figure 44: Energy disadvantages areas (PDOK, n.d.)

Figure 45: Social disadvantage areas (PDOK, n.d.)(CBS, n.d.)

Figure 46: Potentials and Challenges in the different Territories

Figure 47: New AgriEnergy Cooperatives, AECO

Figure 48: Participation on different levels

Figure 49: Participation of rural residents and farmers in new energy production projects

Figure 50: From a centralized to a renewable decentralized energy production

Figure 51: Integrated and multifunctional land-use

Figure 52: Systemic section of existing situation

Figure 53: Systemic section of new situation stated in the vision

Strategy

Figure 54: General spatial principles for northern Netherlands

Figure 55: Catalogue for agri-energy spatial interventions

Figure 56: Territories with their identities

Figure 57: Overlapping and conflicting elements of existing policies (European Commission, 2021), (European Environment Agency, n.d.), (Paneva, V., 2021), (Ministerie van Economische Zaken en Klimaat, 2021), (Ministerie van Infrastructuur en Waterstaat, 2025), (Westra & Stuurgroep RES Groningen, 2021), (Poepjes et al., 2021), (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021)

Figure 58: Important take-aways from existing policies (European Commission, 2021), (Westra & Stuurgroep RES Groningen, 2021), (Poepjes et al., 2021), (Werkbureau RES-regio Drenthe & JongRES Nederland, 2021)

Figure 59: Stakeholder identification and profiling

Figure 60: Power and interest matrix – Now and Future (Bryson, 2004)

Figure 61: Conflicts and synergies between stakeholders

Figure 62: Stakeholder synthesis as a basis for new governance structure

Figure 63: Values of AECO

Figure 64: AECO goals and functions (Georgieva et al., 2024)

Figure 65: AECO governance structure

Figure 66: Exchange of knowledge, money and energy between AECO territories

Figure 67: X curve

Figure 68: Timeline of the transition

Figure 69: Location of Energy village territory

Figure 70: Spatial Development Strategy – Energy village

Figure 71: Process of participation and spatial governance elements of AECO

Figure 72: Decision tree for AECO members

Figure 73: Demonstrating Implementation of solar energy farm using stakeholders and spatial catalogue, principles

Figure 74: View of the new energy landscape : A case of Nieuwe Weerdinge

Figure 75: View showing before and after conditions of the village edge

Figure 76: View showing before and after conditions of a crop farm

Conclusion

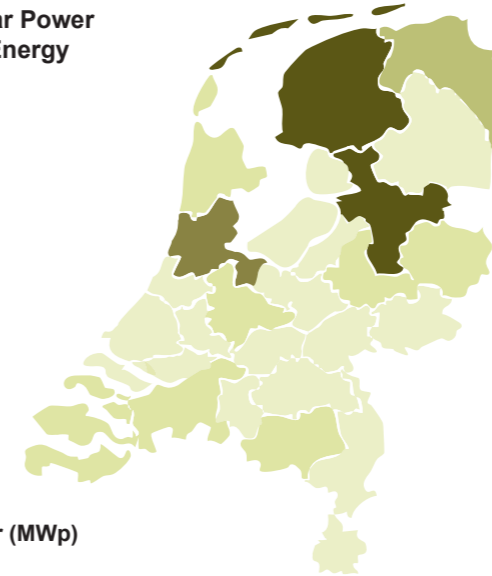
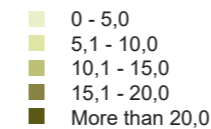
Figure 77: Sustainable Development Goals achieved by goals of the Vision (THE 17 GOALS | Sustainable Development, n.d.)

Figure 78: Benefits for Stakeholder

Appendix

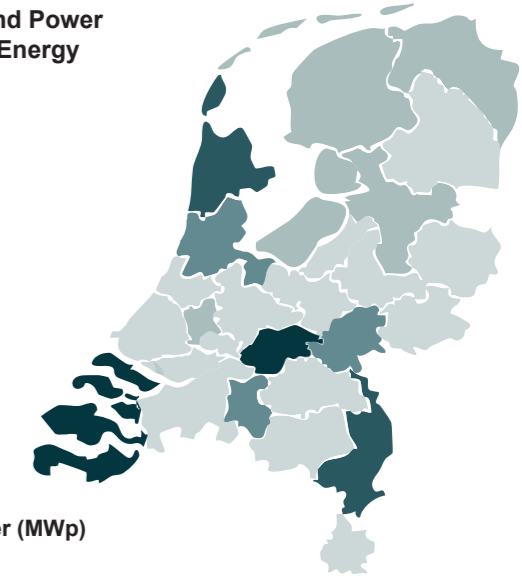
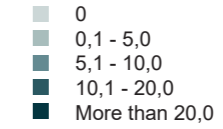
Amount of Solar Power Generated by Energy Cooperatives

