

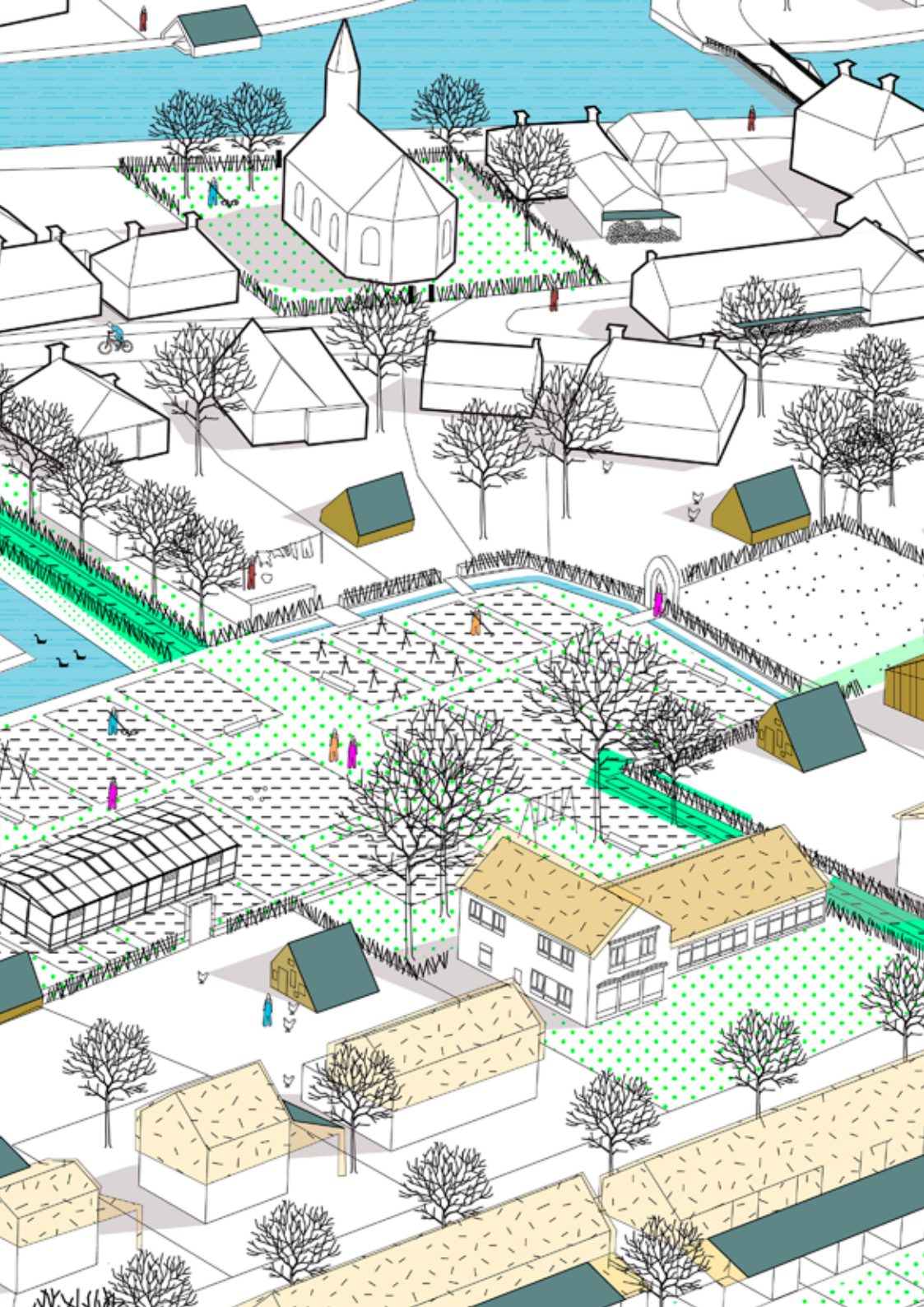


**IABR-ATELIER  
GRONINGEN**

# **THE NORDIC CITY**

**The Energy Transition as a Driver  
for the Next Economy in the City  
and Region of Groningen**

Nordic City





# THE NORDIC CITY

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for the Next Economy in the City  
and Region of Groningen

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IABR-Atelier  
Groningen

# AN ATTRACTIVE PROSPECT FOR CITY AND REGION GRONINGEN



Although the earthquake with a magnitude of 3.6 on the Richter scale that hit Huizinge in August 2012 caused a lot of damage and distress, it was also a turning point: suddenly it became perfectly clear that the extraction of natural gas from the Groningen field leads to unacceptable risks. It also made people realize that the largest gas field in Western Europe would be depleted shortly after 2023.

Since 2012, safety is a priority in considerations regarding natural gas. Residents are very worried about their personal safety, about damage repairs, about the value of their properties, and about the pace at which their houses are being reinforced. These are understandable concerns, deserving of attention, but we must also look ahead. How will we heat our homes in the future? Where will our power come from? What economic opportunities will there be? What will the city and the region look like in 25 years' time? And are we capable of changing tack?

The city and the region have a strong ambition to become energy neutral in the future. The realization that climate change presents unacceptable risks and must be countered is widely shared. Many people in Groningen feel the need to find an alternative to natural gas. The energy transition is a priority for authorities, many businesses, knowledge institutes, and residents.

