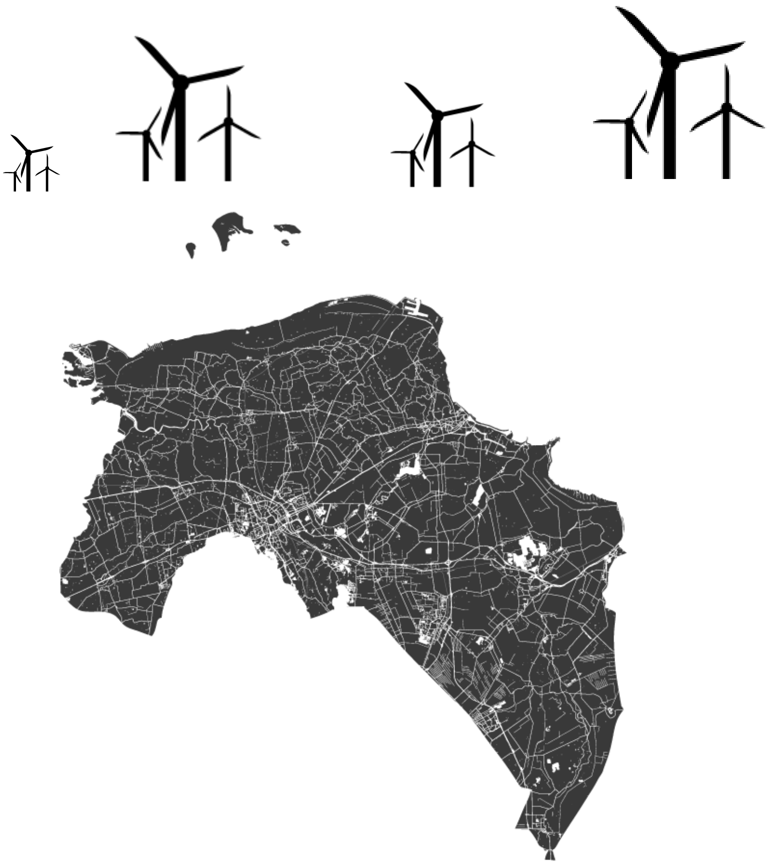
NOTHING TOPS GRONINGEN OFFSHORE WIND



"DOAR BROEST DE ZEE, DOAR HOELT DE WIND
DOAR SOEST T AAN DIEK EN WAD…"

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Summary:

North Groningen is known as a structurally disadvantaged maritime-port area, due to demographic problems such as shrinkage, aging, and brain drain. It also has economic problems, such as the long-term decline of maritime-related industries, the reduction of gas production in North Groningen, and a high unemployment rate. To counteract this rather negative spiral, the region must attract and retain residents, businesses, and forward-thinking citizens. An industry that has significant potential to reach these ambitions is the offshore wind industry. Together with the upcoming offshore wind industry, the innovations of hydrogen and the reuse of idle oil and gas infrastructures seem to be promising for the region. For the region to profit as much as possible, the following main research question has been formulated:

What are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline?

The research is based on the theory of ecological modernization, which explains that sustainable development, like offshore wind, can create opportunities instead of threats. To seize these opportunities, the region must firstly choose a target audience. On the basis of cold place marketing new, and growing companies can be attracted, but also young people, singles, students, technical workers, and retour migrants. The approach of hot place marketing must lead to retaining residents, workforce, current offshore wind companies, and gas and oil companies. Furthermore, hot place marketing has to avoid brain drain. Secondly, the region has to know which niches exist within the offshore wind industry. Only then a region is able to economically focus on retain and attract particular residents, businesses, and forward-thinking citizens.

The methodical approach that is used to answer the main research question fits within the school of constructionism. On the basis of an exemplifying case study, in this case the region North Groningen, has been tried to generate knowledge about economic opportunities within the offshore wind industry with two field studies, a desk study, and open interviews. The generation of knowledge about economic opportunities was conducted by using a general set of ideas, also called sensitizing concepts, which must be examined during the different research strategies and analyses to work towards broadly supported recommendations for a sustainable region marketing strategy for North Groningen.

As mentioned, to seize the economic opportunities that emerge for North Groningen in the offshore wind industry, it is important to know in which niche of the industry the region is active. After conducting a competitor analysis, the researcher has concluded that the Eemshaven is active in the quick-reaction and construction niches. Therefore, the region knows on which niches it must focus. Moreover, region officials know which maritime ports are active in the same niches and thus can compete with the Eemshaven and also which ports are not active in the same niches and can therefore be seen as possible partners. In addition to the competitor analysis, a supply chain analysis was conducted, which underlined the conclusion that the Eemshaven is active in the quick-reaction and construction ports. Furthermore, the supply chain analysis deepened the knowledge about the current business profile of the region, on which the Eemshaven can build an offshore wind industrial cluster.

The last step in formulating recommendations for the sustainable region marketing strategy of North Groningen is to formulate concrete business opportunities. To formulate these opportunities, the researcher conducted a SWOT analysis. Out of the correlation of different quadrants of the analysis, the following three opportunities were found: lobbying for Dutch wind farms in the area north of the Wadden Islands, investing in hydrogen and Power2Gas, and bringing energy ashore in the Eemshaven.

In conclusion, there are several economic opportunities for making North Groningen the offshore wind hub of the Netherlands and avoiding demographic shrinkage and economic decline. These are: the niches quick-reaction and construction ports, hydrogen and Power2Gas, and making the Eemshaven the energy conduit of Northwest Europe.

Preface:

The second couplet out of the Provincial Anthem of Groningen is as follows:

"Doar broest de zee, doar hoelt de wind,
doar soest t aan diek en Wad,
Mor rusteg waarkt en wuilt t volk,
het volk van Loug en Stad.
Ain Pronkjewail in golden raand
is Grönnen, Stad en Ommelaand;
Ain Pronkjewail in golden raand
is Stad en Ommelaand!"

Even in 1919, the writer of the Provincial Anthem of Groningen Geert Teis Pzn. pointed out the strength of wind and the vastness of the North Sea. Now, 100 years later, this Provincial Anthem is more striking than ever. The Groningers must deal, as we all must, with energy transition, but more importantly, the area has been plagued by earthquakes caused by gas pumping. Making use of the North Sea and offshore wind seems to be a very promising and identity-rich development to countereffect the negative spiral in which North Groningen has been caught up in. According to the picture below, the Groningers have only to repeat what they have done for ages: namely, making use of the wind. In the past, water had to be pumped from one flat field to another; today, wind power can be harvested to bring green energy ashore.

Figure i: Old and new wind power in North Groningen (Eemshaven)

Source: (Groningen Seaports, 2017)

I hope you enjoy the story of this master thesis about the opportunities in offshore wind for North Groningen.

More importantly, I want to particularly thank Duncan Liefferink, Gerrit van Werven, and Mark de la Vieter. All of them supported me throughout the process of writing my master thesis. Duncan Liefferink provided me with academic advice as a supervisor from the Radboud University. Gerrit van Werven gave me the opportunity to intern at Energy Valley. Together with Mark de la Vieter, they supported me as mentors during my internship at Energy Valley. Again, I want to thank all of them deeply for their contributions.

Steyn Tielemans
16-08-2018

1. Introduction

1.1 Research problem statement

1.1.1 Background

The province of Groningen will suffer from significant population decline in the coming decades (CBS, 2016). The prospect is that the population decline will be above 3% in 2040 (CBS, 2016). The expectation for the region of the "Eemsdelta," consisting of Appingedam, Delfzijl, Eemsmond, and Loppersum is even worse with, respectively, projected declines of 10.3%, 27.5%, 9.0%, and 18.0% (CBS, 2016). The Ministry of the Interior and Kingdom Relations has therefore quantified the Eemsdelta as a top shrinkage area (Rijksoverheid, Bevolingskrimp, 2015).

Furthermore, the Eemsdelta has also had to cope with the problem of aging. In the Eemsdelta, the elderly dependency ratio was 30.6% in 2016, and this percentage has increased every year (CBS a, 2017). This problem is putting significant pressure on the tax base, shifting supply and the demand of services that accompany such demographic changes (Niedomsyl, 2007). In the province of Groningen, aging is enhanced by the phenomenon of brain drain (Venhorst, Edzes, Broersma, & van Dijk, 2011). Highly educated people migrate from Groningen, where they attended the university, to the western part of the Netherlands. Although there is now a larger share of highly educated people who live or work in the city of Groningen than there was prior to their study, the phenomenon of brain drain can be highly observed. This is especially the case in the hinterland of Groningen, as is seen in North Groningen, which is the case study for this thesis. In these types of rural areas, the "brain" balance is highly negative (Venhorst, Edzes, Broersma, et al., 2011).

Besides putting pressure on the tax base, aging and brain drain also cause a shifting supply and demand of services, population decline, and negative consequences for creativity in those shrinking areas (Venhorst, Edzes, Broersma, et al., 2011). Highly educated people are likely to share the knowledge they have obtained and their creative capacity with each other, as with people who do not have as much education. This has a positive influence on area productivity. Furthermore, highly educated people are also known to consume more in these areas, which creates catchment for urban facilities (Venhorst, Edzes, Broersma, et al., 2011).

One of the main concerns of policymakers in shrinkage areas must, therefore, be on migration flows. A common theory is that people and companies are geographically stable. This is basically caused by location-specific capital (Hospers & Pen, 2011). In the case of residents, the proximity of family, friends, schools, and working places are examples of location-specific capital. In the case of companies, the proximity of skilled workers and clustering are examples of location-specific capital. A way to counteract migration outflows is to create jobs since this is one of the main reasons for people and companies to move (Hospers & Pen, 2011). The current unemployment rate in Groningen (8.5%) is the highest of all provinces in the Netherlands (CBC b, 2017). The average unemployment rate in the Netherlands is 6.9%, and the municipalities Eemsmond and Delfzijl, where the maritime ports are located, have respective unemployment rates of 7.2% and 8.8% (CBS b, 2017). These data suggest that unemployment is a major problem in North Groningen; therefore, new jobs must be created.

In their pursuits for new companies to create jobs, structurally disadvantaged maritime port regions, such as North Groningen, have increasingly begun employing place marketing campaigns (Niedomsyl, 2007). These marketing campaigns often concentrate on sustainable strategies. The assumption of structurally disadvantaged maritime-port regions is that sustainability or climate change offers selective economic development opportunities to port regions that might, in many other respects, be deemed geographically and socially marginal compared to their more competitive urban counterparts (Wurzel, et al., 2016; Jonas, Wurzel, Monaghan, & Osthorst, 2017).

1.1.2 Offshore wind power

The sustainable strategy of North Groningen is to invest or market itself in or with the offshore wind industry (Economic Board Groningen & Energy Valley, Offshore wind industrie. ´Regionale landing´ van deze groeisector in Noord-Groningen, 2017). In the energy agreement, the Dutch government also commits itself to the ambition of building 3.5 GW of new offshore wind parks in the North Sea by 2023 (The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs, 2014). The Netherlands is not the only country that is willing to invest in the coming years in the offshore wind industry; additionally, Germany (6.5 GW by 2020), the United Kingdom (10 GW by 2020), and Denmark (6.5 GW by 2020) are preparing massive investments in the offshore industry in the North Sea (German Wind Energy Association, 2015; Federal Ministry for Economic Affairs & Energy, 2015; The Crown Estate, 2015; Danish Energy Agency, 2017). Due to the investments of the different countries, the price of offshore wind energy will decrease in the coming years, according to data from the NIA (Economic Board Groningen & Energy Valley, 2017). All these developments have the effect that the pressure to realize offshore windfarms the coming years will increase.

The area North of the Wadden Islands has been pointed out as a designated zone for offshore wind in the National Water Plan 2009-2015 (2009) and the Policy Document on the North Sea (2009). A designated zone lies outside the 12-mile zone, and it is only permitted to build offshore wind farms inside one of the designated zones. The advantage of building outside the 12-mile zone is that it avoids visual pollution from the coastline; moreover, the wind speed is much higher than on or near the coast. In the area north of the Wadden Islands, the wind speed is even higher in comparison with other designated areas in the Netherlands. Other advantages of the area north of the Wadden Islands are the proximity of German wind farms and the availability of well-positioned maritime ports in North Groningen, especially the Eemshaven. North Groningen also has enough space, capacity, knowledge, and infrastructure in the energy sector to be suitable as an business location for offshore wind businesses. Finally, the area is the base for many energy or energy-related companies, is connected with overseas high-voltage cables, and has access to the gas network. In short, North Groningen has much to offer for the offshore wind industry and is thus a compatible business location. Marketing the region as the offshore wind industry hub of the Netherlands could help the region to retain and attract companies, citizens, and forward-thinking citizens.

The offshore wind industry provided revenue opportunities for a wide range of companies and services, such as companies involved in the supply chain of the offshore wind industry. Examples are design, production, installation, commissioning, operation, and maintenance companies (The Crown Estate, n.d.). Companies involved in hydrogen and the decommissioning or reuse of oil and gas platforms also play major roles in the transition towards renewable energy. One must think as well of energy-storage, energy-transport, and energy-trade companies; institutes of knowledge; and many other companies related to the offshore wind industry. Eventually, the port where the generated offshore wind power comes ashore works as a catalyst for companies, which are both well aware of their social images and want the cheapest energy (Hart & Milstein, 2011; Klepper, 2010). A recent example of this effect in the Eemshaven is the establishment of Google in the port.

1.1.3 Intertwined developments with offshore wind

The previous paragraph already mentioned that the opportunities for offshore wind companies are accompanied by technical innovations in hydrogen, decommissioning, and the reuse of oil and gas platforms. This is essential to understand because offshore wind cannot be seen separately from these innovations; instead of a singular approach, this research approaches the offshore energy sector in a plural way.

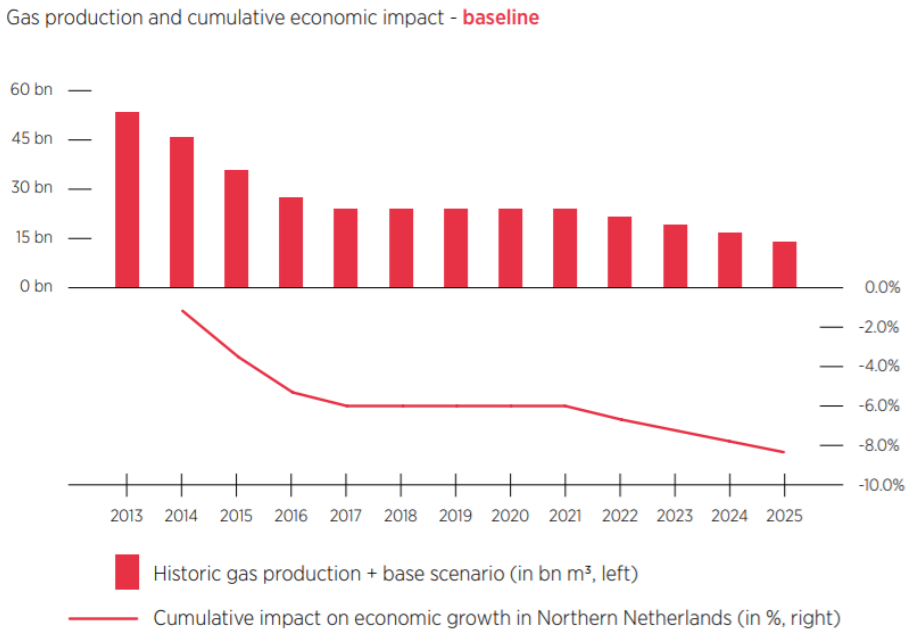
The grant scaling of wind farms all around the North Sea has not yet taken place, as already mentioned, due the as-yet incompatible prices of renewable energy compared to fossil energy and because of two main technological issues. Firstly, there is an issue of how to transport the generated energy to land. The current method for transporting energy generated by wind turbines is through electric cables. However, when the distance from offshore wind parks to land becomes longer, the effectiveness of this method is low. The generated electricity in wind turbines is transported through AC cables to an offshore substation. In this substation, the electricity is converted to a form that is suitable for DC cables, electric cables that are suited for long-distance transport.

When the DC cables reach land, the electricity is converted for a second time to make it suitable for the land-surface grid. During the converting and the transport through a DC cable, massive amounts of electricity get lost. Hydrogen is an alluring solution for this problem. Wind turbines can use a hydrogen-gas network connection instead of electricity. The transport of hydrogen through a pipeline is significantly cheaper and more effective than transporting electricity through cables. In addition, the pipeline functions as a buffer, which means that much less coordination of supply and demand is required, which is the second technological issue for wind energy.

Hydrogen is key in the cooperation with the gas and oil industry as well. The last paragraph described that hydrogen generated by electrolysis in the turbines can be transported through pipelines. The most cost-efficient way to do this is to reuse the current offshore oil and gas infrastructure. The Dutch oil and gas industry is willing to cooperate on this innovation since the Dutch will run out of their oil and gas reserves in 30 years. Moreover, Dutch law requires that offshore infrastructure, such as platforms and pipes, must be decommissioned after they become outdated; thus, to ensure their market positions, oil and gas companies are willing to cooperate in reusing oil and gas infrastructure.

All these developments can assist in the lobbying for North Groningen to be offshore wind hub in the Netherlands. North Groningen is known as the earthquake area of the Netherlands. In addition to the fact that earthquakes cause tremendous damage to buildings and houses, 20% of the economy of the region depends on the production of oil, gas, and minerals. The current policy of The Hague is that the productivity of oil, gas, and minerals in North Groningen must drop down dramatically (see figure 1).

Basic scenario of the current state policy regarding the reduction in gas production in the Northern Netherlands



Source: (van Wijk, 2017)

Figure 1: Gas extraction and cumulative economic impact
Basic scenario implies the current state policy regards to the reduction gas production in the Northern Netherlands.

The cumulative impact of this policy is that the growth of the economy of the Northern Netherlands will slow down by 9% and will eliminate many jobs (van Wijk, 2017). This is a gloomy prospect for North Groningen, but with the developments in offshore wind, hydrogen, and the reuse of the oil and gas infrastructure, North Groningen can turn this prospect into an opportunity. The knowledge of oil and gas is clustered in North Groningen because of the established businesses, the availability of highly qualified personnel, and the current oil and gas infrastructure. If hydrogen is indeed the future for offshore wind, then North Groningen has massive advantages in comparison with other regions in the Netherlands. In short, only if the innovations of hydrogen and reuse are being used can the lost jobs caused by reduced gas production be avoided.

For the rest of this thesis, the researcher defines the offshore wind industry as broadly as possible. Not only are the wind turbines included as part of this new industry, but the grid, hydrogen, decommissioning, and reusing are also included.

1.2 Research aim and research question

All the arguments mentioned above regarding the advantages of North Groningen as an business location for the offshore wind industry explain that there are many economic opportunities for North Groningen to avoid shrinkage and economic decline. However, a coordinated program to truly take advantage of the opportunities of offshore wind in North Groningen is missed. The aim of this research is to investigate what the potential is within the offshore wind industry and how North Groningen can take advantage of it. To do this, the research focuses on sustainable region marketing.

