

## Energy Transition and Sustainable Spatial Development in the Northern Netherlands

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### 1 INTRODUCTION

European cities are responsible for more than half of greenhouse gas emissions and their inhabitants consume around 80 percent of the total energy supply. Sustainable spatial development can contribute significantly to a reduction in greenhouse gas emissions in cities and villages. It also plays a role in the increasing need to adapt to climate change. The large cities in the Randstad region of the Netherlands have each drawn up their own individual climate policies. In the North of the country, however, regions actually cooperate with each other in this area. This study explores the state of affairs of climate policy in general in the Netherlands, and specifically the policies in the North at provincial, regional and local level. The input for this study is an analysis of actual projects and policies from the three northern provinces, supplemented by findings from interviews with staff at a number of municipalities in the provinces Drenthe and Groningen. We focus on mitigation and adaptation policy linked to spatial planning and we ask what the similarities and differences are in the policies of the various government bodies and if the measures contained in these policies are realistic. In addition, we question whether the initiatives for cooperation between government bodies are actually effective. This study is not a full investigation but a preliminary exploration which leads to recommendations in the planning of climate-proof towns and regions in the Netherlands.

### 2 THE NETHERLANDS AND THE CLIMATE

The Dutch receive information about the climate from all sorts of sources. Besides news reports on extreme weather conditions and international climate meetings, there are also the necessary climate studies and policy documents. The one side focuses on the causes and dangers of the climate problem while the other focuses on the different strategies for solutions. In 2008 the Delta Committee, led by the former government minister Veerman, reported that the Netherlands did not meet the current standards on flood risks. Moreover, in the coming decade the risk of flooding will increase as a result of climate change which means that the sea level will rise and variations in river outflow will increase. But flooding is not the only climate problem. The emissions from combustion engines have reduced the quality of air in towns and urban areas. The urban heat island effect is threatening living conditions in these areas. The outlook for our built-up, low-lying country is not very rosy. There are all sorts of policies to tackle the problems we are currently facing. A coherent mitigation policy (reduction of greenhouse gas emissions) can help limit the problems described above. In addition, through adaptation measures the Netherlands is attempting to adjust to the consequences of climate change. Besides existing mitigation and adaptation policy, the government is also working on energy transition, to switch from fossil fuel to sustainable energy. The aim of this energy transition is that by 2050 the Netherlands will be able to supply its own energy requirements in a sustainable manner. Of the three areas of climate policy in the Netherlands outlined here above, this article will focus on mitigation and adaptation. These two aspects cannot be considered separately and in provincial and municipal policies they are go hand in hand. Spatial planning that takes the climate into account also usually focuses on both these areas.

Mitigation targets in the national policy which dated from 2007 were reduced after 30 September 2010. On this date a new, right-wing government came to power in the Netherlands. The new cabinet wants to achieve a 20 percent (previously 30 percent) reduction in CO<sub>2</sub> emissions and the use of 14 percent (previously 20 percent) sustainable energy by 2020. It is doubtful whether the Netherlands will be able to achieve the much tougher targets that are necessary to avoid a rise in the global temperature of more than two degrees. An analysis of the current national policies and what they have so far achieved shows that a lot of work still needs to be done if the Netherlands is going to drastically reduce its greenhouse gas emissions and protect itself against flooding and drought. In the past many Dutch government bodies, regions, provinces and in particular municipalities, have developed their own climate policies that go beyond the targets of the national policy. An analysis of climate policy in the Northern Netherlands shows that intelligent policies and a certain degree of cooperation make a large reduction in greenhouse gas emissions possible while at the same time improving living conditions in the towns. The policy and the plans of the Randstad cities Amsterdam,

Rotterdam and The Hague form the backdrop for the survey of climate policies in the Northern Netherlands. We will start by taking a look at an important study on the application of climate policy in the Netherlands.