Last year, when the International Architecture Biennale Rotterdam contacted the city and the region Groningen to participate in IABR-2016- THE NEXT ECONOMY and further develop the energy transition theme, everyone was imme-

diately enthusiastic. Over the past year, dozens of people have joined the quest for the possible significances of the energy transition to the economy, and to the spatial organization of the city and the region. Exploring and discussing these issues together in the Atelier mutually influenced and inspired a large number of researchers, entrepreneurs, residents, architects, and energy experts. This in turn led to beautiful designs, quality analyses, and exciting proposals on and off the beaten track. Not everything is in keeping with current policy and thought. But that's all right. This Atelier helps us look at the future of the city and the region differently. It offers a perspective to work towards. It is the beginning of a joint process involving governments, entrepreneurs, interest groups, and residents. It is time for us to work hard to realize our ambitions.

We are proud of the end result and hope you will enjoy all there is to see in the exhibitions in Rotterdam and Groningen. And we look forward to discuss the outcomes and possible next steps!

### **STEERING COMMITTEE IABR-ATELIER GRONINGEN**

**Nienke Homan (Member of the Provincial Executive of Groningen);**

**Roeland van der Schaaf (Alderman for the City of Groningen);**

**Rika Pot (Mayor of the Municipality of Appingedam);**

**Marijke van Beek (Mayor of the Municipality of Eemsmond);**

**George Brugmans (Executive Director IABR);**

# RE-IMAGINING GRONINGEN

No-one knows what the future will hold. We can only think about it. Similarly, no-one knows what the Next Economy will hold. When it comes to the subject of the future of our economy, however, we emphatically need to think about it: now more than ever before.

We are in fact standing on the threshold of a new age. We are looking back on a period of unprecedented wealth and prosperity, marked nationally by postwar reconstruction and an economic growth that has persisted since the 1960s. But this economic model cannot help us anymore. One reason for that is our energy supply.

Looking back, it is nothing short of remarkable how little we thought about the energy that our economy required. Long before gas was discovered in Groningen, we believed that we would never be short of energy. This had everything to do with the discovery of nuclear power – ‘energy, too cheap to meter’ we called it in the 1950s. As it turned out, nothing was further from the truth. Meanwhile, the economy flourished due to the tailwind of fossil fuels.

Now we know that an economy based on fossil fuels will not be part of our future. Not because we’ve run out of fossil fuel, but because burning CO<sub>2</sub> undermines our future. There is no shortage

of CO<sub>2</sub> underground, there is too much of it in the air, as Dirk Sijmons, curator of the previous IABR, put it. So we need to explore the prospects of a green economy. This is an urgent task: can we run our society producing no more than 5 to 15 percent of current CO<sub>2</sub> emissions? This is what we have committed to doing at the COP21, the Climate Conference in Paris.

At times, many of us feel like the proverbial deer caught in the headlights of an oncoming car. We can see the danger, but what can we do? What *must* we do?

I think that the climate crisis is also a crisis of the imagination. The risks are well known. But we lack prospects of how to go on; we lack ideas and images that show the opportunities of a green, circular economy. Not only have we taken energy for granted in the past, we quite naively also thought of other resources in terms of unending availability. This linear, input-output economy now has to give way to a circular economy in which the use of materials is always aimed at their reuse.

Given the current crisis of the imagination, research by design comprises a logical step. In fact research by design, with methods like the 'Ateliers' that the IABR has developed in recent years, creates an extraordinary tissue that unites knowledge, interests, challenges, and resources in visions and plans. The concept of the 'Nordic City', the perspective for the city and region that is the outcome of the IABR-Atelier Groningen presented in this brochure, provides an exceptional example. It offers conditions for a debate focused on shared

future prospects rather than on 'compensation,' guilt, and atonement. The IABR-Atelier Planet Texel, the 'Urban Carpet' developed by the IABR-Atelier BrabantStad as part of IABR-2014-URBAN BY NATURE, and the competition 'Rebuild by Design' that took place in the United States are all processes that have proven their worth. Designs are created on the basis of the dialogue that takes place at the Ateliers. But each design is also always the starting point for what comes next. For the continuous quest for workable solutions that demonstrate that a green Next Economy can work very well indeed.

In 2016, global investments in renewable energy will exceed those in oil and gas for the first time ever. It's time to anticipate the Next Economy. Favorably positioned, Groningen may well take the lead.