Region marketing for maritime ports requires a broad approach, which focuses on ports considered as service-based businesses. Furthermore, sustainable region marketing as a political tool helps policy makers to come up with a coordinated program to tackle all the described negative patterns in the region. Working towards a sustainable region marketing strategy, the political tool helps policy makers analyze how to benefit from the offshore wind industry in a number of steps. Firstly, sustainable region marketing provides the opportunity to pick out a target audience for the strategy. Like general marketing, place marketing is also only effective when there is a focus on a certain target audience. Secondly, sustainable region marketing helps an area discover its competitors. By analyzing a region, or port, one is able to make a profile of the region at stake. Only regions or maritime ports with the same profile or that are active in the same niche are competitors. Eventually, the political tool of sustainable region marketing provides the opportunity to analyze the business opportunities for a region. By combining knowledge about the target audience, the region's profile, or the niche in which the port is active with the business opportunities for a maritime port, policy makers are able to came up with a coordinated program to take advantage of the opportunities of offshore wind in North Groningen. In short, sustainable region marketing is thus a political tool that gives policy makers the chance to analyze, in a methodical way, all the facets that are needed in a place marketing process.

To reach the aim of this research, this thesis tries to answer the following question:

What are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline?

Region marketing is precisely defined in this thesis in the following way: region marketing is a political tool that provides an analytical framework, which results in a region marketing strategy with the aim to raise awareness of what the maritime port region offers, and it tries to influence residents, businesses, and forward-thinking citizens in their attitudes and behavior towards the maritime port region, with the result of increased establishment of businesses, creation of jobs, and positive influence of migration flows.

This main question can be answered in a number of steps. This thesis formulates those steps in the form of subquestions. The first subquestions elaborate more on the theoretical background of the main question.

1. *How can the theory of ecological modernization help to explain why regions can grow economically, without harming the environment? And what is the role of sustainable region marketing in this theory?*
   The main research question tries to find answers that both stimulate the economy and are environmentally friendly. The theory of ecological modernization, which will be used as an umbrella theory in this thesis, explains how sustainability (in this case, offshore wind) can be used as an opportunity to create new economic changes for the region. The theory also forms an idea of an ideal

system that explains how the market can be ruled in order to profit from the environment instead of harm it. Sustainable region marketing is an outcome of how to politically realize this view in practice. The first question was formulated to focus on what sustainability means in this study.

2. *What is the theoretically relation between the offshore wind industry and migration flows in North Groningen?*
   It is crucial for North Groningen to retain and attract businesses, citizens and forward-thinking citizens for the region with sustainable region marketing to avoid shrinkage and economic decline. This step must explain how the proximity of family, friends, and work influence migration flows. Moreover, knowing how sustainable region marketing influences migration flows makes it possible to pick out the ideal target audience of the region marketing campaign of North Groningen.
3. *Which niches for maritime offshore wind ports exist?*
   To find the economic opportunities for North Groningen, it is crucial to know which niches exist for offshore wind maritime ports. For sustainable region marketing it is crucial to focus, therefore knowledge on the possible niches is vital. Knowing the differences of the variety of niches in which offshore maritime ports can be active makes it possible to come up with criteria of the different ports' profiles. These criteria must result in competitor analyses, which form the basis of subquestion 4.

The first three subquestion are helpful in answering the theoretical part of the main research question. The next subquestions elaborate more on the practical part of the main research question.

4. *In which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven?*
   On the base of a competitor analysis the niche in which the Eemshaven is active in will be determined. From here, the competitors of the Eemshaven can be selected, as well as ports which are not competitors. Moreover, the selected niche in which the Eemshaven is active forms the starting point in finding the business opportunities for North Groningen.
5. *How is the supply chain of the Northern Netherlands' offshore wind market organized?*
   The goal of this subquestion is to analyze the current supply chain of the offshore wind industry in the Netherlands, and more specifically in North Groningen. This step forms the intermediate step between the competitor analyses and the SWOT analysis from where concrete business opportunities can be formulated. The supply chain analyses is vital because the historical and current activities in a maritime port region form a yardstick for the activities in the future.
6. *What are the concrete business opportunities in the offshore wind industry for North Groningen to build a region marketing strategy on?*
   The last step in answering the main research question is to find concrete business opportunities for the sustainable region marketing strategy of North Groningen. On the basis of the literature study and the conducted interviews, a SWOT analysis is performed. The results of the SWOT analysis identify market-supported business opportunities. Together with the other available knowledge, this makes it possible to answer the main research question.

1.3 Scientific and social relevance

The different elements in the main research question, how can the theory of ecological modernization help to explain why regions can grow economically without harming the environment? And what is the role of sustainable region marketing in this theory, are in the past researched separately. And in the most cases also partly. The first element of the main research question is the element of sustainable region marketing that can retain and attract residents, businesses and forward-thinking citizens. Young and Lever (1997) investigated whether improving the image of Manchester would have a positive effect on attracting professional, office-based companies. Niedomsyl (2007) studied the promotion and place marketing efforts of Swedish rural municipalities to attract new residents. However, both studies had a strong focus on normal place marketing and therefore excluded the "sustainable" parameter. This research project will include the sustainable variable and is in that way a relevant contribution to social science.

The second element is a bit more hidden in the main research question. It is again about sustainability, but in this case, it has a focus on the ecological modernization theory. This is why the first subquestion, how can the theory of ecological modernization help to explain why regions can grow economically without harming the environment? And what is the role of sustainable region marketing in this theory, elaborates more on this element. Ecological modernization is a theory that claims that economic development and protecting the environment goes hand in hand. At times, it is even used by theorists and politicians in an ideological way. Region marketing aligns with this ideologic view. However, the political tool of region marketing—and, more specifically, sustainable region marketing—has, in the context of ecological modernization, never been researched before as a political or analytical tool to counteract shrinkage and economic decline. This study tries to map this relationship for the first time.

As already mentioned, the offshore wind industry, which is the third element of the main research question, is relatively new but is booming. However, because the offshore wind industry is so new, there is a lack of scientific knowledge of it, especially in social science and how specifically to market it, let alone any research that tries to forge a link between sustainable region marketing and an entirely new sustainable industry.

Furthermore, this research tries to use an umbrella approach as an alternative to the fragmentary studies that have attempted to examine North Groningen in relation to the research field of offshore wind. For example, there exists a study about the supply chain of the offshore wind industry in the Northern Netherlands; there are internal studies of Groningen Seaports on how to position themselves in the offshore wind industry; and, Deloitte has already performed research about the changes to increase the number of offshore wind farms in the area north of the Wadden Islands (Lindenbergh & Zonnevijlle, 2014). These studies excluded the opinion of the fossil industry. In this study, this opinion is included because the rollout of offshore wind farms in the area north of the Wadden Islands can only be accomplished in cooperation with the oil and gas industry, due to the innovations of hydrogen and reuse of oil and gas infrastructure. In short, this study is thus unique because it tries to combine all the fragmentary studies and the different viewpoints of all stakeholders to come up with an overarching proposition for the offshore wind industry in North Groningen.

The social relevance is a more obvious case. Authorities believe that there is a positive correlation between place marketing and the image of a place, as otherwise authorities will not invest so much money and time in those campaigns (Zenker & Martin, 2011). A research study with the aim of discovering recommendations for the offshore wind industry of North Groningen is therefore desirable. Public money must be spent well, and this research attempts, as already mentioned, to use an umbrella approach, to be an alternative for all the fragmentary research projects that have been conducted in North Groningen in the research field of offshore wind. This is important for lobbying in The Hague. Currently, negotiations for the rollout of the Dutch wind farms are underway. As a region, it is essential to lobby as one block; otherwise, the lobbying is weak, and the chance that the new government decides to build wind farms in other regions in the North Sea is high. The only way to come up with one story is to combine all the research summed up above and to include the different viewpoints of all stakeholders involved in the offshore wind industry. Eventually, and most importantly, the ultimate aim of this study is to counteract shrinkage and to create jobs, which is the last element of the main research question. This research produces valid recommendations to reach this goal.

2. Theory

The theory part of this thesis consists of three sections: ecological modernization, region marketing and migration flows, and niches for offshore wind maritime ports. These three sections correspond with subquestion 1 up to and including subquestion 3: how can the theory of ecological modernization help to explain why regions can grow economically, without harming the environment. And what is the role of sustainable region marketing in this theory; what is the theoretically relation between the offshore wind industry and migration flows in North Groningen; and, which niches for maritime offshore wind ports exist. The first section shall explain the ecological modernization theory. This theory must be seen as an overarching world view in which the research is conducted. The second section about sustainable region marketing provides theoretical knowledge on how sustainable region marketing can influence migration flows. Moreover, it guides the researcher in finding the target audience for a sustainable region marketing campaign. Eventually, the different niches of the maritime ports with the corresponding function profiles will be explained. This is important for finding the economic opportunities for North Groningen and to distinguish North Groningen from its competitors.

2.1 Ecological modernization

The theory of ecological modernization originated in the early 1980s and became, in a remarkably short time, a well-established set of ideas. Thoughts on ecological modernization form the cornerstones of this thesis. The aim to involve ecological modernization in this research is not to produce new knowledge of the theory by conducting a case study; it is more about positioning the research in a broader line of social theory. The theory can thus be seen as an umbrella theory in which the thesis is written. In this section the first subquestion will be answered, how can the theory of ecological modernization helps to explain why regions can grow economically, without harming the environment? And what is the role of sustainable region marketing in this theory. This section sets therefore out what the theory entails and what the criticism is for the theory, and it explains how the theory affects social patterns between the state, market, and civil society. Eventually, the section will explain how ecological modernization could help to design a sustainable region marketing strategy.

As the thesis has mentioned, ecological modernization was first developed in the early 1980s, primarily in Germany (Huber, 1985; Jänicke, Mönch, Binder, & et al., 1992), the Netherlands (Mol & Spaargaren, 2000; Hajer, 1995) and the United Kingdom (Weale, 1992; Cohen, 1997), the majority of the North Sea region countries that are involved in this research. Approximately 10 years later, an empirical study in Denmark also was conducted by Andersen (1994). Although all authors have slightly different interpretations, the theory has two broad perspectives in common: (i) moving beyond apocalyptic, or Malthus' ideas, to see environmental problems as challenges for social, technical, and economic reform rather than a run to the bottom or to see problems as limits to growth; and (ii) emphasizing transformation of core social institutions of modernity, including science and technology, production and consumption, politics and governance, and the "market", on multiple scales (Mol & Sonnefeld, 2000).

The start of the theory is characterized by a strong emphasis on the role of technological innovation in environmental reform, especially within the sphere of industrial production (Mol & Spaargaren, 2000). Technological innovation was key to reach or to avoid the environmental constraints. Ecological modernization theorist thus do not believe in an apocalypse. This assumption is exactly a deepening of the debate that Malthus began in 1798 regarding the relation between population and food supply established resources. In his book *An Essay on the Principle of Population* in 1798 (p. 44), he stated the following: "The power of the population is indefinitely greater than the power of the earth to produce subsistence." With this contention, Malthus meant that population growth in the end will exceed the limitation of maximum food production. Harvey described the approach of Malthus as a scenario that predicts that the earth is heading towards a doomsday scenario (Knox & Marston, 2011). Malthus' response to this scenario was to enact laws to limit human reproduction. A more modern view, called neo-Malthusian, states that factors such as human behavior and policies, other than policies to limit human production, have more influence on the state of natural resources than population growth in and of itself (Knox & Marston, 2011).

Influential thinkers like Marx and Engels have criticized the work of Malthus (Knox & Marston, 2011). They stated that technical development is key to counteract the imbalance between population and food. Thus, they believed that the population is capable of living within environmental constraints. Innovation can help to higher the environmental plafond with, for example, the development of new products or to be more efficient. In this sense ecological modernization theorist agree with Marx and Engels; however, ecological modernization has added the "green" element to the thoughts of Marx and Engels (Mol & Spaargaren, 2000). Basically, this addition means that ambitious environmental policy measures are beneficial for both the environment and the economy and must therefore not be seen as separate (Wurzel, Jonas, Osthorst, et al., 2015). A simple way to describe this intertwined process is as a win-win situation.

However, the theory of ecological modernization also received some criticism in its early days. Opponents of the theory said that the theory focused too much on technological innovation (Mol & Spaargaren, 2000). This criticism was a guideline for ecological modernization theorists to nuance and to develop two variants of ecological modernization. Both Hajer (1995) and Christoff (1996) made a division within ecological modernization. Hajer (1995) spoke about techno-corporatist ecological modernization and reflexive ecological modernization. While in the former, environmental change purely depends on technological innovation, the latter involved also social learning, cultural politics, and new institutional arrangements. Christoff (1996) made a similar division of ecological modernization, speaking of weak and strong ecological modernization. This thesis focuses on region marketing to "green" the economy, and since region marketing is defined as political framework, new regulations, technologies, and government incentives are essential to create this in addition to technological innovation.

A second point of criticism of the original theory was the desirability of green capitalism (Mol & Spaargaren, 2000). One of the main attackers was Schnaiberg; he began his criticism in the early 1980s until his death in the 2000s (Schnaiberg, 1980). He stated that the theory was not beneficial for both the environment and the economy, but was rather a treadmill of capitalism. Capitalism, according Schnaiberg (1980), caused environmental deterioration. Ignoring capitalism and failing to attack the fundaments underneath the capitalist system will result in cosmetic or incremental environmental changes that are not capable of resolving environmental crises in a fundamental way. Due to this criticism, the theory has again become nuanced (Mol & Spaargaren, 2000). Capitalism is no longer essential for sustainable production and consumption, nor must it be totally neglected. Rather, capitalism is reforming constantly, and one of the main triggers therefore is related to environmental concerns. This means that ecological modernization theorists try to transform capitalism in such a way that it obstructs the environment less and less, and therefore increasingly contributes to a more sustainable world.

A final point of criticism on the theory of ecological modernization is that the theory is overly ideological (Leroy, van Tatenhoven, 2000). According to Leroy and van Tatenhoven (2000), the theory cannot be seen as an objective set of ideas, but rather as a prescriptive way of conducting politics. This criticism can also be used in favor of the theory. The theory can enhance understanding about how environmental policy can be embedded in a changing international context (O'Neill, 1998; Rinkevicius 2000). Since the Paris Agreement, world leaders have committed themselves to protect the earth from climate change. To achieve this, the environmental aspect has to be part of every policy process. Sustainability as a precondition is therefore embedded in the current culture of international politics. Sustainable region marketing is closely linked with this prescriptive way of doing politics. The political framework has set the precondition to be sustainable. Therefore, a given region can market itself as sustainable, and if this is successful, the consequence will be that the region can act in a sustainable manner.

Zooming in, offshore wind power in North Groningen is an excellent example of why ecological modernization, in its current form, is a valid theory to analyze social change in structurally disadvantaged maritime-port regions. In the introduction, it is mentioned that North Groningen must deal with many negative facets. To counter these facets, North Groningen looks for opportunities in offshore wind. This approach can be defended from a historical perspective. North Groningen has an image as an old, rural industrial-harbor region. This image, as old industrial-harbor region, is associated with darkness, pollution, and unhealthy characteristics. This rather negative image has paved the way for sustainable and climate-friendly policies to aid in a transformation towards a modern, green, and attractive image (Andersson, 2016). Therefore, North Groningen wants to create a leading image as a center for offshore wind energy (Economic Board Groningen, 2017; Economic Board Groningen & Energy Valley, 2017; Groningen Seaports, 2017; University of Groiningen, 2017).

This line of thoughts matches very well with the earlier described win-win situation. Regions that market themselves as sustainable have competitive edges based on the assumption that greening the regional image may attract new, green businesses and may therefore create green growth (Andersson, 2016). Furthermore, the approach of sustainable region marketing within the theoretical field of ecological modernization has a few more positive influences on North Groningen. Firstly, sustainable region marketing has, as already mentioned, a competitive character among regions in general and among structurally disadvantaged maritime-port regions in particular. The structurally disadvantaged maritime-port regions compete with each other to be the most “green” region or to be the most attractive for the offshore wind industry. As a consequence, the overall levels of the greenness of regions increase (Andersson, 2016). Secondly, sustainable region marketing might be seen as a catalyst for local satisfaction. By education and by informing citizens of sustainable results, the local governments of North Groningen can achieve happiness and willingness among citizens (Andersson, 2016). This is important in light of the earthquake issue. Concerned citizens want alternatives for gas pumping in the province, and employees in the gas branch want new jobs in the offshore wind industry.

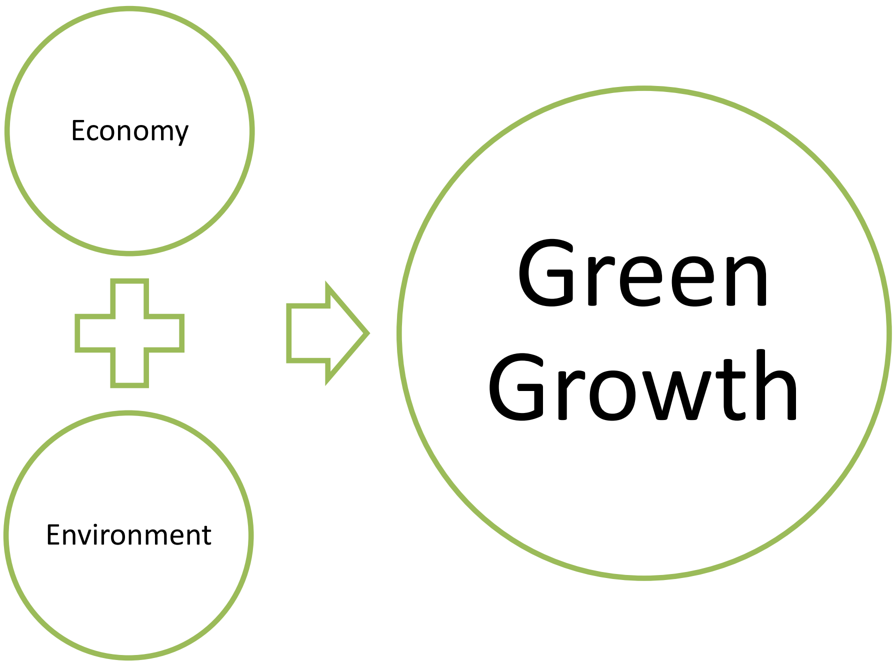


Figure 2: Conceptual model showing the theory of ecological modernization

2.2 Migration flows

In this section, the thesis elaborates on the second subquestion: what is the theoretically relation between the offshore wind industry and migration flows in North Groningen. This includes an explanation about domestic-labor migration and the link to the target audience of the sustainable region marketing strategy of North Groningen.

To answer the question of how sustainable region marketing can influence migration flows, the researcher must go almost 2,000 years back in time. A Roman wrote in Pompeii on a wall: “We were excited to came to Pompeii, but we desire even more to go back, because we really want to see Rome again” (Gay, 1993). This quote refers to the term “topophilia” (Tuan, 1974), a term that literally means love for a place; it explains that people experience an indescribable bond with a place. As in real love, one cannot describe it but knows when one feels it. Many experience this feeling; examples are student cities, hometowns of a favorite sport team, and birth towns (Hospers & Pen, 2011). In addition to emotional bonds with places, there also exist some socioeconomic bonds with places; this is called “location-specific capital” in literature (Da Vanzo, 1981). This term has already briefly been touched upon in the first chapter of this thesis. In short, it means that a place has certain criteria that other places have not—for example, the proximity of family or good, qualified personnel. In terms of migration flows, scientists claim that the higher the degree of location-specific capital, the fewer people intend to move (Hospers & Pen, 2011).