### 3 CO2040

In May 2009, the advisory agencies Posad and Execept published together with the former Ministry of Housing, Regional Development and the Environment a study called CO2040 about how the Netherlands could become CO<sub>2</sub>-neutral by 2040. These agencies argue that the Netherlands will have to take far-reaching measures to be able to achieve this target. Firstly, it has to become clear how much energy the Netherlands actually consumes and how much CO<sub>2</sub> is generated in that process. Posad and Execept also argue that the target of achieving a built environment that is CO<sub>2</sub>-neutral will require far more than just implementing standard measures and technology, such as lower energy performance standards for new buildings and the large-scale insulation or re-insulation of existing buildings, offices and factories. Spatial planning and the selection of locations for functions and buildings must be accompanied by a much better utilization of residual heat and geothermal energy in built-up areas. Lastly, the study calls for a revolution in public transport. CO2040 can be considered to be a wakeup call for spatial planning in the Netherlands. It clearly demonstrates that when you seriously consider the targets in the areas of adaptation, migration and energy transition, then it is clear that spatial planning, energy planning and climate policy are inextricably bound to each other at every imaginable level.

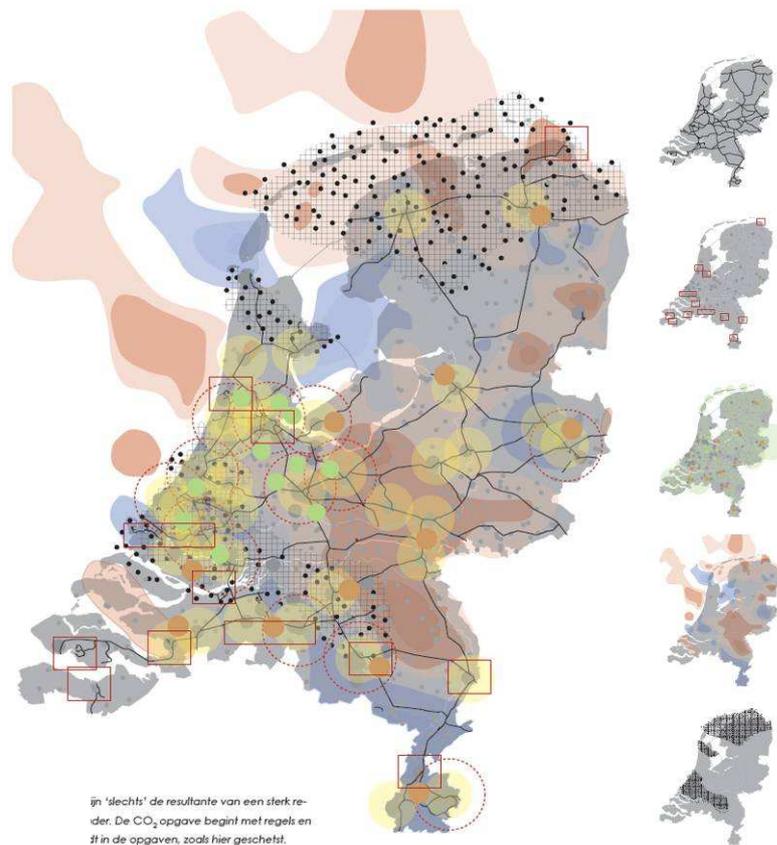


Fig. 1: CO2040. According to Posad and Execept, a CO<sub>2</sub> neutral Netherlands will be the result of many different projects, from traffic and transport, the exchange of waste heat in industrial areas, clustering of facilities for the built environment, the storage of heat in the subsoil and the use of geothermal energy.

### 4 UMBRELLA POLICY. WHAT DO PROVINCES DO JOINTLY AND INDIVIDUALLY?

The policy document Noord-Nederland op weg naar een klimaatbestendige regio (the Northern Netherlands towards a climate-proof region) dated 2007 and drawn up by the Samenwerkingsverband Noord-Nederland (SNN) (the Northern Netherlands Provinces) clearly states why and how the provinces in the north want to cooperate in the implementation of their climate policy. The provinces Friesland, Groningen and Drenthe want to become a climate-proof region in the future. In other words, that they are prepared to face the developments and consequences in these times of climate change. Fortunately governing bodies, businesses, research institutions and social organisations in these northern provinces are already very active. The



provinces are making a joint effort to seriously tackle the climate issue and in particular to meet the energy targets of the government and Energy Valley. Energy Valley is a joint initiative of the provinces Friesland, Groningen and Drenthe and the northern half of the province Noord-Holland which is directed at the energy economy of the Northern Netherlands (refer to the section 'Energy Valley' for more information about this collaboration). In the Energieakkoord (Energy Agreement) Friesland, Groningen and Drenthe take on the pioneering role that is currently played in the Netherlands by Energy Valley with its (sustainable) energy generation and consumption on the one hand and energy saving on the other hand. Economic interests in the region are strongly represented in these choices and will remain a steering force in any considerations with regard to policy on the climate and energy.