**Maarten Hajer**  
**Chief Curator IABR-2016 –**





# THE NORDIC CITY

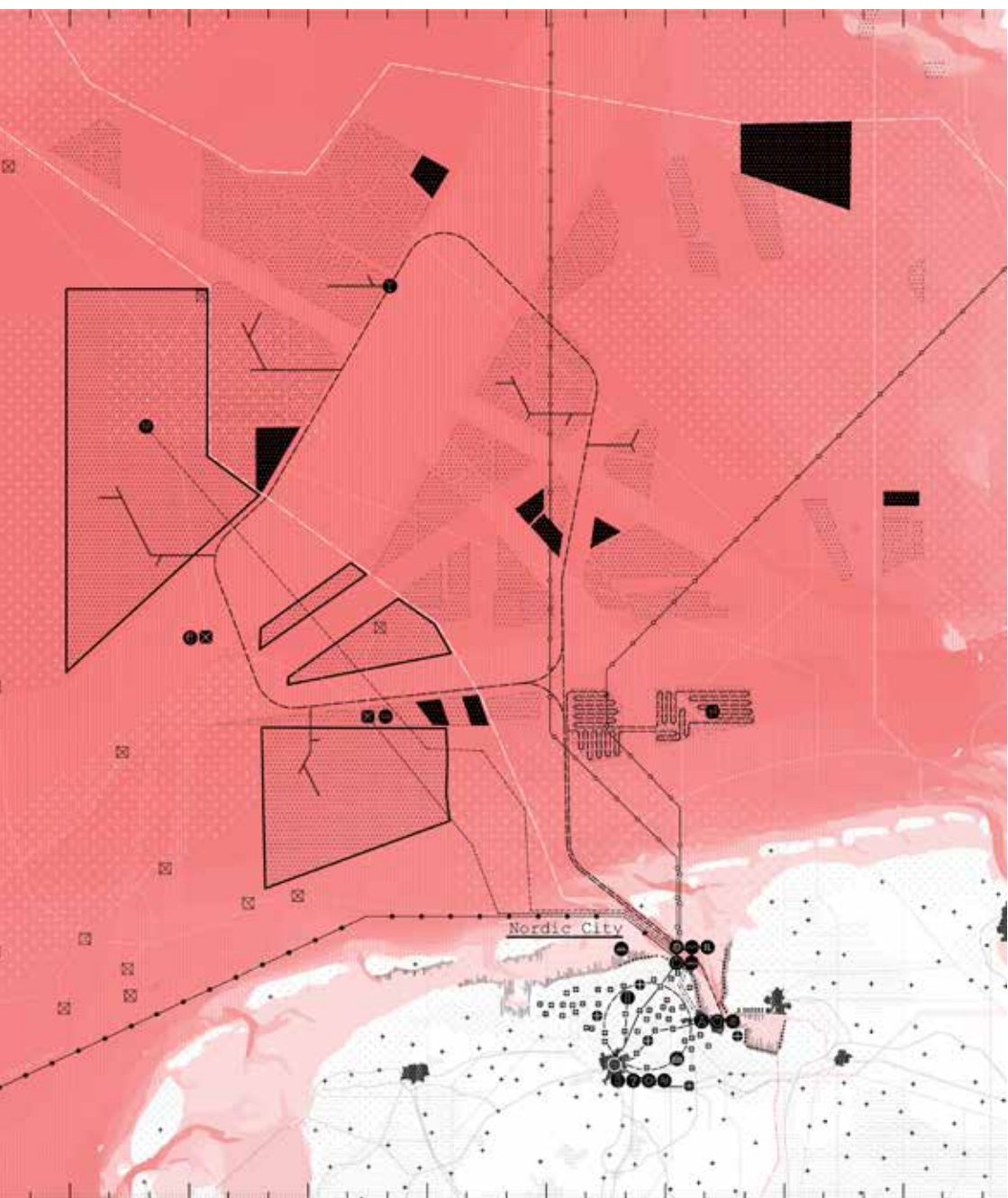
## **The Energy Transition as a Driver for the Next Economy in the City and Region of Groningen**



The Groningen region has seen more than half a century of natural gas extraction, supplying households in the Netherlands and beyond. As a result, earthquakes now occur, causing considerable damage from time to time in the villages and to the landscape of Groningen. All the more reason for Groningers to say: the transition to renewable energy has become inevitable. Both the city and the province of Groningen want to move on and to have largely realized the energy transition by 2035. The IABR–Atelier Groningen has examined the opportunities the transition to renewable energy may bring and specifically whether it can create healthy economic prospects for the city and the region. How can the energy transition strengthen the quality of the urban and rural landscape to advance the region's Next Economy?

The research area covered the territory of eleven municipalities that are in the earthquake zone, complemented with that of the city of Groningen. The Atelier's research has demonstrated that the energy transition can boost the economy of the city and the region while an integrated approach can also strengthen the characteristics of the city and the landscape – for instance by the combined repair of earthquake damage and greening of dwellings and buildings in the earthquake area.

The concept of the Nordic City brings all factors together: a whole, strong, complete city surrounded by a wide range of quality-conscious and sustainable green villages, held together by a shared energy ambition and a developing regional energy economy.





## The City and Region of Groningen: A Strong Position in an International Context

In the wider context, the energy region of Groningen clearly stands out. With its extensive energy-based knowledge infrastructure and logistic hub and landing point for power and data in the Eemshaven sea port, the region can develop into an energy hub that serves a large area.

The area includes four zones: the North Sea with large wind farms serviced out of Eemshaven; next, the Wadden system as a recreational destination and nature reserve; adjoining the Wadden is the sea clay area of the northern Netherlands and Northern Germany, with a cluster of attractive villages in the agricultural landscape and Delfzijl as a center for green chemistry; and finally a series of growing, robust cities (Leeuwarden, Groningen, Oldenburg, Bremen, and Hamburg).

The city and region of Groningen: energy economy in an international perspective

## The Energy Transition in Connection with the Economy of the Region

If all parties pull together it will be possible to reduce CO<sub>2</sub> emissions by 95 percent between now and 2035 and to sustainably produce up to 90 percent of the energy demand. As a source of energy, natural gas will disappear into the background. Ambient heat, geothermal heat, solar heat, and electricity will replace the share of natural gas. A mobility transition is imminent, with people by and large traveling by electric cars and (electric) bicycles. Wind energy and solar energy will provide the large amounts of energy this requires. Individually or collectively, residents and businesses in the city and the region increasingly meet their own energy demands using solar panels on roofs and in residual spaces in cities and villages, solar water heaters, and heat pumps. The 'electricity-driven region' is becoming a reality.

The challenge lies in balancing the system: in finding ways to use the excess supply of wind and solar energy, and ways to counteract an insufficient supply. This is best done by converting power into hydrogen in large power-to-gas installations (P2G) that will make the chemical industry more green and renewable energy more profitable. Batteries of electric cars and hot water buffers in homes and buildings can also add capacity for the storage of surpluses.