The paragraph above explained that topophilia and location-specific capital are two crucial concepts for people in their decisions to move. The following Dutch statistics on migration flows prove how significant this is. In the Netherlands, over 1.5 million residents move each year, which is about 10% of the total Dutch population (Feijten & Visser, 2005; PBL, 2008; van Huis & Wobma, 2010). Of these 1.5 million Dutch people, two-thirds move within their own municipalities and one-third to other municipalities (Feijten & Visser, 2005; PBL, 2008; van Huis & Wobma, 2010). Only 14% moved out more than 100 km (Feijten & Visser, 2005; PBL, 2008; van Huis & Wobma, 2010). Singles and young people move the most over long distances (van Huis & Wobma, 2010). Relocation reasons for young people are mainly for schooling, jobs, or relationships. Moving caused by study opportunities provide the opportunity to touch the group of highly educated people, or forward-thinking citizens, a common group in place marketing literature. Scientists believe that people can be triggered to move to a particular university city when the school offers unique areas of study (Hospers & Pen, 2011). However, place marketing on forward-thinking citizens is a tricky business due to the already explained problem of brain drain; this is especially a problem in Groningen (Venhorst, Edzes, Broersma, et al., 2011). Of all people over the age of 18 who moved to the university city of Groningen in 1999-2000, more than half had already left the province within five years (Latten, Das, & Chkalova, 2008).

Regarding companies, including government agencies, 4% move per annum, comprising 18,000 companies and 200,000 employees (van Oort, et al., 2007). A whopping 94% move within their own labor-market regions, and 75% even move within their own municipalities (van Oort, et al., 2007). The conclusion is thus that only 25% of all the companies that move within one year move to another municipality (van Oort, et al., 2007). It is important to add to this last statistic that there is no such thing as a patron observable here (van Oort, et al., 2007). Rural-urban, urban-rural, urban-urban, and rural-rural patrons are not at stake in intermunicipal migration of companies. Additionally, young companies that grow fast and look for new establishment requirements are overrepresented (van Oort, et al., 2007). Decisive factors for companies in the decisions to move are sufficient business premises, representatives of the premises, the states of the premises, organizational considerations, and accessibility (Kok, Menkhorst, de Roo, & Vening, 1999). In the last years, companies have placed more value on representatives of the premises and accessibility (Pellenbarg, 2005).

Now that the statistics have confirmed the theoretical concepts of the first paragraph of this section, the researcher will explain what topophilia, location-specific capital, and the loyalty of people and companies to a place means for place marketing. To do this, it is important to explain the difference between “cold” and “hot” place marketing (Hospers & Pen, 2011). Niedomysl (2007) showed that city-marketing campaigns have no significant effect on migration flows. Movers over long distances decided for themselves where they move; place marketing only has a trigger effect. Public money for place marketing is thus, in some cases, a waste. Instead of attracting new residents (cold place marketing), it is wiser to invest sometimes in hot place marketing, which means retaining residents for a place (Hospers & Pen, 2011). Regarding companies, the same principle is at stake. Young and Lever (1997) investigated whether improving the image of Manchester will have a positive effect on attracting professional office-based companies. Again, the outcome was that for office managers, the image promoted was not especially important in the decision to relocate their businesses. Eventually, instead of what Hospers and Pen (2011) claim that as regard forward-thinking citizens hot city marketing is the write approach to avoid brain drain, the researcher prefers a combined approach of cold- and hot place marketing. However, the researcher agrees with their assumption that it is important to give forward-thinking citizens perspective in enough job opportunities, because the lack of job opportunities, or that thought among forward-thinking citizens, is the main reason why they move to economically stronger regions. However, it is first important to attract forward-thinking citizens (cold place marketing) to university cities—for example, with unique education programs. Thus, a balanced place marketing strategy, with both cold and hot place marketing, or brain-gain and brain-drain programs, is the proper way to positively influence migration flows among forward-thinking citizens.

The above theoretical assumptions are translatable to the offshore wind industry in North Groningen. In the coming paragraphs, the researcher will set out this translation with a strong focus on groups that are characteristic for the offshore wind industry in North Groningen (see table 1).

Table 1: The theoretical target audience for the sustainable region marketing campaign of North Groningen

Sustainable place marketing (economy + environment = green growth)		
	Cold place marketing	Hot place marketing
Residents	Young people, Singles	Current residents/ workforce, Young children Students of applied universities and secondary vocational education schools
Companies	New companies, Young growing companies	Current offshore wind companies, Oil and gas industry
Forward-thinking citizens	New students, Technical workers, Retour migrants	Graduates, Technical workers (personnel of the oil and gas industry

Like all industries, the focus of the marketing approach in North Groningen must be on retaining the current residents, especially since North Groningen faces problems with shrinkage and aging. The only exception to this strategy can be young people and singles. These groups can be attracted by the strong brand of North Groningen as the offshore wind, or renewable energy, region of the Netherlands. Young people and singles with strong beliefs about sustainability can be attracted in this way; for the rest, it is wise to invest in retaining the current residents of North Groningen. Young children especially provide opportunities for the region. The education programs for young children can be tailored to future jobs. When young children at school learn something about the offshore wind sector, the chance that they become enthusiasts for education programs suited for offshore wind becomes bigger. There are also opportunities offered by study programs at universities of applied sciences and secondary vocational programs with strong practical foci on offshore wind. Education programs at companies or internships must become the standard in the region for it to become a leader in the offshore wind industry.

In addition to young people, young companies are overrepresented in numbers on moving over long distances as well. As is typical for a new industry, there are a lot of young companies in the offshore wind industry. Place administrations can therefore invest in cold place marketing to attract those young companies. Another possibility for cold place marketing is that established companies are growing so fast that they need more business premises. In these cases, the companies want to open new establishments or factories. Either way, the establishment of a few companies in North Groningen can result in a cluster effect (Klepper, 2010). The cluster effect is important for the economic development of a region since it causes a positive spiral. This means that once offshore wind companies start to congregate in North Groningen after the emergence of a leading offshore wind or related company (in the case of North Groningen, the leader is Google), labor pooling, technological spillovers, and a rich supplier industry stimulates further firm growth and the entry of offshore wind or related companies in the region (Klepper, 2010). Moreover, the entrants of an industrial leader has one more important effect. Key to clustering in Detroit (automobile industry), Silicon Valley (semiconductor industry), and Esbjerg (offshore wind industry) are the presences of spinoffs (Klepper, 2010; Verhelst, 2017). Spinoffs are firms whose founders previously worked for another firm in the same industry. Worldwide, both Detroit and Silicon Valley have, within their own industrial sectors, by far the highest numbers of entrants that were spinoffs, with respectively 44% and 80% (Klepper , 2010). Klepper (2010) concluded as well that leaders in their industries produce more spinoffs by far than other companies. Some of these leading spinoffs become, in their turns, fertile sources of further spinoffs. In short, North Groningen can be a hub in offshore wind if it is able to attract a leading company or companies and to stimulate an innovative business climate in the hope that spinoffs enter the region and the process of labor pooling, technological spillovers, and a rich supplier industry kicks off.

This section has already touched upon the subject of place marketing for forward-thinking citizens with a strong focus on students; however, technical workers are also an important group within the broader category of forward-thinking citizens, especially in a new industry such as offshore wind. Since innovation is mainly brought about by scientists or technical workers, it is only in a second instance made operational by social scientists, according to the theory of ecological modernization (Mol & Spaargaren, 2000). Furthermore, technical workers are far more mobile than the general population (Dumont & Lemaitre, 2005). Dahl and Sorenson (2009) studied the migration patterns of technical workers in Denmark. They observed that as regards technical workers, the same principles in the decision to move are at stake as by other groups in society. They also prefer the proximity of family and friends above economic aspects such as wages (Dahl & Sorenson, 2009). The proximity of the parents is especially crucial (Dahl & Sorenson, 2009). An individual technical worker in Denmark would prefer a closer job unless a more distant job paid at least $39,826 more per year. If this individual worker also lived closed to his parents, then the distant job must pay at least $52,579 more. The average technical worker in Denmark earned approximately $69,000 in 2006, so the result implies that a particular individual might need to expect nearly a doubling of income to justify a short move. For longer moves, in the study of Dahl and Sorenson (2009), a doubling of distance required even more gains in expected income. A solid strategy for North Groningen in regards to technical workers is twofold. On one hand, it needs cold region marketing to attract technical workers whose parents live in North Groningen; on the other hand, it needs hot place marketing to retain the current technical workers. Furthermore, both ,the fact that technical workers are far more mobile than the general population and that they prefer to work close to their parents provides another opportunity for North Groningen. From all pupils in the Northern Netherlands who attended “VWO,” the highest high school educational level in the Netherlands, 75% choose to study at the University of Groningen (TWIX, 2006). Although many graduates first choose to move to economically stronger regions, the chance that they will return to the Northern Netherlands is relatively high since the proximity of their parents is the most decisive motivation in choosing a place to live. Cold place marketing on potential retour migrants could therefore be effective in North Groningen to counteract shrinkage and economic decline. However, proper jobs area again key; in this case, in the offshore wind sector, jobs must be available, and furthermore, the available jobs should be easy to find for potential retour migrants.

Within the technical workers, there is one special group: the personnel of the oil and gas companies. In the introduction, the innovations of hydrogen and decommissioning have already been mentioned. In short, these new techniques are chances for old-fashioned oil and gas companies to transform into sustainable offshore companies. In this sense, it pays to invest in marketing programs to retain personnel of the oil and gas companies, provided that the companies are willing to transform themselves into sustainable offshore companies. The personnel of these companies have much knowledge on the infrastructure of the oil and gas industry and the related technical aspects. The infrastructure can, as mentioned, be reused for offshore wind, and the technical aspects are highly comparable. Thus, for the region, it is crucial to retain these people. Of course, the same is applicable for the oil and gas companies where these people are working.

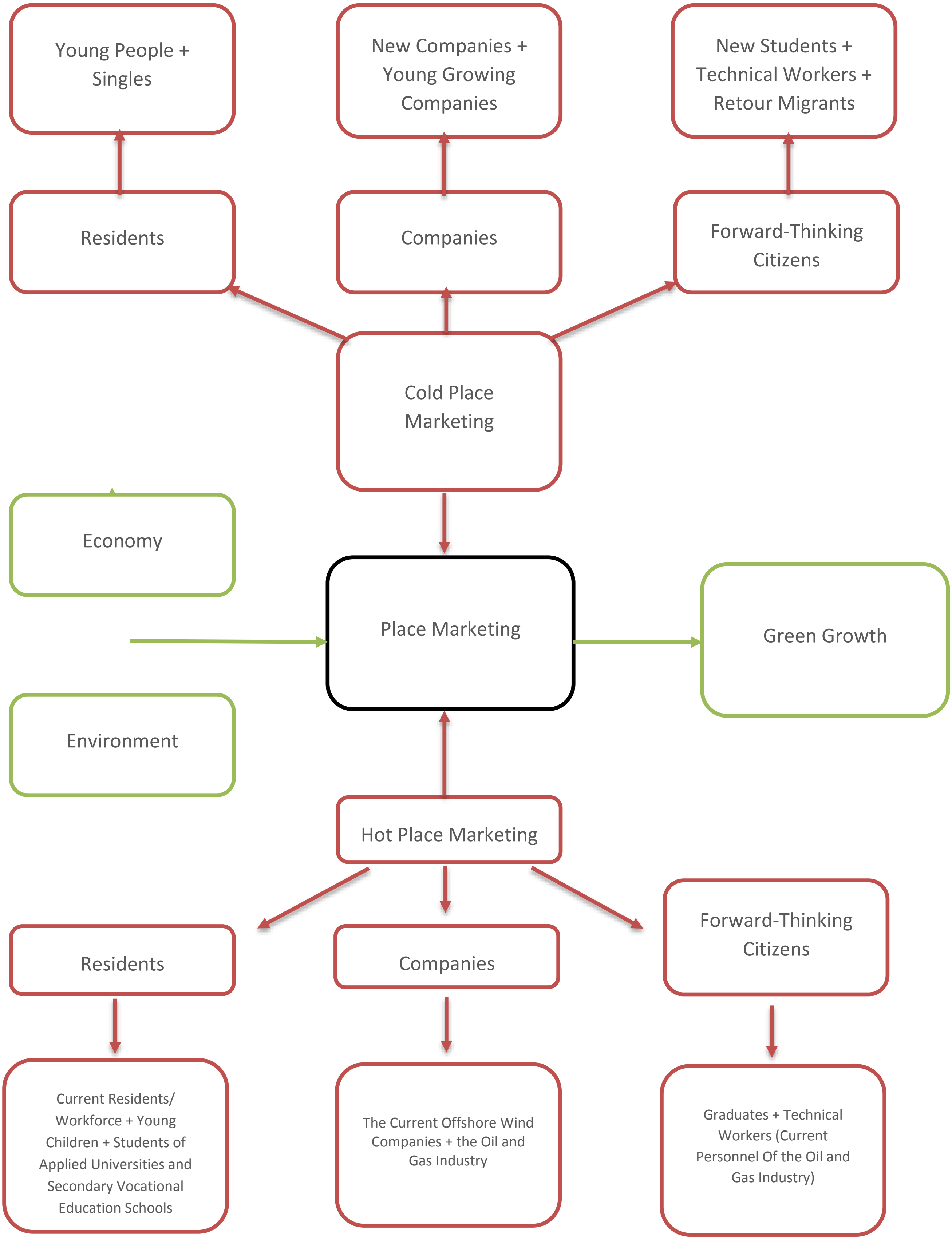


Figure 3: Conceptual model of ecological modernization plus the influence of place marketing on migration flows

In figure 3, the second step of the conceptual model of the thesis is visualized in red. The ecological modernization part are the green boxes and arrows in the model. Both parts are pointing towards sustainable region marketing, which is the analytical framework for this research project.

2.3 Niches for offshore wind maritime ports

After explaining how sustainable region marketing can influence migration flows and picking out the theoretical target audience for the sustainable region marketing campaign of North Groningen, the last subquestion of the theoretical part of this thesis can be answered. This section shall thus elaborate on the subquestion of which niches for maritime offshore wind ports exist. First, though, the researcher shall explain why it is important for an offshore wind maritime port to operate in a specific niche of the offshore wind industry.

Due to globalization, ports become economic competitors of each other (Kruidhof, Rienstra, & Zondervan, 2011). Especially in the North Sea region, this is important for two reasons. Firstly, the North Sea region is a world leader in the field of offshore wind (Chen, 2011). Many ports want to take advantage of the massive investments in offshore wind at the North Sea. For this reason, competition exists between ports among the North Sea coast to attract new businesses in the offshore wind industry. Secondly, the North Sea region is a highly industrialized region with a wide range of maritime ports. Therefore, it is necessary to be unique and to be the most attractive business location; otherwise it will not be found by the industry (van Houtum & van Naerssen, 2002).

However, not every port is a competitor of another. The target audience, the theme within the offshore wind industry, the economic specialization within offshore wind, and the position of the port in the offshore wind supply chain depends upon which ports are competing with each other (Kruidhof, Rienstra, & Zondervan, 2011). Thus, the identity of the port—or what, in place marketing literature, is called “place DNA”—determines, for the most part, the economic changes of the port (Kruidhof, Rienstra, & Zondervan, 2011). From this point of view, policy makers must know very well what the historic and current profile of the maritime port is. An example is that a port that has historically excelled in building ships must, in the future, make ships that are suited for offshore wind operations. Groningen Seaport has specialized in the gas and chemical industries; investing in hydrogen will therefore fit with the past and current activities of North Groningen and can be a future profile of the port. Making a division between types of maritime ports helps to know a port’s profile, but it is also an analytic tool that gives information as to which ports can be categorized as the same types of maritime port and which cannot. In others words, one can use a port’s profile to determine competitors and to find the niche with the most economic potential, which are both very useful in region marketing.

The literature distinguishes roughly two types of maritime offshore wind ports. Although different authors use different names for both types of maritime ports, it is common to make a subdivision between ports that are capable of handling major compounds and vessels (group 1) and ports that can provide service for the offshore wind farms (group 2) (BVG Associates, 2016; Bard & Thalemann, n.d.). For the major-component ports, it is very important that there are sufficient infrastructures and facilities, and for the service ports, the distance between the port and the offshore wind farm is the most important factor; a short distance automatically means lower costs.

The abovementioned ports can be distinguished again in more specific categories (Bard & Thalemann, n.d.).

1. Major-component ports
    a) Import/ export ports transport turbine components from inland ports to ports at the coast, which provide the construction for offshore wind farms. The most important requirements for this type of port are accessibility by land and the facilities to make and transport relatively small and single elements of wind farms, such as cables (Bard & Thalemann, n.d.).
    b) Construction ports have the functions to preassemble components at the port near the wind farm construction site. Important characteristics for this type of port are the facilities to assemble large elements of a wind farm (Bard & Thalemann, n.d.).
    c) Manufacturing ports produce large wind farm components, such as blades, towers, nacelles, and foundations. In the future, when the sizes of wind turbines increase, they produce the entire offshore wind turbine because the turbines are, at that point, too large and therefore not transportable over land anymore. For this type of port, the availability of facilities for producing major elements or entire wind turbines is crucial (Bard & Thalemann, n.d.).
    d) Ocean energy ports assemble and commission entire wind turbines in their ports. Thus, these will be the future manufacturing ports when the turbines are too big to transport. Therefore, the requirements are very comparable to manufacturing ports; moreover, these types of ports are major players in the industry (Bard & Thalemann, n.d.).
    e) Shelter ports are ports where vessels are safely anchored when weather condition are unfavorable. The only requirement therefore is the possibility to safely anchor ships (Bard & Thalemann, n.d.).
2. Service ports
    a) Quick-reaction ports are utilized for spontaneous and short-term maintenance actions. Crucial for these types of ports are the distances to the offshore wind farms and the facilities to dock service ships. Storage space for tools and facilities for maintenance personnel is also crucial (Bard & Thalemann, n.d.).
    b) Supply ports supply quick-reaction ports with required operational resources. Therefore, supply ports require enough space for the storage of tools, spare parts, and components. The land connection also must be without locks (Bard & Thalemann, n.d.).

The list above of the different types of offshore maritime ports must be made measurable to determine in which niche or niches of the offshore wind industry the Eemshaven is involved. Table 2 showed the measurement criteria of the different types of ports. These criteria are based on the criteria Bard and Thaleman (n.d.) have compiled (see appendix I). A first example to explain table 2 is the import and export port. It is important for import and export ports that they are very reachable by land. Small components must be transported by land to other port categories without any barriers. There must also be enough space to store those small components. Eventually, it is important that those components can be lifted onto different means of transport. A second example comprises the manufacturing ports. In these port, major components of the wind turbines are produced. This means that there must be a great deal of working space, both for factories and storage but also for offices. It is also important that the quay and the width and draught of the water in the ports are capable of housing major vessels. Eventually, it is again important that the heavy major components can be lifted onto the vessels. Only the important criteria for a port category are made measurable. That is why some criteria for a certain port category have rates and some do not.