#### **4.1 Energy Agreement Northern Netherlands**

The Energy Agreement in the Northern Netherlands was signed by the former Ministry of Economic Affairs and the Ministry of Housing, Regional Development and the Environment, the provinces Drenthe, Friesland, Groningen and Noord-Holland. This agreement on energy is unique in its nature and scope. It contains a clear target: 'to reinforce and promote energy-related and energy-innovative activities in the Northern Netherlands which will contribute towards economic development in the region'. The ambition of the report is to achieve by 2011 a consumption level of 40-50 PJ sustainable energy and a 4-5 Mt reduction in CO<sub>2</sub> emissions compared to 2007. For the period after 2011, the ambition is a 15-20 Mt- CO<sub>2</sub>-emission reduction. The energy agreement has been detailed further in the following five strategic areas: Energy saving in the built environment, greenhouse farming and industry; Sustainable energy; Bio transport fuels and sustainable mobility; Clean fossil fuels; and Knowledge and innovation. The main aspects of the first two areas will now be outlined, with the focus on the spatial component.

#### **4.2 100.000 housing plan**

In the first strategic area, energy saving in the built environment, greenhouse farming and industry, the goal is an improvement in the energy performance of all buildings within the provinces Drenthe, Friesland and Groningen. This is to be achieved in cooperation with local municipalities, housing corporations and property developers. In the separate '100,000 housing plan' ambitions have been agreed upon for the energy performance of both existing houses and new housing projects. By 2015 there must be improvements in 65,000 existing homes. In addition, the target is to build 35,000 new houses that have particularly low demand for energy. A first attempt at this target, to reduce the EPC standard for new houses from 0.8 to 0.5 by 2008, was rejected by the central government. As of January 2011 the national EPC standard has become 0.6. In the case of existing houses, the provinces, in cooperation with local municipalities, housing corporations and property developers, want to reach agreements that during restructuring and renovation projects, at least two aspects of the energy index of a house will be improved and the use of energy labels will be stimulated. The 100,000 housing plan shows vision and realism; it is clear and concrete. The Energy Agreement also plans for the use of high-efficiency boilers in 5 to 10 thousand homes in the Northern Netherlands and the development of SPS (Smart Power Systems) into commercial operating technology for decentralised energy generators. An HR-e boiler is a high-efficiency boiler that also generates electricity. All sections of the built environment are systematically approached, making use of innovative (financial) concepts and for example central heating boiler optimization. The implementation of innovative energy options is planned for a few hundred hectares of greenhouse farming areas in Friesland, Drenthe and Noord-Holland. Finally, improvements in chain efficiency in the industrial sector are aimed for, for example through the use of residual heat and residual waste on various industrial estates.

#### **4.3 Five sources**

Five sources of sustainable energy have been selected: The exploitation of biomass is done through the provision of clusters of middle-sized biomass plants (total 300-400 MW), the provision of clusters of large and small green gas production locations with a total of 50-100 million m<sup>3</sup> green gas and facilitating the construction of high-efficiency user networks for green gas and investigating the combined use of existing transport networks. In the case of wind energy the Northern Netherlands region is prepared to take on a significant share of the ambitions for the expansion of wind energy power on and offshore in the previous government programme Schoon en Zuinig (Clean and Efficient) (2000 MW and 450 MW respectively), where the emphasis will lie in the provinces Groningen and Noord-Holland. Concerning wind on land, the

Northern Netherlands is actively looking at possibilities in its region which can be included in the Landelijke Uitwerking Windenergie (National Plan on Wind Energy). The agreement also includes the application of geothermal energy, extracted from deep within the earth, thermal energy storage in homes and greenhouse farms and the application of solar energy by achieving innovations in production techniques (e.g. the use of new materials) and application, in particular decentralised applications that are not dependent on the grid, for example ships and motor vehicles.