It takes a lot of biomass to produce the high-temperature heat required for industrial purposes, to back up the power supply, and to fuel trucks, aircraft, and ships. The 'bio-footprint' of the energy system may still be considerable in 2035.

The use of hydrogen gas from P2G installations can reduce this footprint.

Finally: without substantial savings on energy between today and 2035, the energy transition is impossible. Combining the repair of earthquake damage with the reinforcement and insulation of homes and buildings offers the region the opportunity to pioneer the energy transition, with all the economic opportunities that entails.

The economic effect of the energy transition becomes substantial when we take the connections into account that the energy sector can make with other strong urban and regional economic sectors: agriculture, chemistry, knowledge institutes, ICT, and construction. When we compare the impact of the energy transition with the positional advantages of the region (with its sea ports, strong city, and abundance of space), robust trends (such as globalization, but also the growing self-esteem of the inhabitants of Groningen), and the currently strong economic sectors, a number of promising economic clusters emerge. Four clusters stand out: *Energy Port*, *Biobased Economy for the North*, *Groningen: Smart Energy City*, and *Sustainable and Safe Villages*. They bundle the economic activities that will ensure that the energy transition will take root in the city and the region of Groningen.

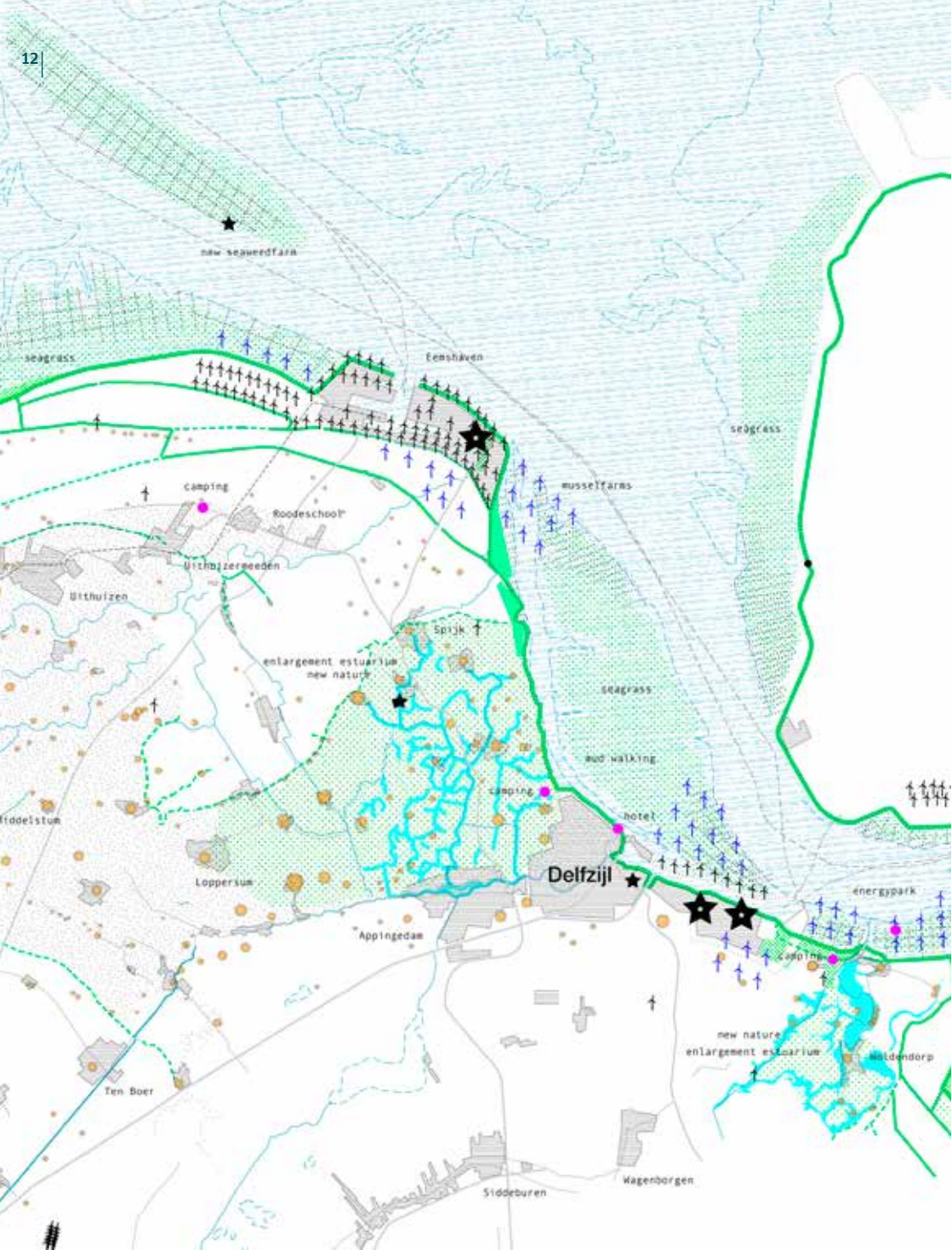


Prospect for Eemshaven: center for offshore wind, biomass supply, buffering, and energy distribution

## SPATIAL DESIGN PROPOSALS

# Energy Port

The Groningen-Eemshaven-Delfzijl triangle, which already offers the right preconditions, can further develop into one of the main energy hubs of northwest Europe. First, Eemshaven is a major international link in the chain of international electricity and gas pipes and cables for data traffic. This makes the region an attractive location for data centers from all over the world. Secondly, Eemshaven is the ideal base for the offshore industry in the part of the North Sea above the Wadden. The construction, building, and maintenance of large wind farms comprise a long-term and comprehensive activity. In the third place, supply and processing of biomass converge in the port complex of the Eemdelta. These conditions together ensure that the Groningen-Eemshaven-Delfzijl triangle can function as the *energy port* and major market place for the production,





The wind landscape experience

storage, and marketing of energy for a large area. Centrally (by wind farms) and locally (through rooftop solar panels) produced energy merges in the region and requires a continuous balancing and fine-tuning of supply, storage, and transport.