Table 2: Rate table per criteria for the different port categories

Ports	Import/Export	Construction	Manufacturing	Ocean Energy	Shelter	Quick Reaction	Supply
Criteria							
Quay (m)	-	200-300	>500	>500	-	>80	80-100
Storage space (ha)	Sufficient	8-30*	500/2	500/2	-	0.2	0.25
Office space (m2)	-	-	500/2	500/2	-	0.05	Sufficient
Crane (availability)	Available	Available	Available	Available	-	Available	Available
Land transport barriers	None	-	-	-	-	None	None
Width of port entrance (m)	-	>100	-	>100	-	-	-
Heavy lift capacity (tons/m2)	High load	High load	High load	up to 1000	-	5	Medium load
Distance to offshore windfarm (h)	-	-	-	-	-	<2	-
Max. draught port (m)	-	8	-	8	-	3.5	3.5
Tidal (m)	-	0	-	0	-	Draught-tidal=>3.5	-
Distance to local airport (km)	-	-	-	-	-	-	Short
Distance to helicopter landing pads (km)	-	-	-	-	-	Possible zero	Short

*of which 30 ha with greater weather restrictions on construction
Source: (Bard & Thalemann, n.d.)

This subdivision above can be seen as a typology, rather than a list of definitions. A definitional approach has limitations (Dobson, 1996). Definitions are self-explanatory. They sum up what the different types of maritime offshore wind ports are by creating a definition from their meaning. In many cases, it is better to work with a typology than a definition (Dobson, 1996). A typology is a framework for analyzing and conceptualizing concepts. Moreover, the typological approach has the advantage that one expects to get plural answers from one's research (Dobson, 1996). This is typically an advantage in the context of maritime offshore wind ports. The natures of both concepts need par excellence plural understandings. Those plural understandings are highly observable since maritime ports have multiple industries and since they want to create an offshore wind cluster throughout the entire supply chain of offshore wind farms, which is even more important since wind turbines are becoming taller and broader (Bard & Thalemann, n.d.). Long-distance road and lower-water transport becomes with this trend more difficult and riskier than it is currently. The section on research philosophy elaborates more on the typological approach by putting this research in the stream of constructivism.

In Figure 4, all the theories used in this research are combined in one conceptual model. As explained above, the items in green refer to the theory of ecological modernization and the items in red indicate how sustainable region marketing can influence migration flows. The items in blue are a new contribution to the model, which show how identifying a port niche helps to determine the economic focus of the sustainable region marketing strategy of a region. Furthermore, this helps to determine which regions are competitors and which are not. The competitor analysis and the supply chain analysis in sections 4.1 and 4.2 elaborate on the part of the conceptual model pertaining to port niches. The issues in green, which refer to ecological modernization, are the focus of section 4.3, which describes the SWOT analysis conducted to identify concrete business opportunities. In the discussion and conclusion of this thesis, predictions are made regarding how the recommendations for a sustainable region marketing strategy of North Groningen may affect migration flows in the region. In doing so, the discussion and conclusion consider the red items in the conceptual model. In this way, figure 4 shows the three theoretical subquestions of this thesis.

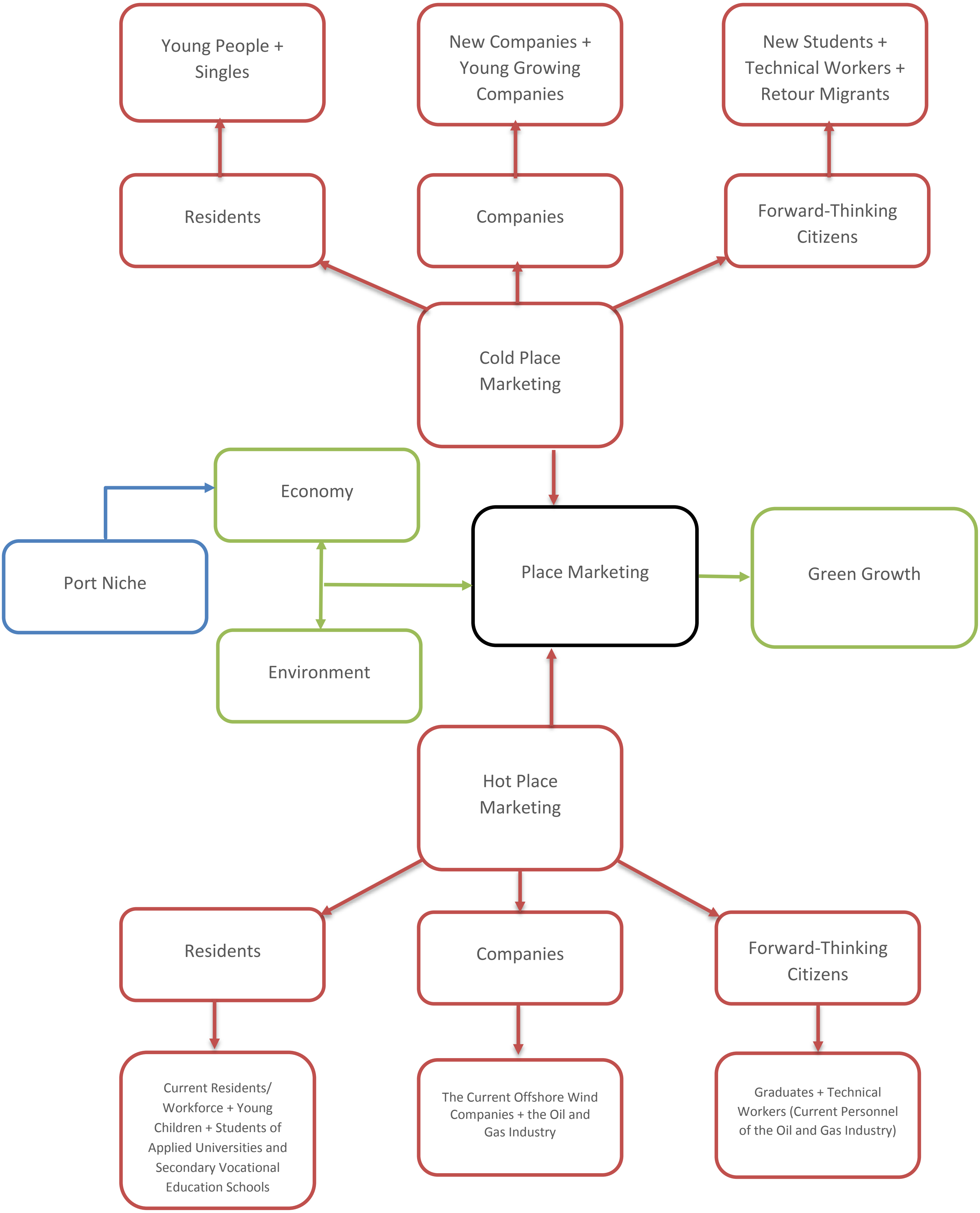


Figure 4: The combined conceptual model, about ecological modernization, migration flows, and port niches

3. Methodology

After summing up the concepts and theories which will be used to reach the aim of this research, this chapter will explain the research's methodological approach, which must make it possible to find answers for the main research question. Paragraph 3.1 presents the philosophical position of the researcher, paragraph 3.2 outlines the research strategy, paragraph 3.3 elaborates on the case selection, paragraph 3.4 explains the methods of data collection and data analysis, and paragraph 3.5 addresses the validity and reliability of this study.

3.1 Research philosophy

Before proceeding with an overview of the research strategy and methods, it is important to make clear from which philosophical position this research is conducted. The philosophical position determines the view of the researchers on reality. Moreover, research philosophy guided the researcher in the process of making choices in research strategy and methods.

The research was based on the assumption that a phenomenon, object, or economic opportunity cannot be observed from an objective viewpoint (Bryman, 2008). Observations are always dependent on the subjective interpretations of the researcher. As a matter of consequence, each observation or analysis is just a part of the truth. Other researchers or persons in general can look differently at the observed object or economic opportunity. One might therefore only be able to approach the truth of an observing object. This philosophical stream is called constructivism (Bryman, 2008). To approach the truth as much as possible, it was important to analyze the case in depth and in detail from different perspectives. The focus was therefore on the consensus of different opinions, instead of generalizing different opinions about the recommendations for the marketing strategy. A grant transition from fossil energy to renewable energy is only possible when all parties or stakeholders from different backgrounds are willing to cooperate. The same is the case for a region marketing strategy. The strategy must be widely supported among all the interested parties; otherwise, it would not be effective. A consensus between ecologists, environmentalists, and anthropologists is therefore crucial.

The theory of ecological modernization can act as a guideline that tries to bring together, on the one hand, parties with a strong focus on nature (such as ecologists) and, on the other hand, parties with a strong focus on the economy (such as anthropologists), as well as everything between these two extremes, by suggesting that the economy and the environment go hand in hand instead of being contradictory. Ecologists state that humankind cannot take its relationship with the environment for granted (Mol & Spaargaren, 2000). They prefer to approach the environment with environmental preservation, so nothing may be constructed that disturbs natural processes. On the other end of the spectrum, postmodernists think that the environmental crisis does not have a real or objective existence but is instead a process of framing certain social problems in a very specific way, and sometimes even an arbitrary way (Mol & Spaargaren, 2000). To a certain degree, this assumption is true, according to the typology of sustainability, which Dobson (1996) has created. However, according to the researcher, this does not mean that the different opinions, which have emerged from the different subjective interpretations of individuals about sustainability, make the environmental crisis unreal. A common ground must be found to define or solve our environmental crisis.

Again, the task is to find agreements between ecologists, environmentalists, and anthropologists. Ecological modernization could help with this task in making green growth central and benefitting both the economy and the environment. Anthropologists can mostly agree because of the economic perspective of the theory, and ecologists can be satisfied to a certain degree because of the environmental advantages that economic development creates. In the end, there exists no left- or right-wing climates, so both wings must work together to find proper solutions. Constructionism is aware of the different frames people has for sustainability in general and in sustainable place marketing specifically. Dealing with different opinions is key to finding green solutions to counteract shrinkage and economic decline in North Groningen.

3.2 Research strategy

Both sections 2.1 and 3.1 have explained how ecological modernization influences social patterns. Together with constructionism, ecological modernization has guided the researcher in selecting the further methodological approach. In the rest of the methodology chapter, the researcher will explain which strategy and methods were used in this thesis.

There are many types of research strategies to conduct research (Bryman, 2008). The researcher has chosen to perform desk research and a case study. The purpose of the desk research is to obtain content knowledge about general theories and particular knowledge of the selected case. In fact, the researcher studied knowledge produced by others, so secondary data was studied (Bryman, 2008).

In the second part of the research, a case study was performed. The term “case” associates the study with a location, community, or organization (Bryman, 2008)—in this study, a structurally disadvantaged port region. Bryman (2008) explains that there exist variety of case study types, but for this research, the author has chosen an exemplifying case. This is defended by means of three arguments. A case had to be chosen, not because it was unique or unusual in some way, but because it represented a broader category of structurally disadvantaged maritime-port regions; moreover, it is suitable to answer the main question, as will be explained in the next paragraph (Bryman, 2008). Furthermore, these kinds of case studies allowed the researcher to examine key social processes (Bryman, 2008)—for this research, a sustainable place marketing strategy that is built on the theory of ecological modernization to retain and attract businesses, citizens, and forward-thinking citizens and therefore to avoid shrinkage and economic decline. Thirdly and most importantly, the theory part of this thesis has explained that region marketing is not generally applicable on all structurally disadvantaged maritime-port regions. A valid region marketing strategy is based on a port’s DNA. An exemplifying case study helps in this particular research project to give recommendations for a sustainable region marketing strategy of a structurally disadvantaged maritime-port region that is different compared to other regions (Bryman, 2008). Although generalizing is not a goal of this research project and the outcomes are thus not applicable for competing structurally disadvantaged maritime-port regions, the method of analyzing can be used as a guideline for other such regions. After all, region marketing is about competition. This is a positive thing because the regions are creating their own market positions, but most importantly, as Andersen (1994) stated, the competition among the different regions increased the overall level of greenness, as the ultimate goal was the environmental transition.

More generally, the research design can have an inductive, deductive, or combining approach (Bryman, 2008). Looking to this traditional division, the researcher chose an inductive approach. It was intended to generate knowledge on how authorities can attract and retain businesses, citizens, and forward-thinking citizens in their maritime ports with a sustainable region marketing strategy. More specifically, the researcher wanted to generated knowledge about creating a sustainable region marketing strategy for structurally disadvantaged maritime-port regions involved in the offshore wind sector with the aim to explore concrete economic potentials. However, the newness of sustainable region marketing made it very difficult to operationalize it. Because of this, the researcher was not able to came up with a fixed set of indicators of the concepts of the main research question of what the economic opportunities are for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline. Instead, the researcher has chosen a set of general ideas, or sensitizing concepts that must be examined during the research. Those general ideas are generated out of earlier-conducted research about region marketing, ecological modernization, migration flows, offshore wind ports, structurally disadvantaged port regions, and sustainability. The choice to use sensitizing concepts instead of pure observations and findings to work towards a theory that combines the abovementioned list of studies caused to nuance the inductive approach. In short, an approach with sensitizing concepts is used to answer the main question.

3.3 Case selection

North Groningen, as mentioned in the introduction, is the case selection for this thesis. In this section North Groningen will be geographically defined, and it will be explained why North Groningen is a structurally disadvantaged maritime-port region and thus a suitable case selection for this research.

The researcher has chosen to use the demarcation of the Economic Board Groningen (2017) for the research area (see figure 5) for two reasons. Firstly, there is a very practical reason: regarding the projected economic potential in the offshore wind industry for North Groningen, the Economic Board Groningen is officially the cooperation partner of the Energy Valley Foundation. This thesis must be considered as a part of this research project, so the choice for North Groningen as a case for this study is an imposed one. Secondly, the reason why the researcher has chosen to include all the municipalities, which are mapped in figure 5, is that these municipalities suffer from the effects of the earthquakes caused by gas pumping in the province of Groningen. It is the so-called earthquake area. The Economic Board Groningen was set up, amongst others, to help sustainable initiatives that can be alternatives for gas pumping in the region (Economic Board Groningen, 2017). Possible wind farms in the area north of the Wadden Islands is seen as such an initiative. In other words, the thesis makes use of the demarcation of the Economic Board Groningen to ensure that it can profit from the support of the board.

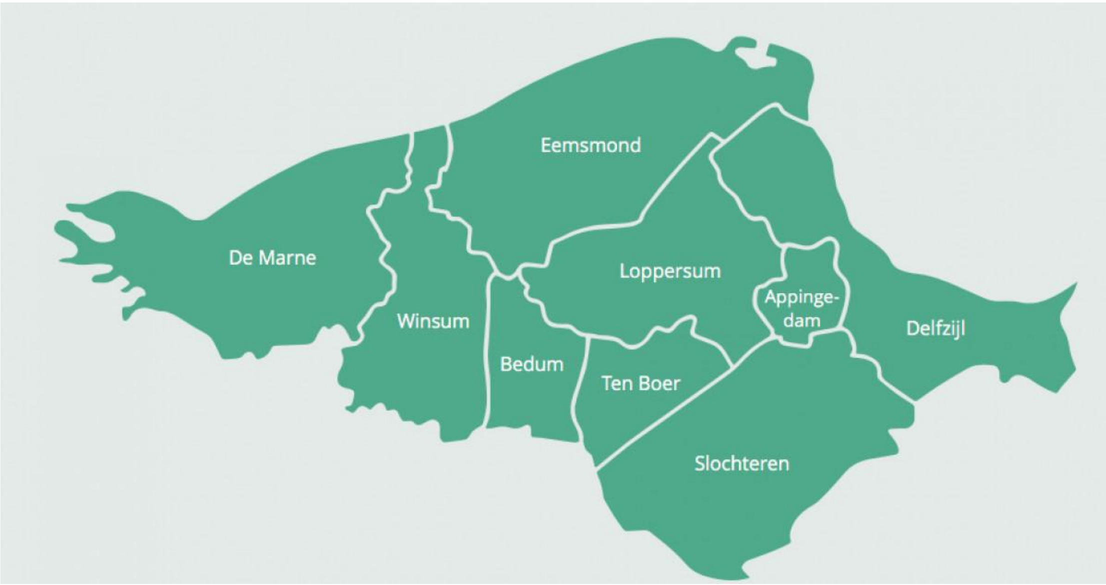


Figure 4: The research area of North Groningen

Source: (Economic Board Groningen, 2017)

After defining the exact research area, it is time to explain why North Groningen is a structurally disadvantaged maritime-port region. To answer this, the thesis follows Jonas et al. (2017), who have defined structurally disadvantaged maritime-port regions as suffering from:

- long-term decline of maritime-related industries (e.g., fishing and shipbuilding);
- disused industrial assets and infrastructures (e.g., port facilities);
- geographical remoteness;
- high unemployment, low/underutilized skills base and declining populations;
- poor external image and marketing;
- weak economic governance structures, shrinking tax bases, and susceptibility to austerity measures.

Some of Jonas' (2017) criteria have already touched upon in the introduction. North Groningen indeed has a high unemployment rate, a low or underutilized skills base, a declining population, and shrinking tax bases because of aging. Moreover, the geographical remoteness of the port is also notable since the port is categorized as being in a top-shrinkage area by the Ministry of the Interior and Kingdom Relations. The other criteria can be observed as well. For example, there is a long term-decline of maritime-related industries observable in the Eemshaven (Chen, 2011). The Eemshaven was first opened in 1973 for the purpose of oil-refinery and petrol-chemical industries. However, an oil crisis occurred right after the opening, and the original plans never materialized. To change the circumstances, the area became a regular port with logistic activities during the 1980s and 1990s, but this plan also was not a success (Chen, 2011).

The facilities and the connection with the hinterland was categorized as moderate in the past. In comparison with other ports in the North Sea region, such as Harlingen, Emden, Wilhelmshaven, Cuxhaven, and Esbjerg, the quality of facilities is a bit low (Chen, 2011). The connections with the hinterland are poor as well, especially the rail connection (Chen, 2011).

In the past, the Eemshaven had to cope with a poor external image and marketing. The North Sea region, where the Eemshaven is located, is a highly industrialized region with a long tradition of international trading and shipping activities (Chen, 2011). As a consequence, maritime ports were densely built among the North Sea coast. Unfortunately, the Eemshaven is a nameless ports outside the Netherlands (Chen, 2011). The Eemshaven is considered a less attractive port to invest in for entrepreneurs. Surrounded by other well-developed maritime ports, the Eemshaven was ignored by many entrepreneurs.

In addition to Jonas' (2017) criteria, there are more elements that validated the choice for North Groningen as a research area. Groningen (and, in particular, North Groningen) is framed as the energy area of the Netherlands. As the energy area of the Netherlands, North Groningen has also a strong focus on renewable energy. There are plenty of examples to prove this statement, but the author will touch upon three of them. Firstly, the Eemshaven marked itself as the offshore wind hub in the Netherlands and has even been a strong focus of the North Sea region market (Groningen Seaports, 2017). Secondly, the building that houses the Energy Academy Europe, on the campus of the University of Groningen, is the most sustainable educational building constructed in Europe; it won the BREEAM Award in 2017, which is an award for new sustainable buildings (University of Groiningen, 2017). In this building, the university provides education, conducts research, and fosters innovation in the field of sustainable energy. That the building is located in Groningen, and thus next to the research area, proves the statement that North Groningen is very sustainable-minded area. Eventually, as was already explained in the first part of this section, North Groningen has to deal with the problem of earthquakes. The Economic Board Groningen has as already mentioned the aim of financing sustainable initiatives, which must lead to alternatives for gas pumping; this is the last example of the sustainability of the research area.