#### 4.4 Climate Effect Sketchbook

The provinces Drenthe and Groningen produced a Climate Effect Sketchbook in 2008. This was done in cooperation with the KNMI (Royal Netherlands Meteorological Institute), Alterra-Wageningen University and the consultancy firm DHV. In the book, the primary and secondary effects of climate change are literally put on a map. Primary effects are changes in temperature, rainfall, wind and the sea level. Secondary effects are drought or too much moisture, flood risks or salinization. These effects are dependent on the physical and geographical aspects of an area. In practice, it means that the primary effects are interpolated by the KNMI at a provincial level and that many of the secondary effects are only outlined. Where relevant, these effects in 2050 are related to the spatial functions at present. The most interesting examples are the maps showing energy potential that have been drawn up in cooperation with Grounds for Change which shows where there are opportunities for the exploitation of certain sources of sustainable energy.

Finally, the formal policy document of the province Drenthe 2008-316 Slotverklaring klimaat- en energiebeleid Noord-Nederland (Closing Statement on climate and energy policy in Northern Netherlands) dated March 2008, gives a clear impression of the climate and energy policy for the provinces Friesland, Groningen and Drenthe. It is an inventory of climate topics in the coalition programmes of the three provincial councils, a number of short interviews with civil servants and some relevant documents. The most important conclusion: 'Climate and energy policy is still at the first stage of the policy cycle, in the starting block as it were. Climate and energy policy covers many policy areas, is diverse and is still developing'. It is not possible to give an complete overview of the current climate and energy policies of the three provinces because within the provinces themselves the policies don't yet fall into the same categories. Climate policy is, however, being developed within each province and also measures are being taken in the collaborations between the provinces. As a result of economies by both central and local government in response to the economic crisis, we can expect that investments in sustainable energy will suffer. The three provinces each lay their own accent on the current climate policy. All things considered, the provinces have laid a solid foundation. The question is, how will this be reflected in municipal policies and local projects?

## 5 WHAT ARE THE LARGE CITIES IN THE RANDSTAD DOING?

In the essay 'The Netherlands 2020, Boundless Policies towards Low Carbon Regions and Cities' written for the ISOCARP Review 05 Low Carbon Cities, we compared the climate plans of the municipalities Amsterdam, Rotterdam and The Hague. Amsterdam is aiming for a CO<sub>2</sub>-reduction of 40 percent by 2025 compared to 1990. Not only must the municipal organisation be climate-neutral by 2015, in the Milieubeleidsplan Amsterdam 2007–2010, Amsterdam duurzaam aan de top (Environmental Policy Plan Amsterdam 2007-2010, Amsterdam sustainable leader) dated 2007, climate policy is considered in relation to policy on air, sound, sustainable consumption and manufacture, soil and nature. The capital city strives to be a clean, compact, healthy and liveable city. The report Nieuw Amsterdams klimaat (Amsterdam's New Climate) includes projects which are planned or have already started in cooperation with businesses and social organisations. For example, the city is going to make its buildings, street lighting and municipal transport systems more economical, using sustainable energy where possible. Together with trendsetters in the building sector, Amsterdam wants to ensure that all newly-built homes will be climate-neutral by 2015. To achieve this goal, an energy vision will be drawn up during new developments giving the best measures for the location, for example urban heat and cooling, underground thermal storage, generation of sustainable energy and solar applications.

Rotterdam has set up the Rotterdam Climate Initiative which aims to achieve a 50% reduction in CO<sub>2</sub> emissions by 2025 compared to 1990, to prepare the city for climate change and to strengthen the Rotterdam economy. The initiative is based on five pillars. 'Sustainable city' aims to make the built environment energy-neutral by 2025. The aim of the pillar 'Energy Port' is a harbour and industrial area that is clean and



sustainable and which acts as a junction point for the collection, transport and storage of CO<sub>2</sub>. ‘Sustainable mobility’ is intended to make all traffic and transport systems as clean and sustainable as possible. ‘Energizing City’ focuses on behaviour and changes in attitude of the people who live, work or visit Rotterdam. The pillar ‘Innovation Lab’ concerns innovations and the development of know-how. One of the results of the Innovation Lab is a new method that enables planners and their clients to develop a CO<sub>2</sub>-neutral city: the Rotterdam Energy Approach and Planning (REAP) project. The method links houses, shops, offices, sports facilities, schools and other amenities located in a neighbourhood to each other in order to utilize residual heat and cooling.