The Atelier proposes to continue the concentration policy for wind on land. Especially now that the newest generation of turbines transcends the scale of mounds, villages, and the open landscape, it is a good solution that will preserve the appeal of Groningen's open sea clay landscape. This requires the further development of the locations near Eemshaven and Delfzijl on the Eems-Dollard estuary. There, across a wide expanse of water, the wind turbines offer a dynamic experience. The proposal includes research concerning the development of more wind energy production along the coast in conjunction with the substantial strengthening of the ecological values of the Eems-Dollard estuary.



Eems-Dollard: energy bay



Prospect for Delfzijl: a 'green' industrial complex and the center of the biobased activity in the region

## SPATIAL DESIGN PROPOSALS

# Biobased Economy for the North

In the cluster *biobased economy*, we anticipate a successful union between the greening of the chemical complex in Delfzijl and the further development of the strong agricultural sector in the area, with the principles of the *biobased economy* as a shared starting point. The combination of a large crop acreage (North Netherlands and North Germany), the presence of industrial complexes and plenty of wind energy makes the region of Groningen one of the best locations in the world for the transition to the *biobased economy* to take shape.

The industry in Delfzijl can become greener and smarter. Recycled and sustainable materials can replace fossil ingredients. This becomes an innovative environment where fibers, bioplastics, biogas, and biofuels are produced from residual





Agriculture for a biobased regional economy

products of regional agriculture. Residual heat and residual products are used directly and locally.

Green chemistry and the *biobased economy* will generate a wide range of business types in different sizes. The large-scale enterprises of the chemical complex form the core, but small, innovative businesses and laboratories that focus on recycling and the processing of residual products are beginning to show up. These start-ups and developing enterprises are looking for green environments to do business in.

In the agricultural area, potatoes, corn, and sugar beets can still be grown. What is new is the Atelier's proposal to apply the principles of 'cascading': the protein-rich part is used as food for humans and animals, the left-over fibers are

raw material for the green industry, and the residual products are refined into biofuel.

The crop acreage in the region and the chemical complex in Delfzijl are interconnected. Agriculture generates all kinds of raw materials (besides food) that are processed by the industry. In addition, agricultural business and landscape maintenance supply biomass for energy production.

Another attractive prospect is to seize the opportunity and use as many locally produced materials in construction as possible. The agriculture in the region can provide building products: hemp panels for insulation, compressed straw panels, maize-cellulose for sheet material. The use of such sustainable building materials fits the profile of the energy region.



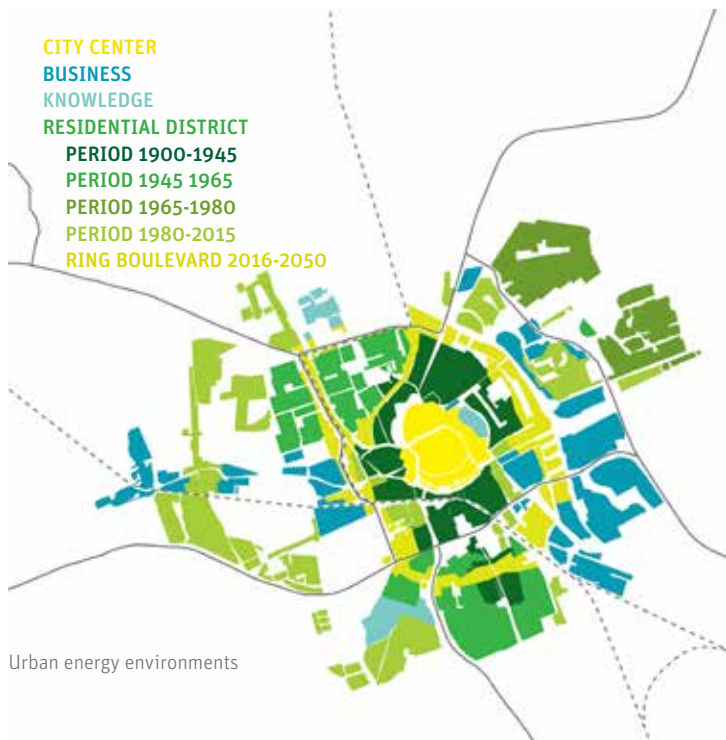
Prospect for the Smart Energy City: the Ringstraat as a new urban environment.

## SPATIAL DESIGN PROPOSALS

# Groningen Smart Energy City

Between now and 2035, the collaboration between centers of education, knowledge institutes, and businesses in the city of Groningen that are part of the sustainable energy region will develop further into a coherent economic cluster. Innovations in the field of generation, storage, and distribution of energy on the one hand and ICT applications on the other go hand in hand. The new energy system requires continuous fine-tuning: between self-sufficiency and supply, between high and low energy demands, between driving and consuming versus standing still and storing energy in the city's electric car fleet. This fine-tuning requires smart meters, networks, and systems. And, most of all, people who can make the most of a flexible and fluctuating energy system. All of this can be found in *Groningen Smart Energy City*.