A very paradoxical but urgent additional argument is that although there are earthquakes, employment opportunities in North Groningen are highly dependent on the gas sector. The public opinion is against gas pumping in Groningen, and moreover, Groningen is running out of gas. As a consequence, alternative jobs must be created. Both the framing of the area for sustainable energy in the Netherlands and the need for creating jobs for the people of North Groningen make it a suitable case for studying sustainable region marketing within the theoretical school of ecological modernization. The thought of creating new jobs with renewable energy is a perfect example that economic development and sustainability are not separate dimensions but are intertwined.

3.4 Research methods, data collection, and data analysis

Paragraph 3.2 already mentioned that the data for this study were collected from primary and secondary data. Secondary data were gathered by a desk study. First, the researcher conducted a critical review of academic literature. These was found on the web using Google Scholar and with the help of RUQUEST to find journals in the sector of maritime-port management and offshore wind. Furthermore, references in the articles were used to find other relevant sources. However, after the review of the academic literature, there were still enormous knowledge gaps. This was basically caused by the newness of the offshore wind industry. Scientists have not had the time yet to do enough research on the offshore wind industry. This is especially the case for social scientists in the field of sustainable port management and marketing. As a result, data of the CBS, policy documents, marketing documents, and port websites were used to fill the knowledge gaps after the review of the academic literature and to do an in-depth research of the content of the case and competitors. These documents were found using Google Scholar and on websites of different stakeholders who are involved in the offshore wind industry. The aim of the desk study was particularly important to answer, at least partly, the first three subquestions: how can the theory of ecological modernization helps to explain why regions can grow economically, without harming the environment; what is the theoretically relation between the offshore wind industry and migration flows in North Groningen; and, which niches for maritime offshore wind ports exist.

The set of primary data was collected with two field studies and open interviews. The aim of one of the field studies of an onshore wind farm in the Eemshaven was to gather knowledge about it and to experience a wind turbine in real life. Although there are difference between onshore and offshore wind turbines, the turbines have enough similarities to form an image (Bilgili, Yasar, & Simsek, 2010). The second field study was a driving tour through the earthquake area. The goal of this field trip was to see the port of Delfzijl, the gas pumping, and the effects of shrinkage in real life. Open interviews were conducted to find out what the positions of different stakeholder in the offshore wind industry were and to obtain an impression of concrete economic opportunities within the offshore wind industry. Thus, the open interviews were “conversational” in style, and this avoided interview schedules. The aim was to include the points of view of the interviewees and to create recommendations for a sustainable region marketing strategy that reflects social constructs of the entire branch, as explained in section 3.2 (Bryman, 2008). This was particularly interesting to answer subquestion four up to and including six: in which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven; how is the supply chain of the Northern-Netherlands offshore wind market organized; and, what are the concrete business opportunities in the offshore wind industry for North Groningen to build a region marketing strategy on. And more in general to test the conducted information for answering sub-question 1 up to and including 3 in practice and in some cases to full some knowledge gaps, which still exist after the desk study. It is self-evident to say that all the methods of data collection contributed to answer the main research question, what are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal of avoiding shrinkage and economic decline. An overview of which data collection method is used to answer the different subquestions is presented in table 3.

Table 3: The used data collection method per subquestion

	Field Study	Desk Study	Interview
Subquestion 1	-	X	(X)
Subquestion 2	-	X	(X)
Subquestion 3	-	X	(X)
Subquestion 4	-	X	X
Subquestion 5	-	X	X
Subquestion 6	-	X	X
Main research question	X	X	X

X = used, - = not used, (X) = indirectly used

Appendix II shows which persons were interviewed and why. The interviewees could be subdivided into six categories: decommissioning/reusing, local governance, national governance, ocean energy, offshore wind, and supply chain.

Decommissioning/Reusing:

The energy transition from fossil energy to offshore wind energy also means that the offshore oil and gas infrastructure become useless. If North Groningen decided to invest in offshore wind, then decommissioning gives the region enormous economic opportunities. From this viewpoint, it was interesting to interview Shell, a major company in the oil industry. Additionally, TNO, the Dutch organization for applied natural science research, was from added value because of its knowledge on the reuse of the offshore oil and gas infrastructure. The same applies to the “Nederlandse Olie en Gas Exploratie en Productie Associatie (NOGEPA)” and the “Energiebeheer Nederland (EBN).” Lastly, “Energie Centrum Nederland (ECN)” was added to the interviewee list of this category. In contrast to Shell, TNO, NOGEPA, and EBN is ECN, an organization that looks to decommission or reuse infrastructure, not from an oil-and gas perspective, but from the perspective of renewable energy.

Local Governance:

It is necessary to include the opinion of the local governance into recommendations for the sustainable region-marketing strategy of North Groningen. After all, they are the organizations that should put the strategy into practice. Moreover, as explained in the section about social relevance, it is important that all the stakeholders, including the province and Groningen Seaports lobby in The Hague with the same story about offshore wind in North Groningen. Additionally, Groningen Seaports of course has the most expertise about its own maritime ports. As explained before the spatial characteristics of the port has a very strong influence on what there is economically possible. Therefore, both organizations are interviewed.

National Governance:

The interviews with the North Sea Energy Challenge/Dröge and van Drimmelen was conducted with the aim to procure advice on how to lobby in The Hague. Dröge and van Drimmelen is suitable for that purpose because of its experience in strategic interest management of organizations towards the government. Moreover, it has an influential network in The Hague.

Ocean Energy:

In addition to offshore wind, there are also other types of sustainable energy that can be produced simultaneously or at the expense of offshore wind. Knowledge about the other types of renewable energy helps to compare and to distinguish the offshore wind industry to its competitive counterparts. The Energy Delta Institute is an international business school, a world leader in knowledge about energy transition and how businesses can manage it (Energy Delta Institute, 2017). Project Synergy is an example of how different forms of energy can work simultaneously.

Offshore Wind:

The researcher added this category because offshore wind is, of course, the central element in this research. It was important to know what the national developments in the Netherlands in the field of offshore wind were and how they influence the economic opportunities for North Groningen. The TKI Offshore Wind facilitates the offshore wind sector inter alia in the fields of: research, development, demonstration, valorization, knowledge transfer, international cooperation, training, and market development (TKI Wind op Zee, 2017). It aims to reduce the cost and to strengthen the economic impact of offshore wind. Therefore, the TKI is the organization in the Netherlands that has scientific knowledge about offshore wind. The second organization in this category interviewed during this research is the “Nederlandse WindEnergie Associatie (NWEA).” The NWEA is the branch organization of the offshore wind sector (NWEA, 2017). In short, NWEA is the organization in the Netherlands with contacts of all companies and institutions involved in the sector.

Supply Chain:

As already mentioned, the supply chain leads to the business profile of the Eemshaven. Based on this profile, a region-marketing strategy and resultant economic potentials emerge. BLIX was interviewed because it conducted a similar study to this one in the same period. Furthermore, it has much knowledge on how the supply chain in the offshore wind industry is organized. The “Noordelijke Innovation Board” was interviewed because of its knowledge on the energy market, and it representative Ad van Wijk, is the ambassador of the hydrogen economy in the Netherlands.

All the gathered information from the interviews, the desk study, and the field studies was combined in a SWOT analysis to evaluate the present conditions of North Groningen. The SWOT analysis is therefore based on the research of the regional economy, current port activities, hinterland, and infrastructure as well as the interviews of the stakeholders. However, before the SWOT analysis could take place, a number of analytic steps had to be completed (see figure 6). Firstly, subquestion 4, in which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven, needed to be answered. This was completed through a competitor analysis. Secondly, the knowledge about the current activities of the ports was examined with a supply chain analysis. In fact, this was the step to answer subquestion 5, how is the supply chain of the Northern-Netherlands offshore wind market organized. Eventually, the conducted interviews were analyzed by coding the interview reports with the aid of AtlasTI. The researcher decided to use interview reports instead of transcripts due to sensitive business information. All analyses listed above could thus be combined into a SWOT analysis. The SWOT analysis is an analytical tool to evaluate the present conditions of North Groningen, both internally and externally. The present internal strengths and weaknesses, and the external opportunities and threats, form the basis to choose concrete business opportunities for North Groningen in the offshore wind industry. These concrete business opportunities were essential to answer the main research question, what are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline.

In conclusion, this section has explained what the research design is, how the data were collected, and how the collected data were analyzed. As mentioned, the figure below schematically shows the methodological approach of this thesis.

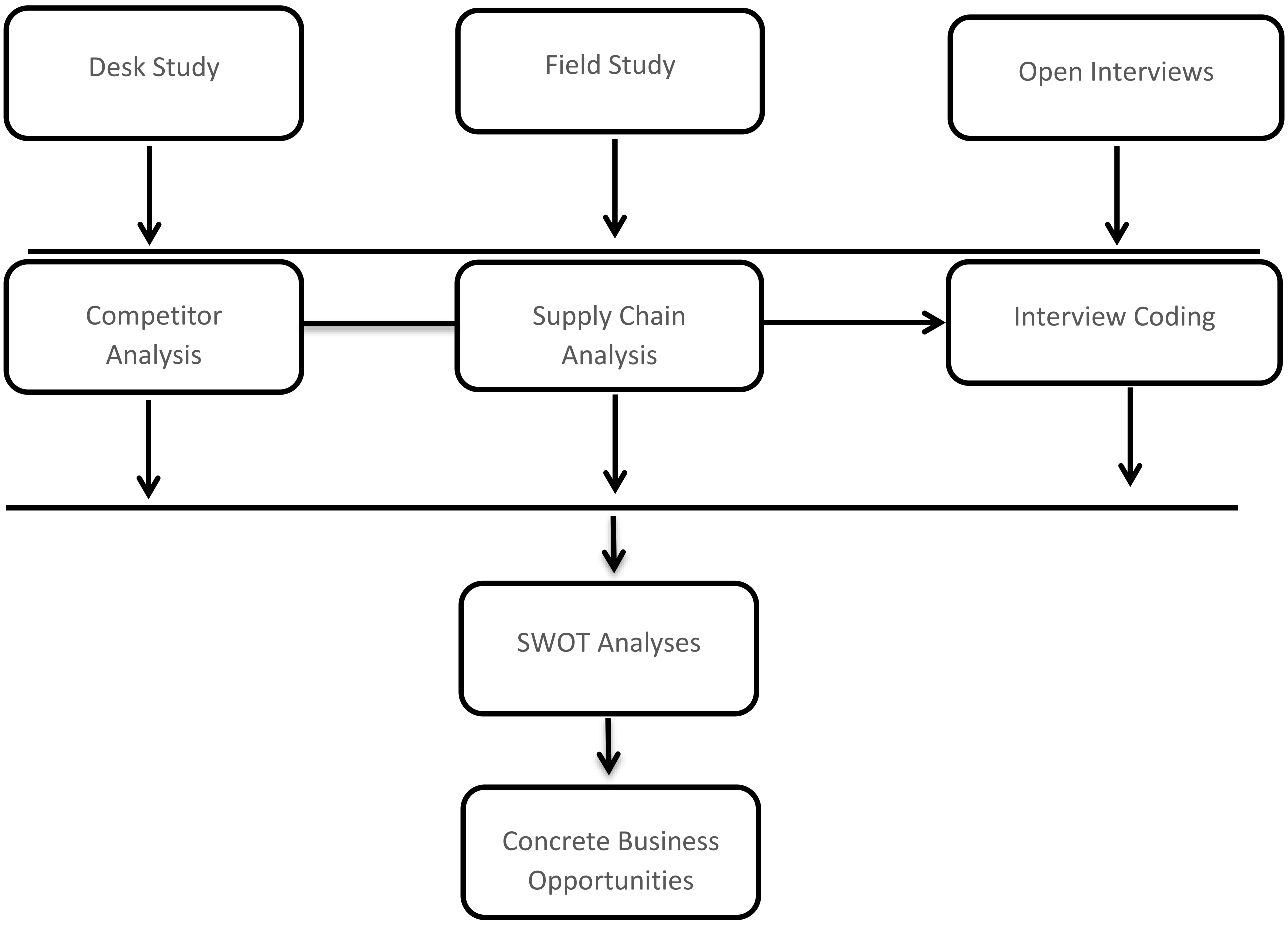


Figure 5: Schematic methodical research approach

3.5 Reliability and validity of the research

Reliability and validity in qualitative research mean nothing more than playing down the salience of measurement issues (Bryman, 2008). It determines the quality of the research. These are important criteria since the thesis explained in paragraph 3.1 that observations of a researcher cannot be seen apart from the subjective meanings of the researcher. The higher the reliability and validity of the research, the closer conclusions of a research project approach the truth.

External reliability says something about the degree to which a study can be replicated. This is a difficult requirement to meet in social science since it is hard to freeze social circumstances (Bryman, 2008). In this study the main challenge for external reliability was that the interviews were conducted by representatives of North Groningen. The danger of this was that the interviewees were appeasing; they could say what they thought North Groningen would want to hear. The only solution to overcome this problem was to be as neutral as an academic can be. The purpose of academics is to analyze social patterns and not to give judgments value. This is also important to overcome the social constructs of the researcher. For this reason, the researcher will only give recommendations for the sustainable region-marketing strategy of North Groningen. Policy makers have the job of exactly designing the strategy.

Internal reliability means that different observers must have the same conclusions about the observed object (Bryman, 2008). To tackle this, interviews were conducted in pairs. One member of the interview team was changeable, but the other member was constantly involved in the interview pair. Furthermore, the interviews were evaluated in the weekly research-team meeting. By conducting the interviews in pairs and evaluating the interviews in detail, the researcher hoped to achieve as much interobserver consistency as possible.

Internal validity is a strength of qualitative research. It indicates to what degree the researcher measures what he or she wants to measure (Bryman, 2008). By interviewing a wide range of stakeholders involved in the offshore wind industry in depth, the researcher was able to ensure a high level of congruence between concepts and observations. On the other hand, external validity has a bit more weakness in qualitative research. It refers to the degree to which findings can be generalized (Bryman, 2008). The story of North Groningen is difficult to replicate for other structurally disadvantaged maritime-port regions. Therefore, it is important to go beyond the official storyline in order to find the real story, which can be generalized (Kern & Bulkeley, 2009). This assumption is based on port DNA. The DNA of the ports in North Groningen is totally different than the DNA of ports in other regions. The conducted research framework about the sustainable region marketing strategy of North Groningen can therefore be used as an example for other structurally disadvantaged maritime-port regions in making their own sustainable region-marketing strategy (Kern & Bulkeley, 2009).

4 Results

After concluding the theoretical and methodological part of this research project, it is time to move on to the empirical part. In this chapter, the three empirical subquestions will be answered in a stepwise approach. Firstly, section 4.1 elaborates on subquestion 4: in which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven. This section will provide a competitor analysis to determine the competitive ports and the none competitive ports for the Eemshaven. Secondly, section 4.2 will answer, using a supply chain analysis, subquestion 5, how is the supply chain of the Northern Netherlands offshore wind market organized. Eventually, what are the concrete business opportunities in the offshore wind industry for North Groningen to build a region marketing strategy on, will be answered in section 4.3. Using the stepwise approach to answer subquestion 4 up to and including 6 makes it possible for the researcher to provide concrete recommendations for the sustainable region marketing strategy of North Groningen.

4.1 Who are the competitors of the Eemshaven?

This section shall answer subquestion 4: In which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved, and who are the competitors of the Eemshaven? Looking back to the conceptual model, portrayed in figure 4, the thesis focuses on the blue item in the conceptual model (figure 4a).

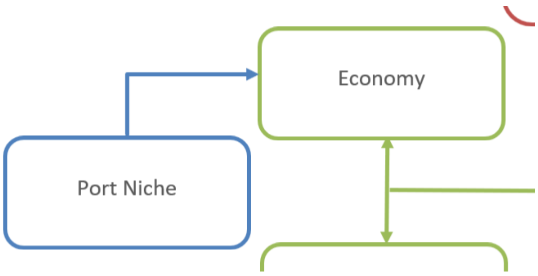


Figure 4a: the blue part of the conceptual model about port niches

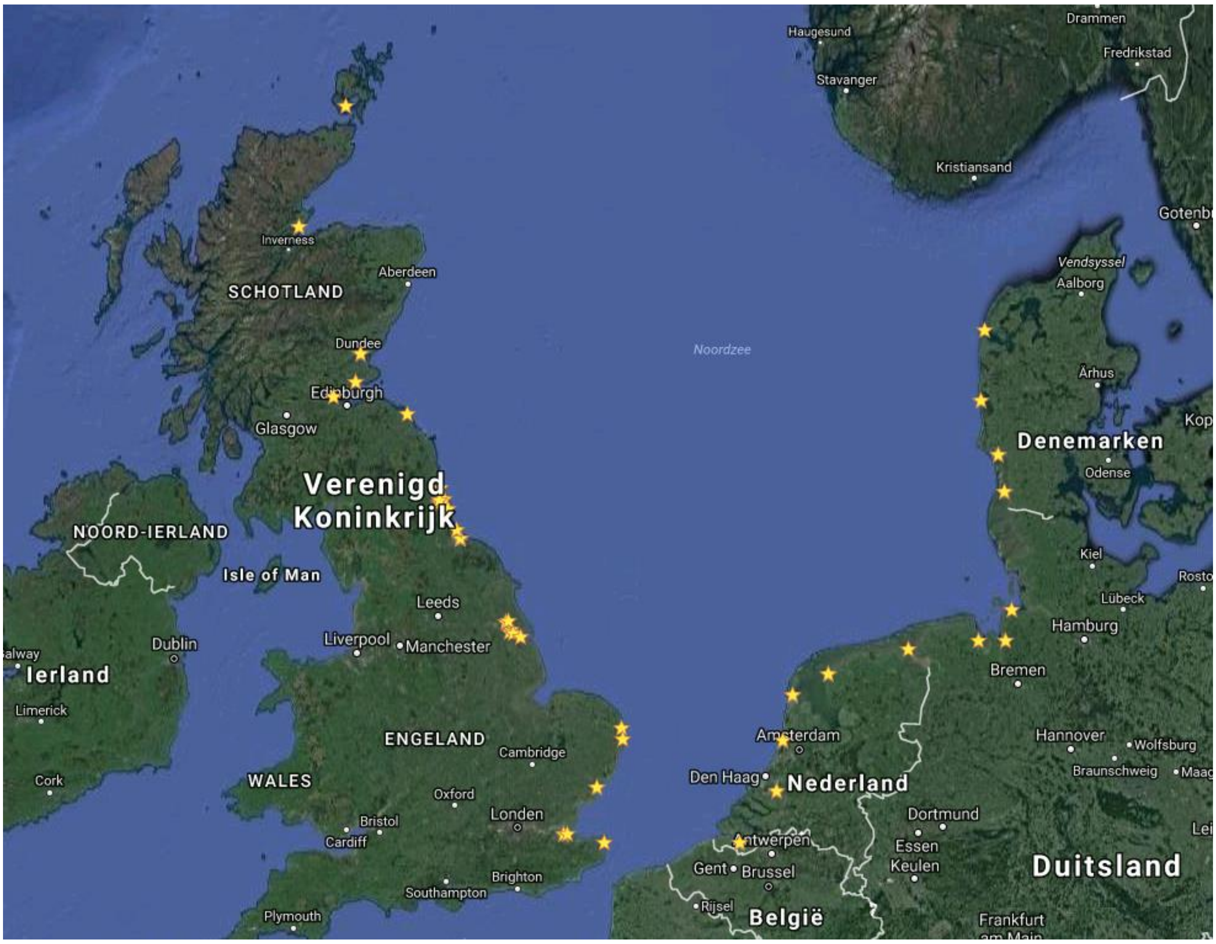
To do this, a number of steps must be taken. Firstly, all the meaningful maritime offshore wind ports along the North Sea coast must be listed. Secondly, the maritime ports must be ranked by means of a competitor analysis in one or multiple niches, which are explained and made measurable in section 2.3. After listing and ranking the maritime ports in the different niches, the researcher knows which ports are competitors of each other. The last step in answering subquestion 4 is to explain what the competitive position of the Eemshaven means for the recommendations for the sustainable region marketing strategy.