The Hague is on the verge of a large-scale operation to ensure that the city becomes climate neutral by 2050. The city has good prospects to achieve this because it is situated on the coast, has the most hours of sun and wind and does not have any heavy industry within its boundaries. Underneath the city there are opportunities for the extraction of geothermal energy. In the framework policy document *Op weg naar Duurzaam Den Haag* (The Hague: Towards Sustainability) sustainability has become one of the pillars within the programme *Wereldstad aan Zee* (Global city by the Sea). The Hague is an internationally orientated city that wants to achieve a global climate improvement. This is to be achieved in six areas: the municipality as a sustainable organisation, energy, urban development, public areas, mobility and the international city The Hague. The first results can be seen in Duindorp, a redeveloped residential estate situated in the dunes at Scheveningen, between The Hague and the North Sea. Around 800 newly-built houses utilize the temperature of the seawater for heating and cooling. One of the recent spearheads of the city is the future residential estate Erasmusveld which will have 600 to 800 houses. Atelier 2T, a firm of architects from Haarlem, was assigned by the municipality to broadly investigate how Erasmusveld could become the most sustainable residential area in the Netherlands.

The conclusion reached in the essay after comparing the initiatives and plans of Amsterdam, Rotterdam and The Hague, is that they are all, without exception, inspiring, optimistic and transparent plans. On the other hand we see that the ambitions, horizons of the plans and their spearheads vary drastically and that the spatial translation, for example into infrastructure or what the cities are going to tackle fundamentally, is lacking for the most part. The three cities have indeed based their initiatives on their own specific situation and key qualities, but it is still by no means certain whether they can get by under their own steam. For example, The Hague sees its location on the coast as an opportunity to utilize wind energy. But the only place on the coast where one or more wind turbines can be erected is at the harbour in Scheveningen, which may or may not be expanded, or out at sea. The rest of the coastline is designated Natura 2000 area. Generally speaking, we have to come to the conclusion that terms like CO<sub>2</sub>-neutral, climate-neutral and energy-neutral are being increasingly interpreted to suit individual needs and that fundamental choices are not being made. Maybe we should add that this perhaps doesn’t apply to other large cities, but in general we have to conclude that the three climate plans we have compared do not contain much more than old and inferior policies dressed up in new, trendy clothes. We would argue that local climate policies in the large cities can only be successful when they are tailored to neighbouring municipalities and when they, à la Energy Valley, have been embedded regionally for example on the scale of the northern or southern region of the Randstad. This is serious and fundamental criticism. In the following sections we will explore whether this criticism also applies to municipalities in the Northern Netherlands. It is true that the situation is hard to compare. The Randstad region is more built up and the Northern Netherlands is known for its sober-minded and unpretentious attitude.

## 6 ENERGY VALLEY

Energy Valley is a joint initiative of the provinces Friesland, Groningen and Drenthe and the northern half of the province of Noord-Holland. Since the extraction of natural gas began 50 years ago a substantial energy sector has become established in the Northern Netherlands, comprising about 400 companies and providing 25,000 jobs. In 2007, the ministers for Economic Affairs and Housing, Spatial Planning and the Environment signed an energy agreement with the four provinces. This agreement targets the production of 40 to 50 PJ of sustainable energy and a 4.5 Mt reduction in CO<sub>2</sub> emissions by 2011. The main objective of Energy Valley is to strengthen the economy and employment prospects in the north of the Netherlands by further stimulating sustainable energy activities. The emphasis is on energy conservation, the production of clean fossil fuels, the development of sustainable mobility and new energy technologies.



## 7 A PATCHWORK OF PROJECTS

A tour across the Northern Netherlands reveals a wide range of local projects and initiatives. The diversity of these is surprisingly large. Take for example the housing estate Nieuwveense Landen in Meppel, the Lokaal Duurzaam Energiediensten Bedrijf (Local Sustainable Energy Services) in Hogeveen, or the sustainable industrial district ECOMunitypark in the Frisian town Oosterwolde or the structure plan Stad op Scherp (City on Edge) for the city Groningen that is based on a sustainable foundation. Each of these projects are jewels among the patchwork of projects. Moreover, most of the key projects in the Northern Netherlands have some kind of a sustainable approach to them. This is true for the Florijnas in Assen, the move of the Noorderdierenpark zoo in Emmen, the redevelopment of the Afsluitdijk, Groningen-Eelde Airport, the CiBoGa area, Meerstad and the Suikerfabriek in Groningen or Nieuw Thialf in Heerenveen. Not all projects in the North run smoothly, but the ambitions and the innovations that are in the pipeline are commendable.