**CITY CENTER**  
**BUSINESS**  
**KNOWLEDGE**  
**RESIDENTIAL DISTRICT**  
**PERIOD 1900-1945**  
**PERIOD 1945-1965**  
**PERIOD 1965-1980**  
**PERIOD 1980-2015**  
**RING BOULEVARD 2016-2050**

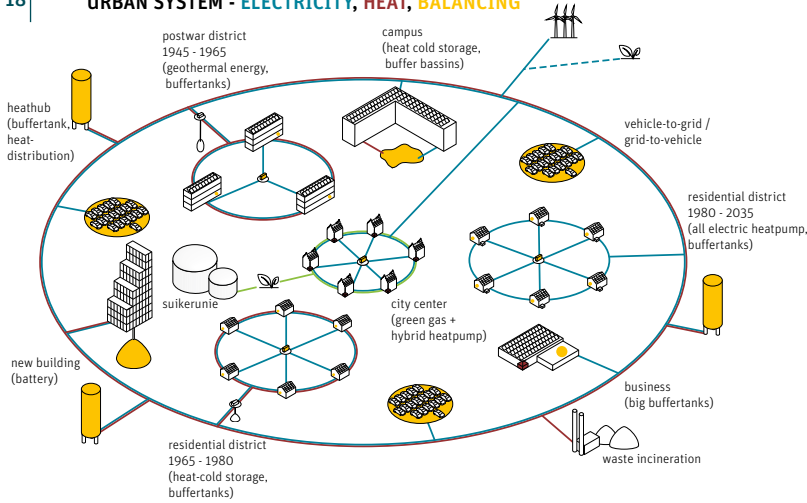


In the spatial transformation of the smart energy city, we distinguish different urban environments that each features a distinctive mix of energy measures. Each of the environments can realize a particular combination of the degree of insulation that can be achieved, the way heat is supplied, and the way electricity is produced.

Urban energy environments

2035

	<b>CITY CENTER</b>	<b>POST WAR DISTRICT</b> 1945-1965	<b>RESIDENTIAL DISTRICT</b> 1965-1980	<b>RESIDENTIAL DISTRICT</b> 1980-2015	<b>RING BOULEVARD</b> 2016-2050
<b>SAVING</b>	- internal wall insulation	- external wall insulation	- high quality insulation	- high quality insulation	- energy neutral
	ENERGY LABEL: E → C	ENERGY LABEL: D → A++	ENERGY LABEL: C → A	ENERGY LABEL: A++	ENERGY LABEL: A+++
<b>ELEC-TRICITY</b>					
<b>HEAT</b>	- green gas - hybrid heatpump - high temperature heating	- all electric Heatpump - low temperature heating - heat recovery system	- heating network (geothermal energy) - high temperature heating	- all electric Heatpump - low temperature heating - heat recovery system	- heating network - low temperature heating - heat recovery system
<b>BALANCING</b>	- individual buffertank	- collective buffertank - electric vehicle	- individual buffertank - electric vehicle	- individual buffertank - electric vehicle - battery	- collective buffertank (heat hubs) - electric vehicle (car-sharing) - battery



The measures taken in the field of heat, electricity, and buffering of the instances of high and low energy demand require networks that connect individual houses and buildings with collective, central locations for distribution and storage. This results in networks for heat, electricity, and buffering at the level of the city.

Urban energy network: system design for heat, electricity and balancing.

Bundling the networks of heat, electricity, and buffering and realizing them circularly – coinciding largely with the city’s current ring road – means that the entire metropolitan area can be covered. The use of electric vehicles and car sharing ensures that the traffic space in the ring can be reduced. That space can be used to construct a light rail connection that connects the economic focal points and the knowledge centers of the city. The ring also has room for a new urban environment. An environment that is cleverly set up from an energy and mobility perspective, that focuses on encounter and exchange, and that can accommodate a large part of the growth of the city until 2035. The ring structure forges the different urban districts together into a single coherent urban environment.



The Ringstraat as a new urban environment







Prospect for a Sustainable and Safe Onderdendam: reparation, reinforcement and greening of homes.

## SPATIAL DESIGN PROPOSALS

# Sustainable and Safe Villages

The reparation, reinforcement, and greening of homes and buildings in the earthquake area triangle bring energy-neutral homes and buildings within reach. An additional advantage is that these houses do very well on the market.

The combined approach to homes and buildings in the earthquake area will boost the construction sector and installation companies (heat pumps, solar water heaters and solar panels, batteries and other forms of storage) in the city and the region. New energy-efficient concepts for dwellings and living environments can be developed for cases involving demolition and new construction. The construction sector will become a driving sector because its knowledge and techniques can also be applied elsewhere in the Netherlands and abroad.