To start this section, as mentioned in the previous paragraph, all the meaningful maritime offshore wind ports along the North Sea coast must be found. Table 4 presents the meaningful maritime ports, and figure 7 maps all the ports below.

Table 4: The meaningful maritime offshore wind port along the North Sea coast

The Netherlands	Denmark	Germany	The United Kingdom
Eemshaven	Esbjerg	Bremerhaven	Albert Dock (Hull)
Amsterdam	Hvide Sande	Cuxhaven	Alexander Dock (Hull)
Den Helder	Thyboron	Wilhelmshaven	Blyth
Harlingen	Romo Havn		Dundee
Rotterdam			Eyemouth
Vlissingen			Great Yarmouth
Ijmuiden			Grimsby
			Hartlepool
			Harwich Navyard
			Humber Able Port
			Immingham
			London Thamesport
			Lowestoft
			Lyness
			Methil
			Middlesbrough
			Neptune Energy Park
			Nigg Yard
			North Shields
			Ramsgate
			Rosyth
			Sunderland
			Teesport
			Wallsend

Source (4COffshore, 2017).



Source: (Google Maps, 2017)

Figure 6: Map of all the maritime offshore wind ports along the North Sea coast

Section 2.3 conceptualized the different types and categories of maritime offshore wind ports. In addition to the conceptualization, section 2.3 has also made the criteria measurable for each category of maritime offshore wind port. The table below shows the gathered data set of all the maritime offshore wind ports in the Netherlands, Denmark, and Germany. The maritime ports in the United Kingdom are excluded in the table below because the researchers of BVG Associates for the Offshore Wind Industry Council (2016) already performed a comparable study into the port's DNA of the British maritime offshore wind ports along the North Sea coast. After analyzing the individual ports, the results of the BVG Associates for the Offshore Wind Industry Council (2016) regarding the British ports are included again in the competitor analyses.

Table 5: Dataset of the key criteria of maritime offshore wind ports in the Netherlands, Denmark, and Germany

	Eemshaven	Amsterdam	Den Helder	Harlingen	Rotterdam	Vlissingen	Ijmuiden	Esbjerg	Hvide Sande	Thyboron	Romo Havn	Bremerhaven	Cuxhaven	Wilhelmshaven
Quay (m)	5085	1700	3360	1450	6500	4750	760	120000	150	5000	400	500	290	1725
Storage space (ha)	100	130	140	30	-	100	6	171/2	2	12/2	4.5	25	10	130/2
Office space (m2)	3750	1600	-	-	-	-	1000	1710000/2	200000	120000/2	1100	2000000	85000	1300000/2
Crane (availability)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes
Land transport barriers	None	-	None	None	None	None	None	None	max width 80	None	None	None	None	None
Width of port entrance (m)	-	45	230	40	600	350	120	200	35	-	50	-	-	-
Heavy lift capacity (tons/m2)	30	20	4	4	6	15	23.5	150 (tons)	10	20	-	10	1500	20
Close to an offshore wind farm (yes/no)	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Max. draught port (m)	14,00	13.70	10,00	7.50	23.65	16.50	-	9.50	7.00	3.50-9.00	6.00-6.50	14.10	15.80	18.00
Tidal (m)	2.5	0.0	1.80	1.8	1.2	4.5	-	1.3	-	-	0.9	0.0	0.0	-
Distance to local airport (km)	9,00	30,00	4,00	60,00	10,00	85,00	25,00	12,00	72,00	134,00	-	69,00	105,00	10,00
Distance to helicopter landing pads (km)	30,00	0,00	-	-	-	3.5	20,00	0,00	-	-	0,00	0,00	0,00	0,00

Matching table 2 and 5 made it possible to select, using an inductive approach, as explained in the methodology chapter, the niche or niches in which the ports are active. Per the criteria, all the possible niches of maritime ports were selected; after doing this, the niche with the highest sum is the theoretical niche in which a port is active. However, because of doubts raised following the quantitative data analyses, due to a tie between multiple niches, the port's websites are analyzed qualitatively as well. This is necessary to ensure that the quantitative data is consistent with the practice. This can assist in making a decision in cases when there is a tie between multiple niches. Romo havn, in Denmark, is the only exception in the above-described methodological approach to the competitor analyses. Data on this port is not analyzed quantitatively because it focuses only on sheltering (see table 17) (Romo, 2017). The results of this first step of the competitor analysis are presented in table 7 up to and including 20, and in addition, table 6 shows the legend of the competitor analysis.

Table 6: Legend for the competitor analysis

Port Type	Color
Import/Export	
Construction	
Manufacturing	
Ocean Energy	
Shelter	
Quick Reacton	
Supply	

Table 7: Results of the competitor analysis of the Eemshaven

Criteria	Results	Possible niches					
Quay (m)	5085						
Storage space (ha)	100						
Office space (m2)	3750						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	-						
Heavy lift capacity (tons/m2)	30						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	14,00						
Tidal (m)	2.5						
Distance to local airport (km)	9,00						
Distance to helicopter landing pads (km)	30,00						
Total		5	5	3	3	3	
Result		Quick Reaction Port					
Secundair profile		Construction Port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 8: Results of the competitor analysis of the Port of Amsterdam

Criteria	Results	Possible niches					
Quay (m)	1700						
Storage space (ha)	130						
Office space (m2)	1600						
Crane (availability)	Yes						
Land transport barriers	-						
Width of port entrance (m)	45						
Heavy lift capacity (tons/m2)	20						
Close to an offshore wind farm (yes/no)	No						
Max. draught port (m)	13.70						
Tidal (m)	0.0						
Distance to local airport (km)	30,00						
Distance to helicopter landing pads (km)	0,00						
Total		6	6	5	5	5	5
Result		Import/ export port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 9: Results of the competitor analysis of the port of Den Helder

Criteria	Results	Possible niches					
Quay (m)	3360						
Storage space (ha)	140						
Office space (m2)	-						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	230						
Heavy lift capacity (tons/m2)	4						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	10,00						
Tidal (m)	1.80						
Distance to local airport (km)	4,00						
Distance to helicopter landing pads (km)	-						
Total		6	6	5	4	4	
Result		Quick Reaction Port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 10: Results of the competitor analysis of the port of Harlingen

Criteria	Results	Possible niches					
Quay (m)	1450						
Storage space (ha)	30						
Office space (m2)	-						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	40						
Heavy lift capacity (tons/m2)	4						
Close to an offshore wind farm (yes/no)	No						
Max. draught port (m)	7.50						
Tidal (m)	1.8						
Distance to local airport (km)	60,00						
Distance to helicopter landing pads (km)	-						
Total		6	6	4	2	2	2
Result		Supply port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 11: Results of the competitor analysis of the port of Rotterdam

Criteria	Results	Possible niches					
Quay (m)	6500						
Storage space (ha)	-						
Office space (m2)	-						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	600						
Heavy lift capacity (tons/m2)	6						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	23.65						
Tidal (m)	1.2						
Distance to local airport (km)	10,00						
Distance to helicopter landing pads (km)	-						
Total		4	4	4	4	2	
Result		Manufacturing Port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 12: Results of the competitor analysis of the port of Vlissingen

Criteria	Results	Possible niches					
Quay (m)	4750						
Storage space (ha)	100						
Office space (m2)	-						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	350						
Heavy lift capacity (tons/m2)	15						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	16.50						
Tidal (m)	4.5						
Distance to local airport (km)	85,00						
Distance to helicopter landing pads (km)	3.5						
Total		5	5	5	3	3	2
Result		Construction Port					
Secondair Profile		Shelter Port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 13: Results of the competitor analysis of the port of IJmuiden

Criteria	Results	Possible niches					
Quay (m)	760						
Storage space (ha)	6						
Office space (m2)	1000						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	120						
Heavy lift capacity (tons/m2)	23.5						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	-						
Tidal (m)	-						
Distance to local airport (km)	25,00						
Distance to helicopter landing pads (km)	20,00						
Total		7	6	3	3	2	2
Result		Quick Reaction Port					

Source: (Netherlands Foreign Investment Agency, N.D.)

Table 14: Results of the competitor analysis of the port of Esbjerg

Criteria	Results	Possible niches					
Quay (m)	120000						
Storage space (ha)	171/2						
Office space (m2)	1710000/2						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	200						
Heavy lift capacity (tons/m2)	150 (tons)						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	9.50						
Tidal (m)	1.3						
Distance to local airport (km)	12,00						
Distance to helicopter landing pads (km)	0,00						
Total		8	8	5	3	3	2
Result		Ocean Energy Port					

Source: (Port of Esbjerg, 2017)

Table 4: Results of the competitor analysis of the port of Hvide Sande

Criteria	Results	Possible niches					
Quay (m)	150						
Storage space (ha)	2						
Office space (m2)	200000						
Crane (availability)	Yes						
Land transport barriers	max width 80						
Width of port entrance (m)	35						
Heavy lift capacity (tons/m2)	10						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	7.00						
Tidal (m)	-						
Distance to local airport (km)	72,00						
Distance to helicopter landing pads (km)	-						
Total		8	7	2	2	1	1
Result		Quick Reaction Port					

Source: (Hvide Sande Havn, 2017)

Table 56: Results of the competitor analysis of the port of Thyboron

Criteria	Results	Possibilities					
Quay (m)	5000						
Storage space (ha)	12/2						
Office space (m2)	120000/2						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	-						
Heavy lift capacity (tons/m2)	20						
Close to an offshore wind farm (yes/no)	Yes						
Max. draught port (m)	3.50-9.00						
Tidal (m)	-						
Distance to local airport (km)	134,00						
Distance to helicopter landing pads (km)	-						
Total		6	5	4	3	3	3
Result		Quick Reaction Port					

Source: (Thyboron port, 2017)

Table 176: Results of the competitor analysis of the Romo Havn

Criteria	Results	Possible niches
Quay (m)	400	
Storage space (ha)	4.5	
Office space (m2)	1100	
Crane (availability)	-	
Land transport barriers	None	
Width of port entrance (m)	50	
Heavy lift capacity (tons/m2)	-	
Close to an offshore wind farm (yes/no)	Yes	
Max. draught port (m)	6.00-6.50	
Tidal (m)	0.9	
Distance to local airport (km)	-	
Distance to helicopter landing pads (km)	0,00	
Total		12
Result		Shelter port

Source: (Romo, 2017)

Table 7: Results of the competitor analysis of the Bremerhaven

Criteria	Results	Possible niches					
Quay (m)	500						
Storage space (ha)	25						
Office space (m2)	2000000						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	-						
Heavy lift capacity (tons/m2)	10						
Close to an offshore wind farm (yes/no)	No						
Max. draught port (m)	14.10						
Tidal (m)	0.0						
Distance to local airport (km)	69,00						
Distance to helicopter landing pads (km)	0,00						
Total		8	8	5	3	2	2
Result		Ocean Energy Port					

Source: (Bremenports, 2017)

Table 8: Results of the competitor analysis of the Cuxhaven

Criteria	Results	Possible niches					
Quay (m)	290						
Storage space (ha)	10						
Office space (m2)	85000						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	-						
Heavy lift capacity (tons/m2)	1500						
Close to an offshore wind farm (yes/no)	No						
Max. draught port (m)	15.80						
Tidal (m)	0.0						
Distance to local airport (km)	105,00						
Distance to helicopter landing pads (km)	0,00						
Total		6	4	4	3	3	2
Result		Manufacturing Port					

Source: (Rhenus Cuxport, 2017)

Table 20: Results of the competitor analysis of the Wilhelmshaven

Criteria	Results	Possible niches					
Quay (m)	1725						
Storage space (ha)	130/2						
Office space (m2)	1300000/2						
Crane (availability)	Yes						
Land transport barriers	None						
Width of port entrance (m)	-						
Heavy lift capacity (tons/m2)	20						
Close to an offshore wind farm (yes/no)	No						
Max. draught port (m)	18.00						
Tidal (m)	-						
Distance to local airport (km)	10,00						
Distance to helicopter landing pads (km)	0,00						
Total		6	5	5	3	3	3
Result		Manufacturing Port					

Source: (Wilhelmshaven, 2017)

All the maritime offshore wind ports in the Netherlands, Denmark, and Germany are now categorized in niches. Table 21 shows an overview of the results of the competitor analyses. Moreover, as already mentioned, the maritime offshore wind ports in the United Kingdom that are involved in the construction, manufacturing, or ocean energy niches are included in this overview table as well (BVG Associates, 2016). The rest of the British maritime offshore wind ports are involved in the other niches. However, the researcher has decided that it was not necessary for answering subquestion 4 to know in which exact niche or niches those British ports are involved. Market activities in these niches are mostly regional instead of transnational, and therefore, those British maritime ports are not competing with the Eemshaven.

Table 91: Competitors table

Import/ Export	Construction	Manufacturing	Ocean Energy	Shelter	Quick Reaction	Supply
Amsterdam	**Eemshaven**	Rotterdam	Esbjerg	Romo Havn	**Eemshaven**	Harlingen
	Vlissingen	Cuxhaven	Bremerhaven		Vlissingen	
	Dundee	Wilhelmshaven	Nigg Yard		Ijmuiden	
	Neptune Energy Park	Methil	North Shields		Hvide Sande	
	Albert Dock (Hull)	Rosyth	Alexandra Dock (Hull)		Thyboron	
	Great Yarmouth	Blyth	Killingholme		Den Helder	
	Seaton	Wallsend	Immingham			
		Sunderland	Sheerness			
		Hartlepool				
		Middlesbrough				
		Neptune Energy Park				
		Albert Dock (Hull)				
		Great Yarmouth				
		Seaton				

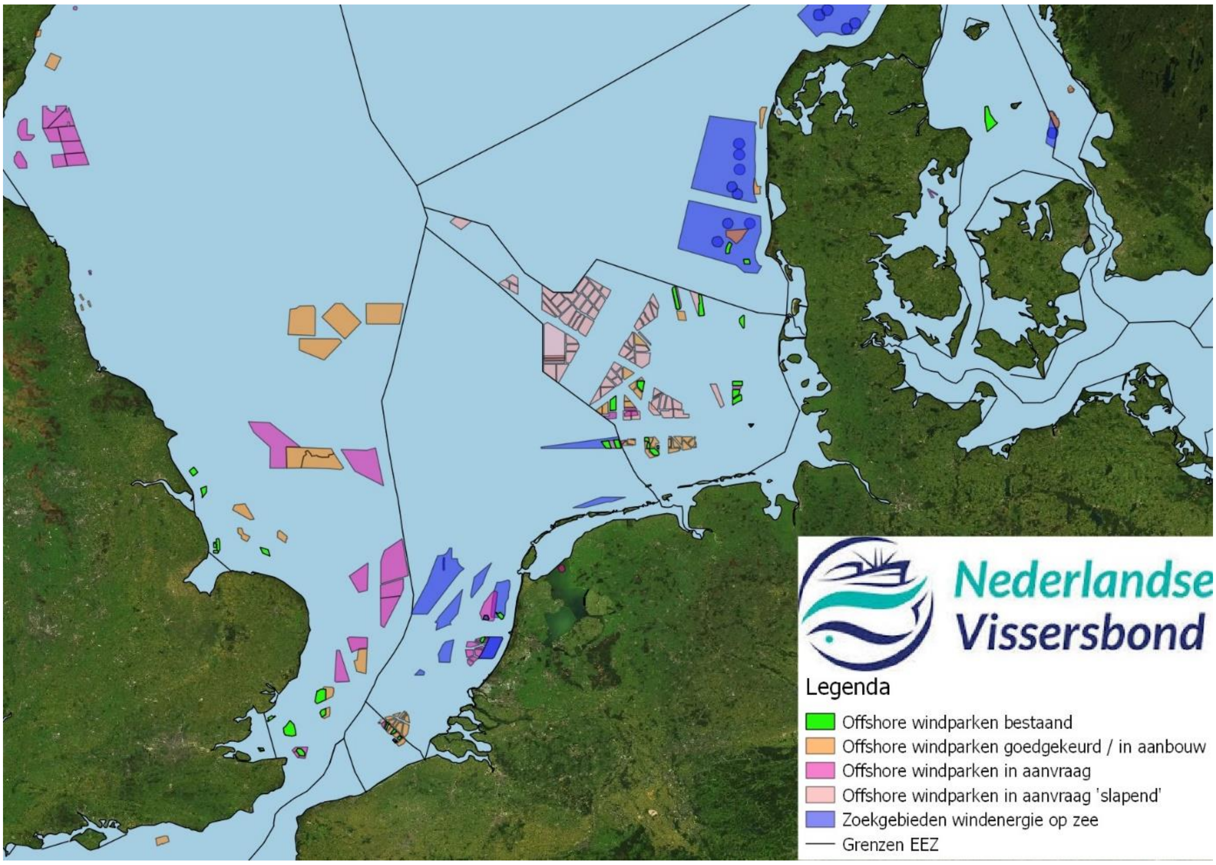
Source for the British maritime ports: (BVG Associates, 2016)

Due to the competitor analyses, the researcher can conclude that the Eemshaven is involved within two niches of the offshore wind industry: quick-reaction and construction ports. Again, none of the ports fits perfectly in a specific niche; however, the typological approach helps to tell a multifaceted story of a port. Therefore, the ports have multiple understandings and can be sometimes listed in various niches. In the section below, the thesis explains more in depth about the two niches in which the Eemshaven is involved. The remainder of this section also elaborates more on what the competitive position of the Eemshaven means for the sustainable region-marketing strategy.

Quick-reaction ports

As the theory section has mentioned, maritime ports that are located close to (designated) wind farm zones have significant advantages for the niche quick-reaction ports, since they keep personnel transfer times low and, as a consequence, keep on-site working times high (Bard & Thalemann, n.d.). The Dutch government has pointed out three designated wind farm zones: Borsele near Vlissingen; “Hollandse kust,” divided into “Hollandse Kust zuid” near Rotterdam and “Hollandse Kust noord” near IJmuiden; and an area north of the Wadden Islands near Eemshaven and Den Helder (Rijksoverheid, Nationaal waterplan 2009-2015, 2009; Rijksoverheid, policy document of the North Sea 2009-2015, 2009). Based on distance, all these ports can be partly theoretical described as quick-reaction ports. However, most quick-reaction ports do not compete against each other since operational and maintenance clusters are very dependent on short distances. Each port close to a wind farm can, for that reason, develop operational and maintenance clusters for themselves. The outlet of a quick-reaction port can therefore best be described as regional. This assumption is naturally applicable for the Eemshaven as well. Nevertheless, Den Helder is a competitor of the Eemshaven, based on the geographical distance, which is not much further from the area north of the Wadden Islands than the Eemshaven. The remaining of this section will compare both ports to see which port is likely to be the quick-reaction port for the area north of the Wadden Islands.