Ultimately, sustainable spatial development begins with intelligent planning and sensible spatial structuring. Some municipalities realized in the past that the economic growth of the past two decades was no guarantee whatsoever for a continual demand for new housing estates in large new urban developments. For example, in its regional structure plan for the housing estate Buitenwoel dated 2003, the municipality Veendam split the estate into various areas so that the plan could be implemented in phases. The estate has been planned so that after each phase the project can be stopped temporarily or permanently without this being detrimental to the lay out or appearance of the whole estate. Hogeveen was far more consistent in 2004. To the surprise and dismay of the province Drenthe, the municipality Hogeveen withdrew completely in 2004 from plans for a new housing development as the successor to the residential area Erflanden when it drew up its regional structure plan for 2015-2030. Hogeveen took a brave decision to opt for a large-scale restructuring of the existing housing estates and making room for the small-scale expansion of the 10 village communities surrounding Hogeveen. The insight that at some point there could be less growth and a greying population had been recognized for years in a number of areas in the Northern Netherlands. Sensible spatial planning, however, is not easy to reflect in lower emissions of CO<sub>2</sub> throughout the years, but it does form the basis for sustainable spatial development.

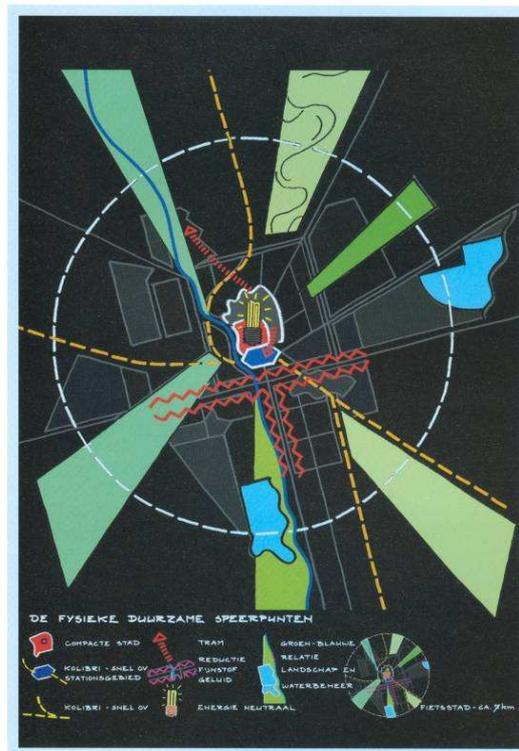


Fig. 3: Spatial concept that illustrates the physical sustainable and durable key projects for the city of Groningen. This concept is one of the elements of the structure plan Stad op Scherp (City on Edge) for Groningen.

Sustainable spatial development in the Northern Netherlands got off to a slow start. The majority of long-running pilot projects in this area are located roughly in a strip from west to east between the Randstad region and the region Arnhem, Nijmegen. In addition, it is difficult to get information on current projects and

initiatives. The initiators, on the whole exclusively municipalities, are not promoting the subject of the projects. Success receives little to no attention, not even in the areas where we see the majority of developments in the region Groningen-Assen. The region itself is committed to the RegioTram and the Energy Valley network does the rest. A good division. But what is striking is that municipalities are seriously making up for lost time and, irrespective of experience elsewhere, are pioneering on their own. Which is fine. In practice you're not going to gain all that much from what worked in Culemborg, Tilburg or Almere. Knowledge and experience in the area of sustainable spatial development has to be built up from scratch. A few examples: the policy document Assen koerst duurzaam naar een CO<sub>2</sub>-neutrale stad (Assen on a sustainable route towards a CO<sub>2</sub>-neutral city) gives a clear picture of what the municipality Assen is facing up to 2020, the municipality Tynaarlo has produced a thorough vision for the village Vries of what will become the most sustainable housing estate in the Netherlands and Groningen is presenting itself as the more sustainable city in the Netherlands. In the regional structure plans for Assen and Groningen sustainability as an ambition is explicitly emphasized. In the regional structure plan for Groningen this has also been made more explicit in a spatial image with physical spatial spearheads.