## Onderdendam: a community based approach

For the Groningen village of Onderdendam, the Atelier investigated how renewable energy insulation initiatives in houses and reparation of the

earthquake damage can go hand in hand with maintaining and improving the qualities of the village. An integrated approach to the energy issue can lead to a network of energy facilities for Onderdendam while its historical and iconic



New network of the sustainable village of Onderdendam



ensembles of monumental buildings will be kept free of solar panels as much as possible. A number of prominent buildings (village hall, monumental barn) will have collective functions as charging points and parking spaces, combined with meet-

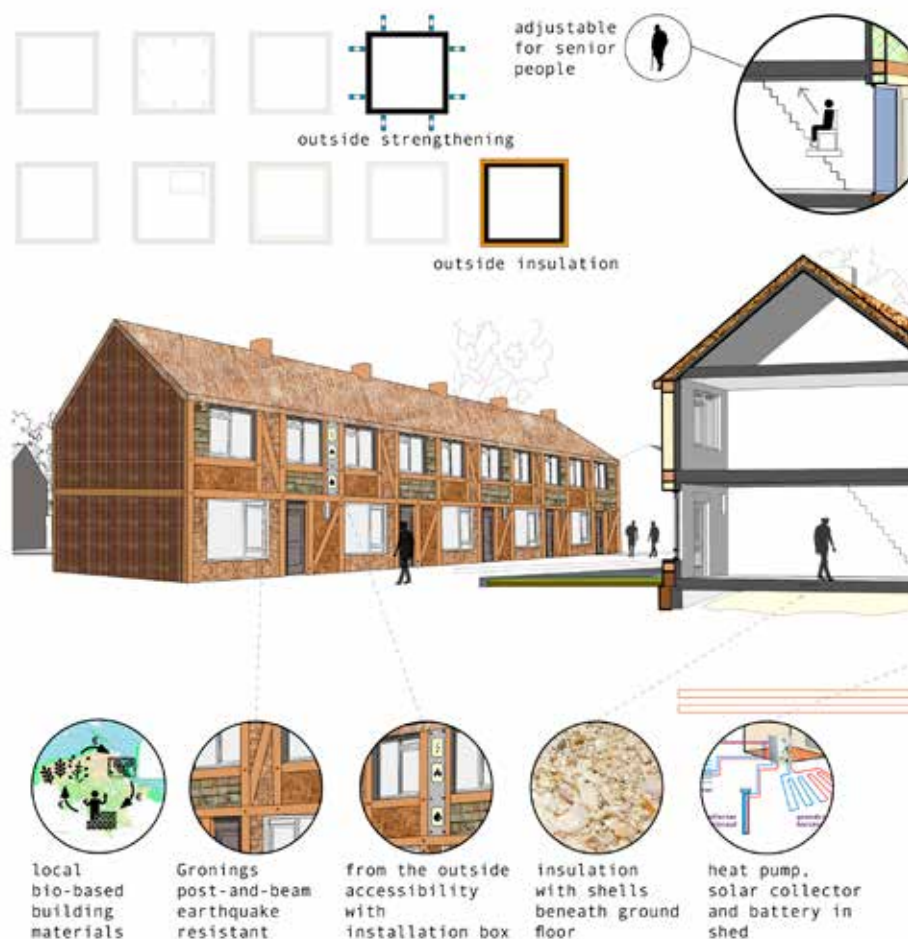
ing functions. And the greenery in and around the village will also become 'of the village'; the 'harvest' goes to the biomass plant to play a (modest) role in the buffering of the energy system.



## Biobased buiding material

Plans developed to make five types of buildings common in Ouderendam both energy-neutral and earthquake-proof include the use of as many biobased, locally produced building materials as possible. As it turns out, combining reparation with insulation measures is profitable.

The Ouderendam approach serves as a model for the approach of the other villages in the region. This way, a wide range of quality-conscious and strong villages will emerge to complement the residential areas of the city.



Example of combining repairs and greening: biobased workmanship for a single-family dwelling

A highly cohesive urban region including a strong and smart city with a multicolored facility system and robust surrounding villages, held together by a sustainable energy and transport system and ready for the Next Economy: *the Nordic City.*



# INSPIRATION FOR THE FUTURE

Nordic City tells a story about a future that is both viable and desirable and can actually become a reality. This story puts a firm spin on the image of Groningen by highlighting the opportunities of a region that is now mostly known for its struggle with persistent problems like earthquake damage and demographic and economic shrinkage. It is a story that can rekindle the confidence necessary to draw investments to the region, to realize the energy transition, to repair the earthquake damage and turn lost ground into a head start. Nordic City comprises proposals that are ready for implementation as well as far-reaching concepts that will take a little more time. Rather than being visionary, the story paves the way for new projects and encourages policy- and decision making.

Below are some directions for the future and roads that may lead there.

## **Small Where Possible**

The energy transition is an issue that the 'energetic society' can take part in. A large proportion of the energy transition taking place in the Nordic City is the result of hands-on activities by individual residents and businesses in the city and the region. People are insulating their homes, making their businesses sustainable, driving electric cars, or producing solar or wind power. Public authori-

ties and energy companies have a role to play in facilitating, stimulating, and accelerating these types of initiatives by allowing experiments and energy collectives such as Grunneger Power and GREK to develop. The national government should play its part by adapting the rates for electricity and taxation to the point that the storage and buffering of energy becomes profitable.

### **Large Where Necessary**

However, bottom-up initiatives alone are not enough. Besides making room for this type of initiative, the energy transition requires interventions on a regional and international level, as well as overall guidelines for action.

One example of a far-reaching proposal is to turn the coastal zone of the Eems-Dollard estuary near Eemshaven and Delfzijl into a Energy Bay. The essence of the proposed approach is that sensitive issues like wind power are developed in conjunction with other issues, rather than by sector.

The Ringstraat intervention in the urban fabric of the city of Groningen is another such example. Nordic City addresses major interventions as well. Connecting the energy transition to other issues and forming new alliances to develop and realize them can create synergy, open debate, and support. Public parties and especially the province and the city are in a position to initiate this. To do so they have to involve parties at an early stage and enter the stakeholders' arena with an open agenda.