Geographically, the Eemshaven is located more favorably to the German wind farms than the port of Den Helder. This is an advantage for the Eemshaven, since the Germans have no meaningful quick-reaction ports (see table 21). This can be explained by the shape of Germany’s North Sea territory (see figure 8). The coastline of the North Sea bends north of Noord-Holland, via the coastline of Friesland, Groningen, and Germany to the east. Just east of the major offshore maritime ports of Germany, the coastline bends again back to the North towards Denmark. This means that the North Sea territory of Germany lays in a funnel, between the Dutch and the Danish territories. The funnel is a big disadvantage for Germany since the wind flows do not bend together with the coastline immediately. As a consequence, the wind speed is low close to the German coast, and therefore the Germans are forced to build their wind farms away from their maritime ports (see figure 8 as well). Since the Germans have no maritime ports that are located close to wind farms, they must seek a partnership with a Dutch maritime port. The Eemshaven is located perfectly to step in as a quick-reaction-port partner for the Germans (again, see figure 8). If the Eemshaven actually fulfills a role as a quick-reaction port for the German wind farms of the North Sea, they will create economies of scale compared to Den Helder.

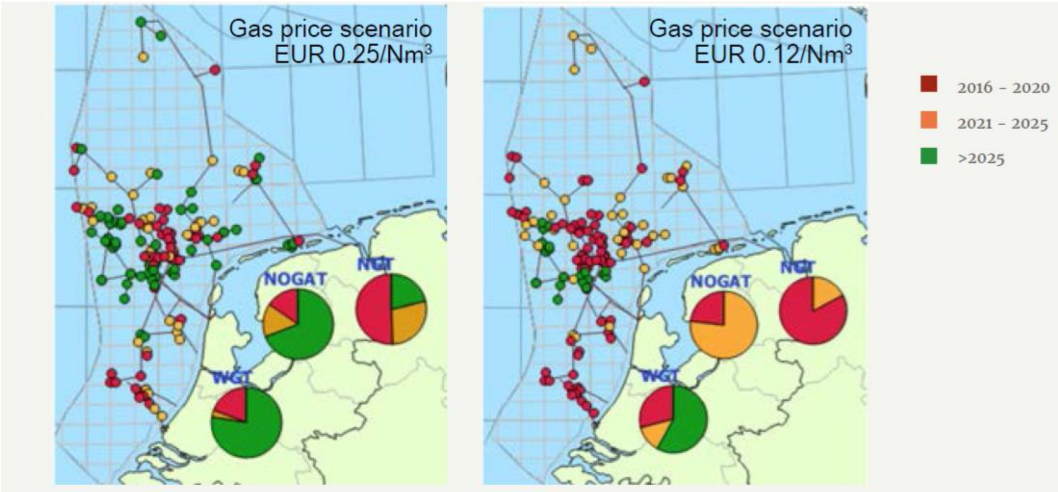


Source: (Nederlandse Vissersbond, 2018)

Figure 7: The funnel shaped German North Sea territory

In addition to the geographical argument of why the Eemshaven has an advantage over Den Helder to be the quick-reaction port for the area above the Wadden Islands, there is also a practical or business-related argument for it. According to some interviewees, the way of providing services and maintenance to offshore wind farms changes from one-stop services to services that have multiple stops. In other words, service vessels will provide no longer service to a single wind farm, but rather to series of wind farms. It will become very comparable to the service and maintenance operations of the oil and gas industry. Admittedly, Den Helder has a long history as a quick-reaction port of the offshore oil and gas industry, but the transition towards multiple stop-services favors the Eemshaven. Since on-site working times become longer and working teams become bigger, it is only cost efficiently for service companies to be for a while on the sea and to work with the multiple stop-services approach. For this reason, a partnership with the Germans is essential because there are too few Dutch wind farms in the area north of the Wadden Islands to create enough economies of scale.

Furthermore, according to some of the interviewees, it will be very likely that some of the oil and gas platforms, which are currently used as personnel hotels, will be reused as housing for the service and maintenance workers of the offshore wind industry. Again, this can be explained by the fact that on-site working times will become matters of weeks. The geographical position of the Eemshaven regarding oil and gas platforms that will be soon decommissioned or reused and lies close to the wind farms is very advantageous in comparison with Den Helder as well (see figures 8 and 9).



Source: (EBN, 2017)

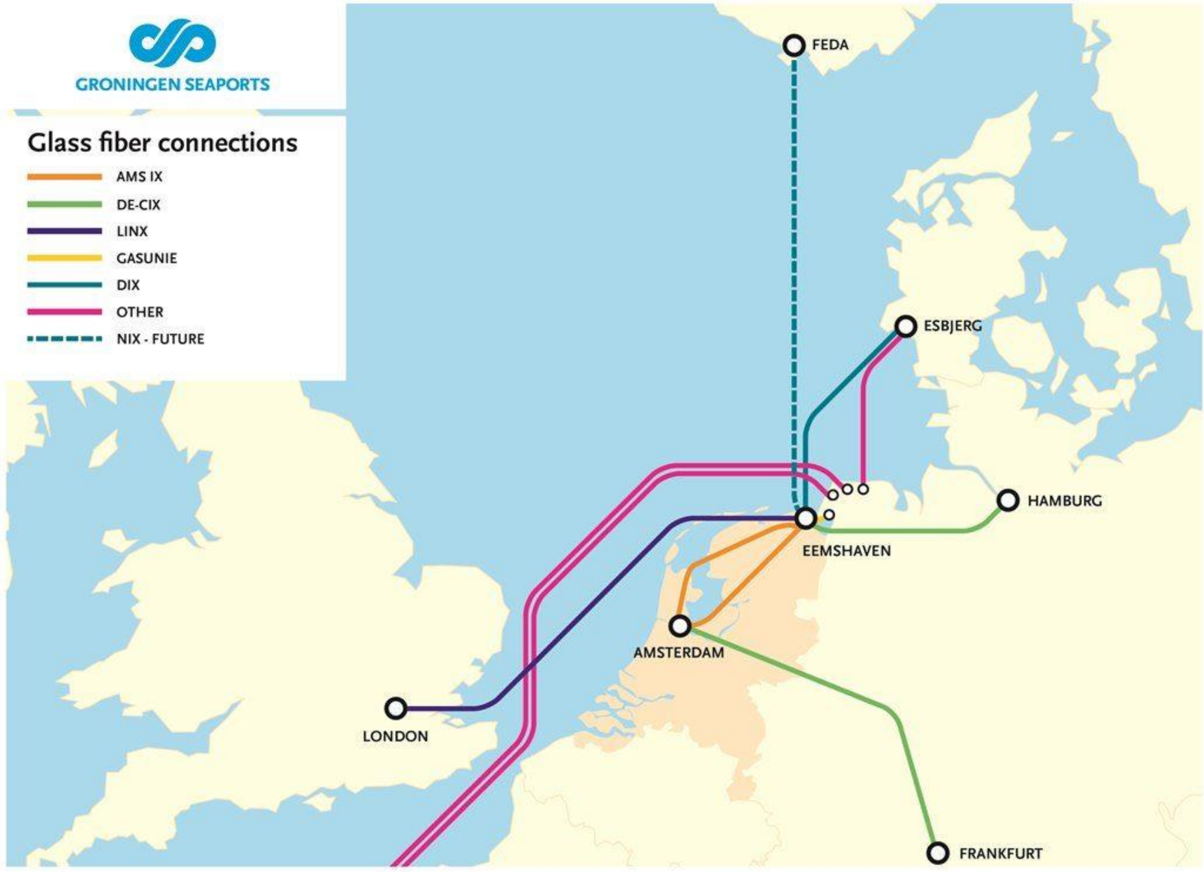
Figure 8: Cessation of production gas and oil infrastructure Dutch North Sea territory; "best- and worst-case" scenarios

<u>Construction ports</u>

The second niche in which the Eemshaven has massive potential is the niche construction ports. The Eemshaven is the second maritime offshore wind port in the Netherlands, and looking to table 5 is the large amount of empty space for storage and offices in the Eemshaven striking. The Eemshaven have space for large vessels and heavy lift capacity, which made it possible to compete among the most influential construction ports in the North Sea region. Instead of the quick-reaction ports, the market of construction ports is not regional but international. In other words, ports in the construction niche must offer much more than only empty space and proper facilities.

Two elements are key for the market position of the Eemshaven. The first is the geographical position of the Eemshaven within the North Sea region. Figure 7 shows that the Eemshaven is located in the center of the North Sea region. Figure 8 visualizes that the Eemshaven lies relatively close to a large number of existing or planned wind farms. In addition to what has been explained in the previous paragraph, this geographical position is even more valuable for the Eemshaven since ocean energy ports and manufacturing ports are looking for partners where they can easily store their major compounds, before those compounds will be installed. Therefore, owners of wind farms, mostly manufacturers or at least in cooperation with manufacturers, are looking for construction ports close to the particular construction sites. In this case, distance must be seen relatively. In comparison to quick-reaction ports, the distance to an offshore wind farm does not have to be very short, but it generally has to be shorter than the distance from competitor construction ports to the same construction site. Shorter sailing time creates massive cost reduction and is therefore quite an important selling point for a construction port to have.

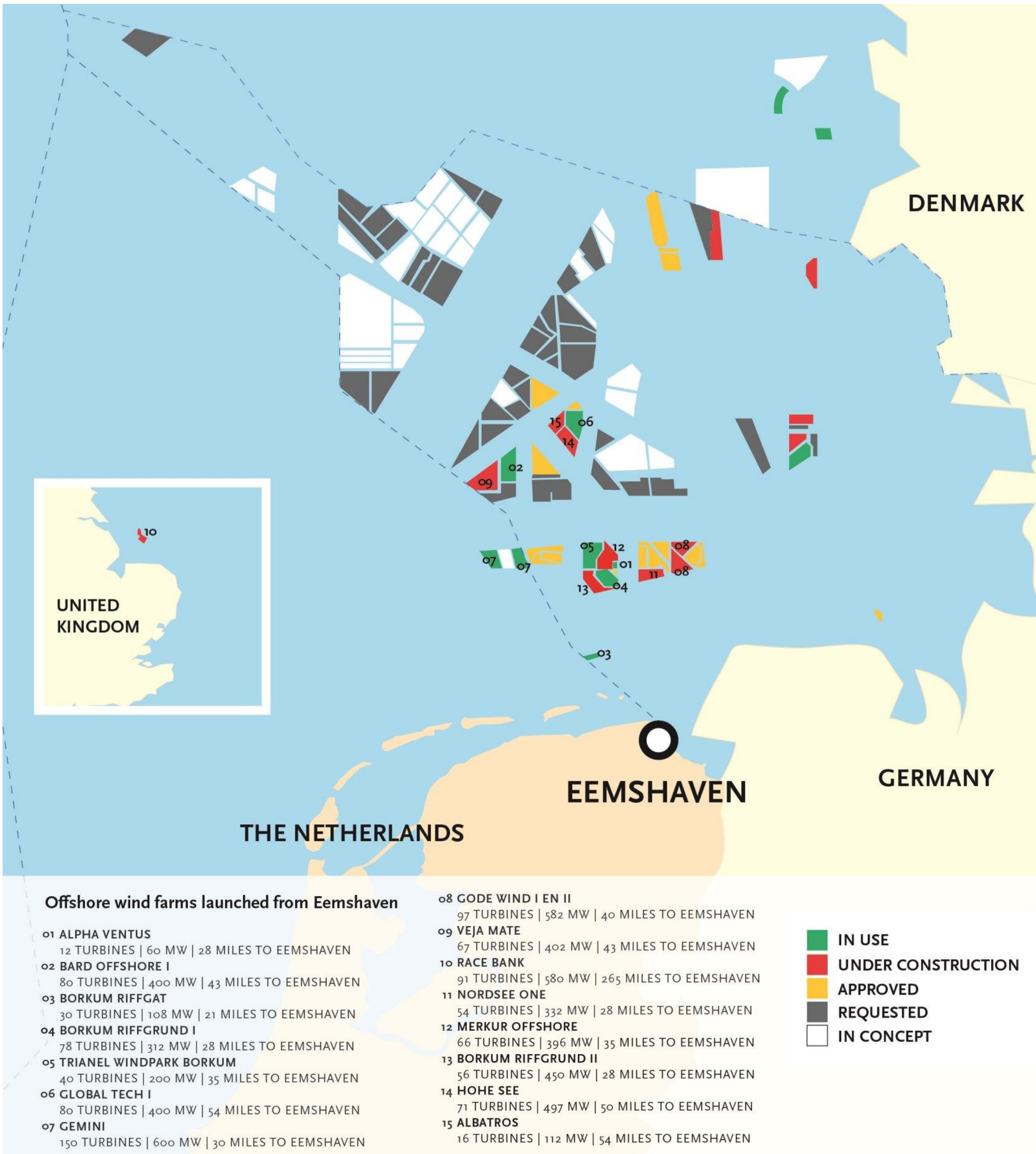
Secondly, the Eemshaven is an internationally well-established name in the offshore industry. This seems perhaps a bit surprising for the general public, but the Eemshaven is a landing port for international connections, especially for wind energy (see figure 10). These so-called "interconnectors" are international high-voltage cables that create a transnational energy network.



Source: (Bertholet & Groningen Seaports, 2017)

Figure 9: The interconnectors

The Eemshaven is, through the NORNED, connected with Feda Norway and in 2019, will be connected through the Cobra cable with Endrup Denmark (close to Esbjerg). The Eemshaven is connected with Germany and the United Kingdom as well. Due to Eemshaven's well-established name and partnerships with other interconnector ports, ocean energy and manufacturing ports in other North Sea region countries are perhaps more likely to cooperate. In practice, the choice of the Eemshaven as a construction-port partner has already been made in some cases (see figure 11).



Source: (Bertholet & Groningen Seaports, 2017)

Figure 10: Offshore wind farms launched from the Eemshaven

Moreover, the massive potential for the Eemshaven in the niche construction ports is observable in figure 11, since most wind farms have just been approved, are being requested, or are even in concept. Looking at the column construction ports of the competitor table, two observations are striking. Firstly, there is a lack of Danish ports in the niche. Esbjerg is by far the biggest port of Denmark, and the rest of the ports play roles only on a regional level. This means that there is a market gap between manufacturing and maintenance. In other words, if a Danish manufacturer located in Esbjerg wins a tender, they will always need a construction port in another country as a partner. Since Esbjerg locates the biggest manufacturers in the industry, this is a massive opportunity for the sustainable region marketing strategy of North Groningen. Secondly, according to some of the interviewees and the competitor table, the same situation as in Denmark (more or less) is observable in Germany. Bremerhaven is by far the biggest port and thus is the ocean-energy port in the country, where the big manufacturers are located. However, Cuxhaven and Wilhelmshaven seem to focus on the niche manufacturer ports instead of construction ports. This is very advantageous for the Eemshaven, since vessels for the niche manufacturing– and construction ports needs the same quays and cranes. Whit other words, if Cuxhaven and Wilhelmshaven indeed will focus on manufacturing, they cannot develop on the same time activities in construction, since this cannot be combined. With other words there are no competitors in the niche construction ports in Germany and Denmark. The Eemshaven must therefore full focus on launching Dutch, German and Danish offshore wind farms.

Conclusion

The competitor analyses above have created the opportunity to answer subquestion 4, in which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven. According to the conducted competitor analyses, the Eemshaven is involved in the niche of quick-reaction ports. This niche characterizes itself as regional. For this reason, each maritime offshore wind port close to a wind farm can develop itself as a quick-reaction port. As a consequence, Den Helder is the only competitor of the Eemshaven. However, the Eemshaven has a better chance of being the quick-reaction port for the area north of the Wadden Islands since the port is the closest port to the Dutch wind farms in the area and closest to the German wind farms north of the area, and since the long on-site working times require more outlets than just the Dutch wind farms in the area north of the Wadden Islands to maintain service. In 2030, the there is a plan for 12 wind farms to be located within 48 nautical miles from the Eemshaven (Bertholet & Groningen Seaports, 2017). The services that require those wind farms create a large number of blue-collar jobs. The niche quick-reaction ports thus must be one of the cornerstones for the recommendation of the sustainable region marketing strategy of North Groningen.

Additionally, the Eemshaven is involved in the niche construction ports. The port is located closest to the wind farms in the area north of the Wadden Islands, Germany, and Denmark from all the construction ports in the North Sea region. Furthermore, the Eemshaven is a well-established port in the offshore industry due to its interconnectors located in the Eemshaven. Consequently, partnerships with ocean-energy and manufacturing ports in Denmark and Germany seem to be logical. In the planning up to 2030, a total of 35 wind farms will be located within 70 nautical miles from the Eemshaven, all of which can be launched from the Eemshaven (Bertholet & Groningen Seaports, 2017). Therefore, the niche construction port creates massive opportunities for the sustainable region marketing strategy of North Groningen as well.

4.2 What is the current business landscape of the Eemshaven?

The previous section has concluded that the Eemshaven, or North Groningen, competes in the theoretical niches of quick-reaction ports and construction ports. The next step in creating recommendations for a sustainable region marketing strategy for North Groningen is to analyze the supply chain of the offshore wind sector in the region. To analyze the supply chain of North Groningen, subquestion 5 is formulated, how is the supply chain of the offshore wind industry organized in the Northern Netherlands. The researcher has decided to analyze the supply chain of the Northern Netherlands because that data has already been gathered by the Northern Netherlands offshore wind (NNOW) (n.d.) (see appendix III). Since the fact that the Eemshaven is the core of the offshore wind industry in the Northern Netherlands, the researcher expects that the majority of the companies in this region are established in the Eemshaven or North Groningen. Therefore, the analysis of the Northern Netherlands is a measure for North Groningen.

Additionally, the supply chain analysis can give empirical evidence of the findings of the previous section; it also forms a yardstick of the future activities of a maritime port. The theoretical portion of this thesis has already given the example of a maritime port that specializes in building maritime vessels. It is very likely that this port will develop itself as a specialist of building maritime offshore vessels to be successful in the offshore wind industry. For this reason, it essential when formulating a sustainable-marketing strategy of North Groningen to know which kinds of companies are active in the region. Therefore, this section must be seen as an intermediate step between the competitor analyses and the recommendations for concrete business opportunities. To answer subquestion 5, this section shall begin by explaining what the supply chain of the offshore wind industry includes. Next, the thesis will give the empirical findings of the offshore analyses conducted by the NNOW (n.d.). Eventually, this section will conclude what the current company profile predicts for the future offshore wind industry in North Groningen—in other words, what the current offshore wind business profile of North Groningen means for the recommendations for the sustainable region-marketing strategy.

Thus, the NNOW (n.d.) made the supply chain of the offshore wind industry in the Northern Netherlands insightful. They distinguished three phases: the development phase, the construction phase (both the wind turbine generator and the balance of the plant), and the operation and maintenance phase. In fact, there is also a decommissioning phase; however, this phase is very comparable to the construction phase but is in reverse order. The same companies shall be active in both phases and therefore have been chosen to excluded the decommissioning phase from the analysis. These phases are comparable with the niches in which a port can be active. However, a supply chain has a much broader perspective on the different niches or phases in the supply chain because it also looks to suppliers of companies that are indirectly involved in one of the niches. It also looks to the preparatory stage of building wind farms—for example, the different scientific surveys before a zone can be designated for building a wind farm.