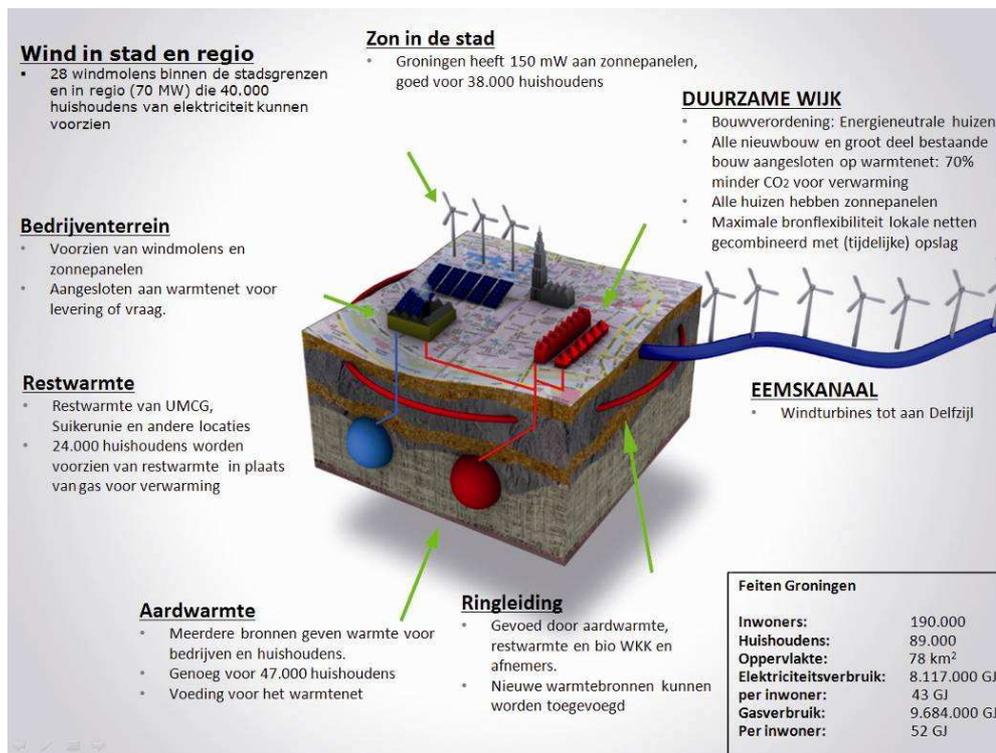


Fig. 4: Energy transition in the city of Groningen. This diagram illustrates the strategy that leads Groningen towards an energy neutral city in 2040. (Note: text in this diagram will be translated in the final version).

## 8 A BEAUTIFUL BEGINNING

It is a popular opinion that working towards a sustainable city is an integral task. After making inquiries it appears, and this is hopeful, that municipalities in the Northern Netherlands do network and exchange knowledge among themselves. For example, the municipality Groningen forms a network of the five national leaders in the area of climate policy together with Apeldoorn, Tilburg, Heerhugowaard and The Hague and the municipalities in Drenthe work closely within the concept of so-called 'climate contracts'. The collaboration and partnership with the municipalities to achieve the targets of the provincial programme Klimaat en Energie (Climate and Energy) appears to work well. In the climate contracts 2009 and 2010, the province Drenthe makes specific agreements with the twelve municipalities in the province. Plans are translated with the support of knowledge and additional financing into actual projects in the fields of housing, mobility, energy saving and consumption, agriculture and nature.