The Nordic City concept couples small initiatives with major intervention and involves various collaborative trajectories across the boundaries of sectors, budgets, and interests.

### **Combined Approach: Earthquake Resistance and Sustainability**

In the Multiannual Program Earthquake Resistant and Viable Groningen 2016-2020, the National Coordinator Groningen addresses the combined issues of making homes and buildings in Groningen earthquake resistant and energy neutral. However, these are merely recommendations to activate research and debate. The brief of Atelier Groningen and the ambitions of the commissioners are more far-reaching. The Onderdendam proposal makes a combined approach concrete. As it turns out, it is possible and efficient to couple restoration measures with both the insulation of residences and buildings and with the provision of means for sustainably energy production. Tenants and private owners can use savings in energy costs to finance the measures.

To encourage this combined approach, it is necessary to establish guarantee funds or create the possibility to prefinance necessary interventions. Public parties ought to encourage the combined approach and ensure that the required certainties and guarantees are established. They also ought to involve, activate, and encourage residents, housing associations, and businesses at every opportunity. The Onderdendam proposal shows that a method that involves the towns as a whole and an integrated approach to homes and residential environments can reinforce the qualities of towns.

### **Preservation and Enhancement of the Quality of Life Are Crucial**

The preservation and enhancement of the quality of rural residential environments and landscapes are of major importance for keeping a region that

struggles with a shrinking population attractive as a living and working environment. Secure, sustainable homes do better on the housing market. A valuable agricultural landscape with large open spaces, free of wind turbines, coupled with landscapes that combine economic activity and wind turbines, demonstrates care and attention for environmental quality. Urban and traffic structures that facilitate innovation and boost the quality of life and businesses in the city create an attractive environment for residents and entrepreneurs. Atelier Groningen shows that the energy transition will greatly influence residential environments, but that the integration of the corresponding provisions and networks can preserve and reinforce their quality if plans are implemented carefully in collaboration with the parties involved and designed with a sense of location, material, and detail. To strengthen the confidence in the region as a residential environment and an investment climate, every spatial intervention has to boost quality.

### **Investing in the Region**

The energy and economic research has calculated that the energy transition requires an investment volume of 7 billion euros in the region. In addition to the 1 billion investment necessary for the production of solar and biomass energy, it will take an approximate 2.1 billion to produce wind power on land and at sea, 1.9 billion in energy savings, and 1.5 billion for heating projects. These investments will reinvigorate the city and the region as a residential and business environment. The transformation with respect to the large-scale production of renewable energy has a great appeal to new businesses and will lead to a

fundamental change in the energy sector. Overall, that sector will benefit and therefore grow. This effect will multiply once related sectors such as ICT, construction, chemistry, and agriculture start offering the energy sector new services and products. Furthermore, the city and the region can benefit from the pioneering role they play. Prioritizing and accelerating the energy transition, they can effectively focus on the integration of restoration measures in the earthquake area by insulating residences and buildings and providing the means for sustainable energy production. They ought to wholeheartedly decide to address the three issues together. Such a decision would create a plethora of economic opportunities and give the region, which has contributed to the prosperity of the Dutch national economy for many years, back some of the revenues it produced: not only secure houses for comfortable living, but an economic future as well. A prospect the region is entitled to, and that will keep it going for quite some time.

# COLOPHON

## IABR-ATELIER GRONINGEN

What opportunities for the economic and environmental quality of the city and the region will occur if we facilitate the energy transition? It was this question that kick-started the IABR-Atelier Groningen. The Atelier developed four prospects in an intensive process of research by design and exchange with experts and stakeholders from the city and the region. From the Biobased North to Sustainable and Safe Villages, and from Energy Port to Smart Energy City Groningen, the prospects stem from a blueprint of the transition to renewable energy by 2035 and ways in which this could be economically productive. The results show that Groningen can become a pioneer, once the stakeholders in the energy transition genuinely get down to business.

The IABR-Atelier Groningen is part of IABR-2016-  
THE NEXT ECONOMY.

### Commissioners

Atelier Groningen is a collaboration of the International Architecture Biennale Rotterdam (IABR) and the Province of Groningen, the Municipality of Groningen, Eemsdelta Region and the Groningen-Assen Region.

### Atelier Master

Jandirk Hoekstra (H+N+S Landscape Architects)

### Research and Design Offices

Quintel Intelligence;  
E&E Advies;  
Atelier of the Chief Architect of the Municipality of Groningen;  
Specht Architecten;  
Studio MARCHA;  
MD Landscape Architects;  
Maat ontwerpers;  
van Paridon x de Groot in collaboration with LINT;  
DAAD Architects.

### Steering committee

Nienke Homan (Member of the Provincial Executive of Groningen);  
Roeland van der Schaaf (Alderman for the City of Groningen);  
Rika Pot (Mayor of the Municipality of Appingedam);  
Marijke van Beek (Mayor of the Municipality of Eemsdmond);  
George Brugmans (Executive Director IABR).

### Project group

Marieke Francke (iabr/UP);  
Gerhard te Rijdt (Province of Groningen);  
Wouter van Bolhuis (Municipality of Groningen);  
Harrie Hoek (Eemsdelta Region);  
Enno Zuidema (Eemsdelta Region).

## PUBLICATION

### Editors

Jandirk Hoekstra (H+N+S Landscape Architects);  
Marieke Francke (iabr/UP).

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Neon ontwerpers

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Maat ontwerpers

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InOtherWords, D'Laine Camp, Gerda ten Cate,  
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