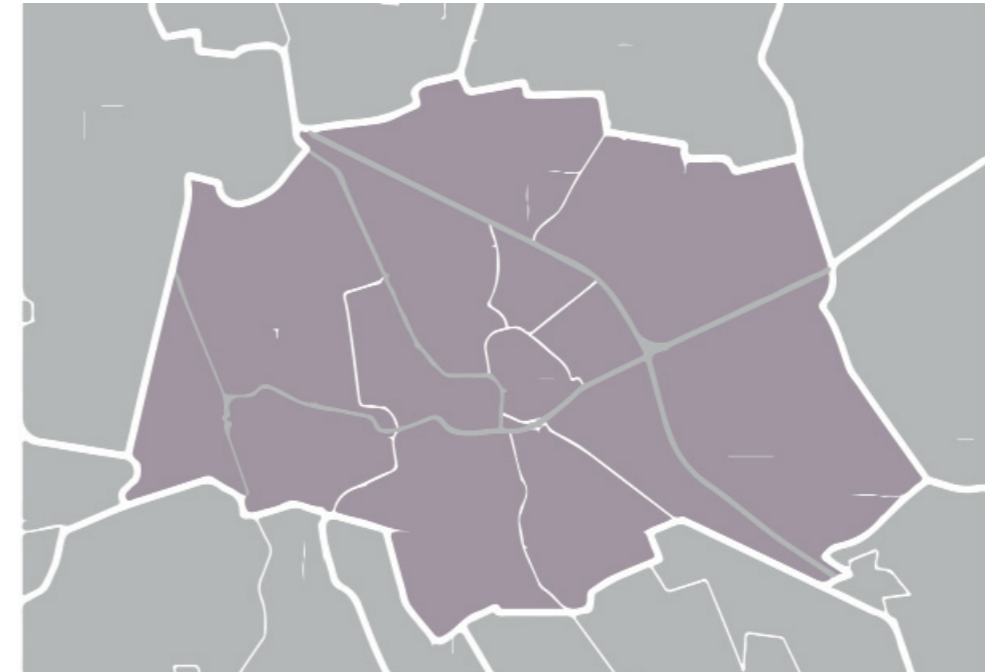
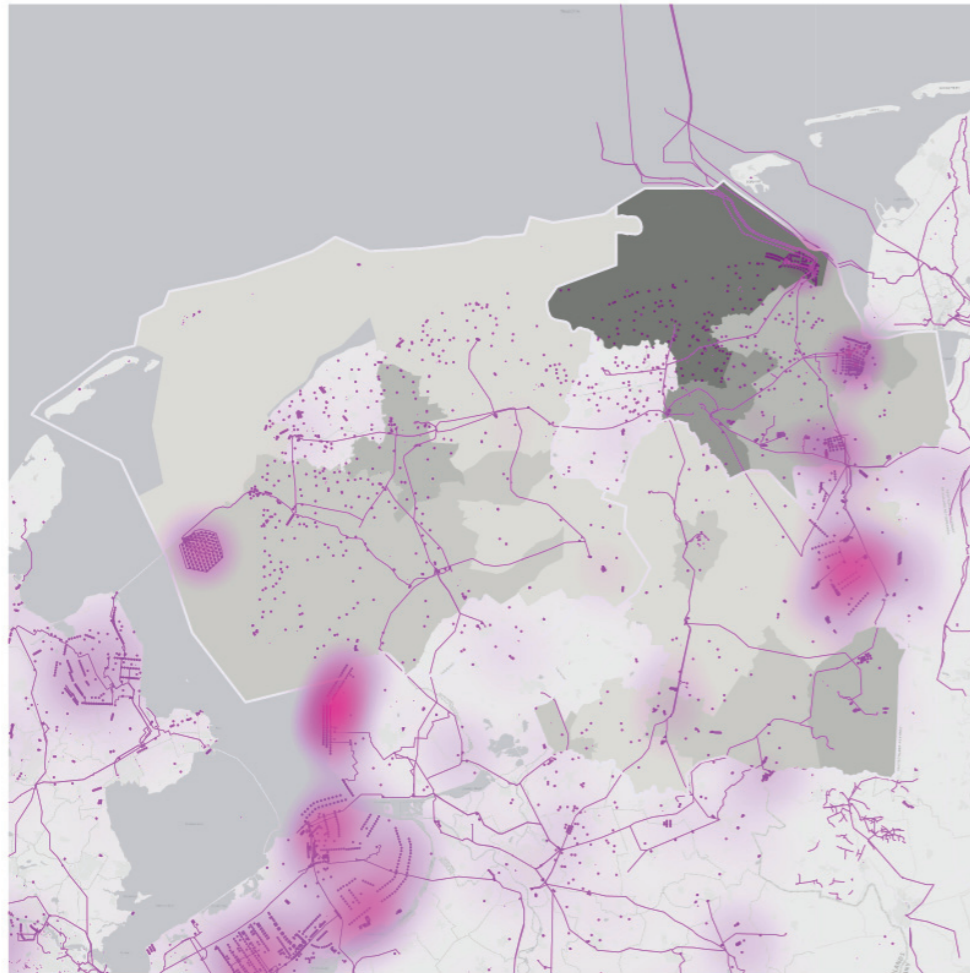
Solar Power (MWp)



Amount of Wind Power Generated by Energy Cooperatives

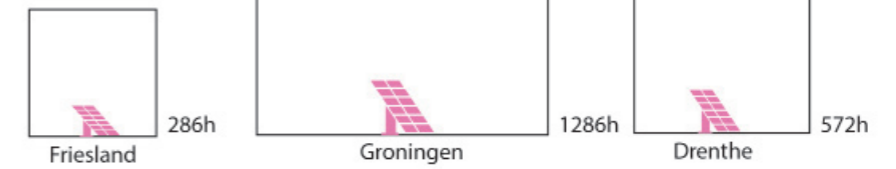
Wind Power (MWp)





Area needed for plans, in comparison to Groningen City

Solar parks



Windturbines