Sustainable spatial development requires substantial investments in knowledge, FTEs, infrastructure, and communication and requires in particular an enormous shift in thought. Building one new housing estate with energy-neutral houses is by no means enough; the entire city has to be considered. Including sustainability and energy transition side by side in planning processes for housing estates and industrial



estate is great, but first of all consider if there is really a need for the programme to be carried out. The fiasco of the Blauwe Stad is not only reserved for Oost-Groningen, it could happen elsewhere in Drenthe or Friesland. Municipalities would be wise to first take the time to consider what their identity is and their position within the region. Will Hoofdstad Assen profit in the future from a more or less continuous strip of industrial estates along the A28 or would it not be better to leave the building of industrial estates to Hogeveen and Groningen? Do wind turbines really fit into the already empty 'energy landscape' at Veenkoloniën, an area full of cultural history that according to some experts should be put on the World Heritage List as soon as possible?

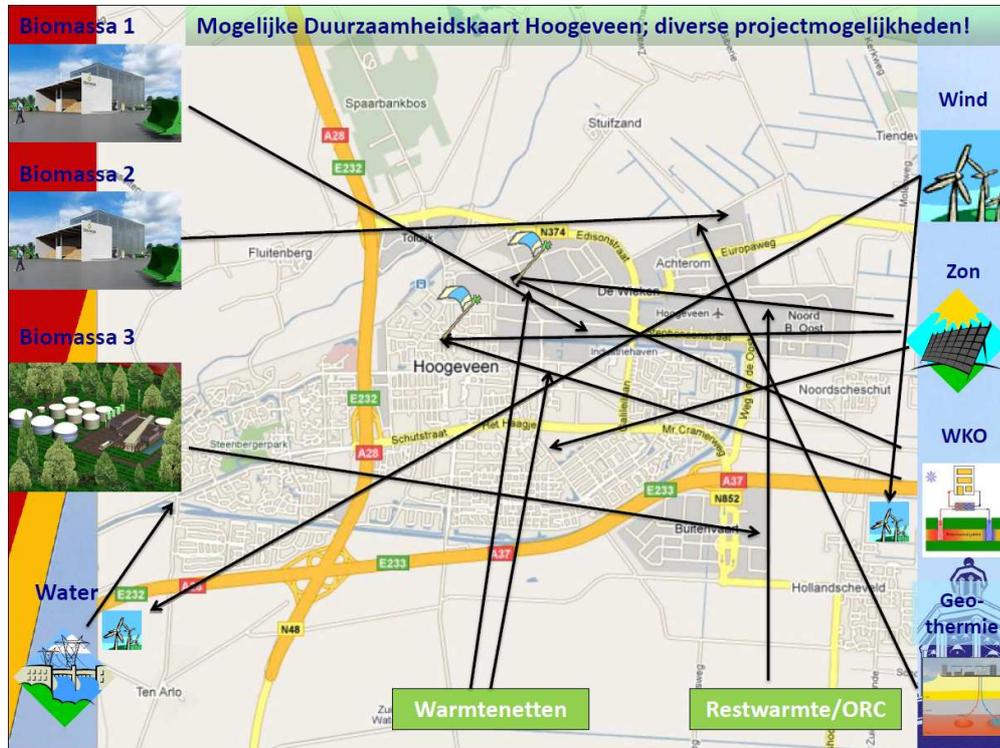


Fig. 5: One of the objectives of the Lokaal Duurzaam Energiediensten Bedrijf (Local Sustainable Energy Services) in Hogeveen is to contribute to a climate neutral city in 2040. This will be a mix of biomass, wind energy, solar energy, geothermal energy, hydro power and the exchange of waste heat. (Note: text in this diagram will be translated in the final version).

Accepting that we need both an integral approach and to be less dependent on fossil fuel in the not too distant future, there is still a long way to go. Municipalities can all be doing their utmost best, but achieving targets like becoming CO<sub>2</sub>-neutral by 2020 or energy-neutral by 2030 is an enormous task and will require more than just a plan of action. The three northern provinces have carried out good work and with the Energy Valley network the prospects for a more sustainable future are good. One advantage for the Northern Netherlands compared to the rest of the country is that there is sufficient physical space to link hydropower, wind energy and biomass.

Sustainable spatial development and becoming free from an independence of fossil fuel is tackled in a simple and modest (perhaps too modest) way in the Northern Netherlands. In nearly every municipality a high-profile project is being carried out or has already been completed, though no-one has a complete list of all the projects. After carrying out this study, it has become clear that there is a need for an overview and a kind of atlas showing all the initiatives and local projects that have been realized. This overview or atlas would be very helpful when promoting a mission and exchanging information.

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