The supply chain is divided into tiers. Manufacturers are among the first tier, and suppliers are among the second, third, and fourth tiers. Suppliers who supply directly to manufacturers are among the second tier, and suppliers who supply to suppliers in the second tier are among the third tier, and so forth. In appendix III, the different phases of the supply chain of the offshore wind industry in the Northern Netherlands are schematically visualized. A legend has been added to explain the coding. First of all, it is significant to explain that the figures make use of three colors. Green indicates that the specific part of the supply chain is provided by companies in the Northern Netherlands. Red stands for the fact that the specific part of the supply chain is not provided by companies in the Northern Netherlands. A tier can also be orange, which means that it can be partly provided by companies in the Northern Netherlands. Secondly, the number of companies that provided a tier is indicated by a number.

Focusing on the different phases of the supply chain of the offshore wind industry in the Northern Netherlands, the following recommendations can be made. Firstly, the development phase shows potential. All types of environmental surveys can be conducted from North Groningen, as well as onshore impact assessments and the logistics of these surveys. This means that the region can provide the entire chain, which is needed to designate an offshore wind farm zone in the Netherlands. This chain includes benthic environmental surveys, pelagic environmental surveys, ornithological environmental surveys, sea mammal environmental surveys, onshore environmental surveys, coastal process surveys, met station surveys, sea bed surveys, geophysical surveys, geotechnical surveys, front-end engineering and design studies, and human impact studies (The Crown Estate, n.d.).

Secondly, the construction phase shows a mixed view. However, this is not so surprising since this phase includes the niches of manufacturing, construction, and quick-reaction ports. Section 4.1 concluded that a port cannot both be a manufacturing and a construction port. This conclusion is again confirmed by the supply chain analyses of the NNOW (n.d.); with the exception of the blades, there are no manufacturing or tier 2 companies active in the Northern Netherlands. Therefore North Groningen must, instead of some interviewees are arguing, not focusing on attracting major component producers companies. The large manufacturing companies of wind turbines are already established in the ocean energy ports—namely, Esbjer, Hull, and Bremerhaven. A cable factory, for example, is also not realistic, especially since one has recently opened in Twente.

The major-component companies that are established in North Groningen can be best connected with the construction ports. Examples of these companies are companies that specialize in the finishing of major components of the wind turbines, such as steel and concrete companies, but also companies that specialize in cable-protection products. Furthermore, companies involved in logistics are well represented in the Northern Netherlands. This indicates that there arises a cluster of assemblage and installation companies in North Groningen, which confirms an observation of the previous section that the first wind farms have already been launched from the Eemshaven.

Eventually, the operation and maintenance phase also shows the view of a well-represented logistics cluster in the Eemshaven. In other words, there are already companies in the Eemshaven to maintain service on the Dutch and German wind farms. This view is strengthened by service companies involved in the construction phase. Companies that specialize in service lifts, stairs, fall-protection systems, and cabling and ropeways are all already established in the Northern Netherlands. A true hub of service companies encompassing the different tiers (and thus the supply chain) is arising in the Eemshaven.

In conclusion, the results of the supply chain provide empirical evidence for the conclusion of the previous section. As already mentioned, the current business profile forms the best bellwether for future activities. The supply chain shows, among other indicators, that there already some businesses established in the quick-reaction and construction-port niches in the Eemshaven. Furthermore, there is a lack of businesses in the niche manufacturing ports. Thus, according to this evidence, the choice to focus the sustainable-region strategy for North Groningen on the niche’s quick-reaction and construction ports is justifiable. Furthermore, this section confirms that the Eemshaven is not only theoretically involved in the niche’s construction and quick-reaction ports based on physical characteristics of the Eemshaven, but also practical on its business profile. Moreover, the supply chain analysis gave new insights into business opportunities in the research and development sector and also in the sector of the decommissioning of wind farms.

4.3 What are the business opportunities for North Groningen?

The last step in this stepwise approach towards recommendations for a sustainable region marketing strategy for North Groningen in the offshore wind industry is to define concrete business opportunities. To do this, subquestion 6 is formulated, what are the concrete business opportunities in the offshore wind industry for North Groningen to build a region marketing strategy on. As mentioned in the theory chapter, the items shown in green in the conceptual model, which refer to ecological modernization, are the focus of this section.

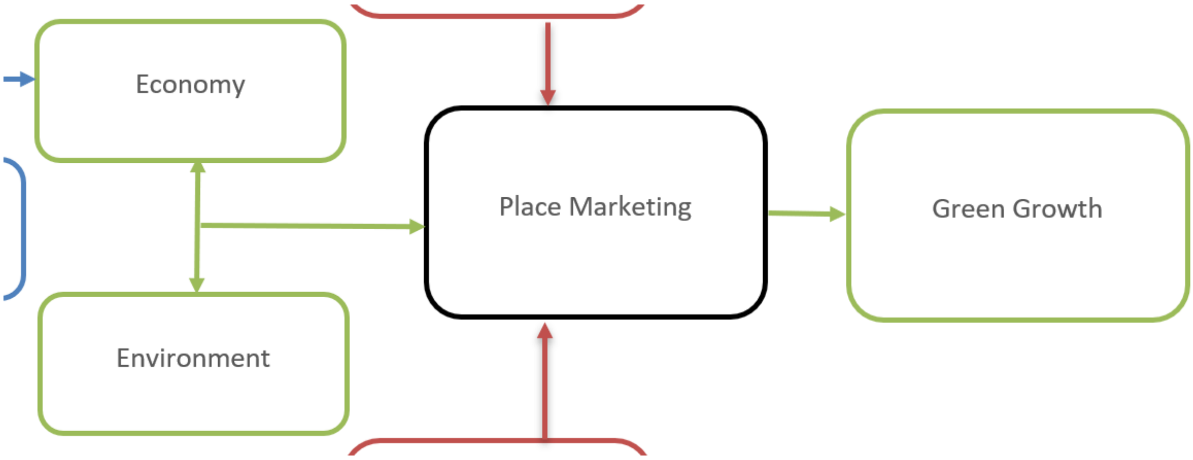


Figure 4b: the green part of the conceptual model about ecological modernization

And as mentioned in the methodology chapter, a SWOT analysis is conducted to find those concrete business opportunities. This section shall therefore start with the results of the SWOT analysis. Characteristics of the target audience, the niche in which the Eemshaven is active, and the current business landscape are processed in the results of the SWOT analysis, as well as other characteristics that will help to define the concrete business opportunities of the region. As also mentioned in the methodology chapter, the results are mostly gathered via interviews. All the interview reports are analyzed in depth, and all the SWOTs in the reports were coded and were thereafter processed in the SWOT matrix (see table 23). Although this section looks at concrete business opportunities and therefore focuses on the green items in the conceptual model, are the SWOT's originate from all the parts of the conceptual model. To make it more understandable, the researcher indicates the various SWOT's according to the colors of the corresponding items in the conceptual model. After all, place marketing is a political framework that helps to analyze target audiences, competitors, and business opportunities.

As explained in the research strategy section, it was impossible to work with a fixed set of indicators and concepts, due to the newness of the offshore wind industry. Therefore, the SWOT's, or the general set of ideas resulting from the analyses conducted in previous sections of this thesis and the coded interviews, are used in an inductive way to come up with concrete business opportunities (see figure 6). In other words, the SWOT's are based on a general story line, which is broadly supported by the results of the analyses and the opinions expressed by the interviewed stakeholders. After explaining the SWOT's, the researcher created a confrontation matrix (see appendix IV). In this matrix, the correlations between certain quadrants of the SWOT analysis are measured (see table 22). If the correlation is 2 or -2 the correlation between two SWOT's is highly significant. If the correlation is 1 or -1, there is some correlation. Zero represents no correlation between two SWOT's.

Table 102: Legend confrontation matrix

	0	1	2	-1	-2
Opportunities - Strengths	No correlation	Positive	Very positive	X	X
Opportunities - Weaknesses	No correlation	Urgent	Very Urgent	X	X
Threats – Strengths	No correlation	X	X	Urgent	Very Urgent
Threats - Weaknesses	No correlation	X	X	Negative	Very Negative

Summing up the correlations per SWOT, the most important SWOTs can be identified. If a SWOT has a high positive number or a low negative number in comparison with other SWOTs in the same quadrant, that SWOT is identified as important. For example, hydrogen has a correlation sum of 22, which is high in comparison with other opportunities. Thus, it is an important opportunity for the region. Lobbying has a correlation sum of -30, indicating it is important. The most important SWOT's represent the main actions to be considered by the authorities in North Groningen in order to build a sustainable regional marketing strategy. The less important SWOT's represent the supporting actions for the Province of Groningen, which must support the main actions on which the sustainable region marketing strategy is built. In the confrontation matrix is a certain important action or recommendation for the sustainable region marketing strategy of North Groningen, with the supporting actions represent by a certain color (see appendix IV). So, for example all purple SWOT's represent a particular recommendation for the sustainable region marketing strategy of North Groningen.

The rest of this section elaborates an in-depth narrative regarding these recommendations. As mentioned in chapter three, the interviewees are cited anonymously, due to sensitive business information. However, to justify arguments the researcher makes frequent use of public sources on which the interviewees or their organizations have worked, or to which a certain interviewee referred.

Table 113: SWOT Matrix regarding the potential of the offshore wind industry in North Groningen

	Beneficial	Harmful
Internal	**Strengths:** S1. Heliport S2. Short distance to offshore wind farms S3. Port authority is road authority as well S4. Experience with onshore wind projects logistics S5. Experience in recent offshore wind projects S6. Empty space S7. Convenient location with respect to offshore oil and gas platforms S8. Gas and oil infrastructure S9. End users Hydrogen Eemshaven and Delfzijl (Magnum power plant) S10. Large amount of grid capacity S11. Appearance of several converter stations S12. Interconnectors S13. Google S14. Test site Eemshaven S15. Research and design sector S16. Competitive purchase and lease prices S17. Tax advantages	**Weaknesses:** W1. Limited number of end users W2. Limited number of end users of hydrogen W3. Distance to end users/Randstad W4. Lack of manufacturers W5. Long distance to designated zone in comparison with other Dutch port regions
External	**Opportunities:** O1. Hydrogen 02. Pioneer hydrogen project like OS 2020 O3. Decommissioning oil and gas infrastructure O4. Reuse of oil and gas infrastructure O5. North Sea Agenda 2050/ synergy O6. Societal pressure/ public opinion O7. Sustainable and shared value O8. Earthquakes funds and Capex investments O9. Cooperation with other ports (2020) O10. Shape German North Sea territory O11. Decommissioning offshore wind turbines O12. New wind farms/rollout programs North Sea region countries O13. Higher wind speed O14. Limited environmental damage O15. Decreasing Costs (sustainable energy, electrolyze) O16. Offshore wind island O17. Cold/Hot region marketing O18. Technological development O19. System integration O20. Norwegian situation: Free energy, CO2 taxes, and Carbon Capture and Storage	**Threats:** T1. Competitive ports T2. Steel Industry T3. High investments in other forms of renewable energy and hydrogen T4. Offshore wind island T5. Continue oil and gas extraction T6. Disappearance of oil and gas companies T7. Hydrogen economy blind spot EZ T8. Shrinkage T9. Brain drain T10. Aging T11. Livability T12. New wind farms/rollout programs North Sea region countries T13. Military zone T14. Priority Provence T15. Lobbying T16. Wind silence T17. (Energy) storage

The sections regarding competitors and the supply chain have explained that the Eemshaven has massive potential in the niches of quick-reaction and construction ports. This is again proven by the results of the SWOT analysis, which is portrayed in the confrontation matrix in black. It is essential for both niches to have a wide market with enough wind farms. Cooperation with the Germans and the Danes in this area already seems to be successful (see figure 11). But there is still a challenge for North Groningen to build enough wind farms in the Dutch territory, the area north of the Wadden Islands.

According to the conducted literature and a unanimous conclusion of the interviewees, the area north of the Wadden Islands has the best physical conditions in the Dutch North Sea territory to build wind farms. The wind speed in the area north of the Wadden Islands is the highest of the Dutch designated zones (see figure 12). To prove this, Lindenbergh and Zonnevijle (2014) have made the generated power measurable with the following formula:

$Pwind = \frac{1}{2} * {}_{\rho} * A * (v)3$

Pwind = Power generated by the wind [W=J/s];
$_{\rho}$ = Density of the air [kg/m3];
V = wind speed [m/s], and;
A = surface of the rotor blades [m2].

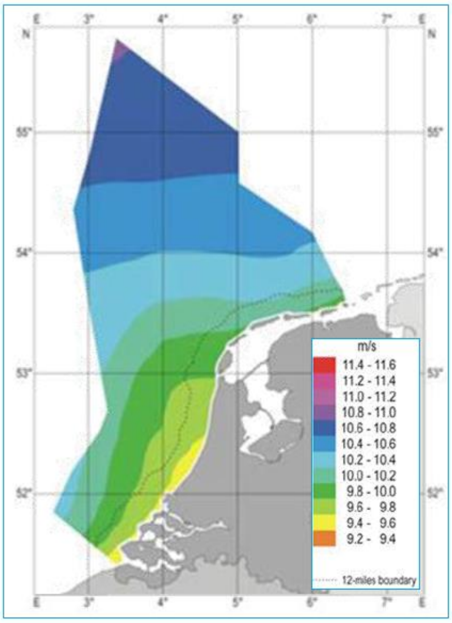


Figure 11: Wind speed at the Dutch North Sea

Source: (Lindenbergh & Zonnevijlle, 2014)

The wind speed is by far the most important variable in the formula above; "V" is namely to the power 3. Wind speed has therefore an exponential effect on energy efficiency and energy yields. Since wind speed is higher above the Wadden Islands, then in the west of the Dutch North Sea, the wind farms in the area north of the Wadden Island generate 7% to 15% more power than wind farms in the west of the Dutch territory (Lindenbergh & Zonnevijlle, 2014). Moreover, in selecting a designated zone, the environmental collateral damage is an important variable as well. In preparation for designating the offshore wind zones in the Netherlands, the Dutch government has conducted a strategic environmental assessment (The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs, 2014). In this assessment, the area north of the Wadden Islands is compared to "Hollandse coast". In short, the conclusion was that Hollandse coast has negative effects for the porpoise, the common seal, the gray seal, and the lesser black-backed gulls, while the area north of the Wadden Islands has only collateral damage for the porpoise. The simple explanation for this is that seals live close to the coast, and the wind farms in the area north of the Wadden Islands will be constructed much farther off the coast than the wind farms in the area of Hollandse coast. Additionally, migration flows of the lesser black-backed gulls do not cross the area north of the Wadden Islands. Eventually, the seabed in the area north of the Wadden Islands is more favorable. Due to the consolidated load-bearing sand layer, the foundation of the monopiles needed to be driven less deeply (Lindenbergh & Zonnevijlle, 2014). Admittedly, it is true that the seabed in the area north of the Wadden Islands lies deeper, but according to developers, this leads to limited additional costs (Lindenbergh & Zonnevijlle, 2014).

However, up until today, the Dutch government has been a bit conservative in installing wind farms in the area north of the Wadden Islands. This is for several reasons; the first is the Dutch method of spatial planning. The way the Dutch designs plans for the North Sea territory is very similar to Dutch spatial land planning. Since the North Sea is one of the most densely used seas in the world, it is not hard to imagine that the North Sea, and therefore also north of the Wadden Islands, is planned fully, with a wide range of designated zones (see figure 13) (The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs, 2014). The pie-slice-shaped orange zone, including the numbers 13, 14, and 15, is the designated area for offshore wind. In the east, the area is bounded by German territory. In the north are shipping lines, and the big red zone in the south is a military-exercise area. The EHD-42 military airfield is used by Dutch and international forces for flight and attack exercises, which require a great deal of space. For safety reasons, permanent installations are not allowed in the area (The Ministry of Infrastructure and the Environment & The Ministry of Economic Affairs, 2014). Moreover, the orange dotted line is the 12 NM line; the yellow zone is for sand extraction; the green zone is a Natura 2000 area; and the purple dots are oil and gas production platforms, whereby the circle represents the helicopter 5 NM zone.

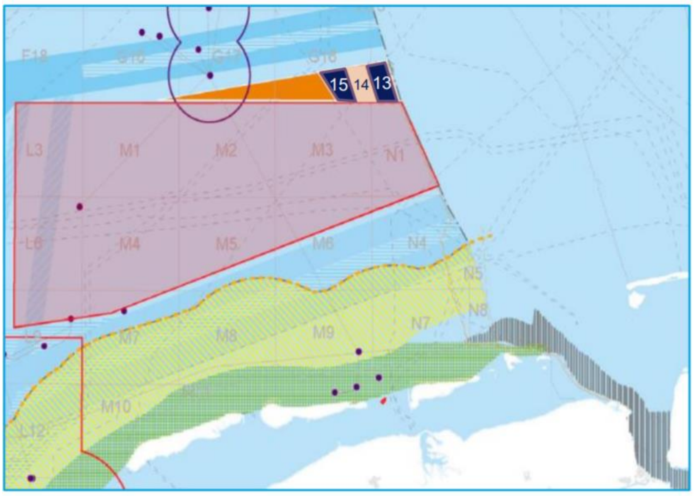
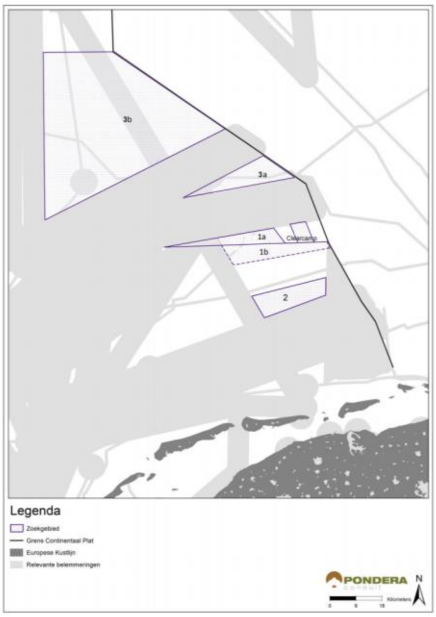


Figure 12: Designated zones area north of the Wadden Islands

Source: (Lindenbergh & Zonnevijlle, 2014)

It is favorable for the offshore wind lobby of North Groningen that interviewees claimed that planning with designated zones is singular and old-fashioned. In addition, the ministry “infrastructuur en milieu” (infrastructure and environment) admit in the *North Sea 2050 Spatial Agenda* (2014) that a new way of planning is needed. The traditional use of the sea is in transition, and therefore the ministry strives to combine as many functions as possible. For example, in this report, it is argued that fisheries must be allowed between wind turbines, and solar, tidal, and seaweed power can be implemented within the wind farms. In cooperation with the fisheries, North Groningen’s offshore wind lobby must utilize this window of opportunity to argue that multifunctionality is also needed north of the Wadden Islands. In other words, the EHD-42 military airfield must be relocated, become smaller, or become multifunctional. According to the latest data, there are plenty of opportunities for harvested wind power in the area north of the Wadden islands, among which is the reduction of the EHD-42 military airfield (see figure 14 and table 24). Summing up the capacity of the search areas north of the Wadden Islands it outrace the capacity of the area “IJmuiden-far,” which is currently be seen as the designated zone with the highest potential for offshore wind.



Zoekgebied	Bruto oppervlak (km²)	Netto oppervlak (km²)	Capaciteit (GW)
1: Gemini-West + Clearcamp	150	114	6 MW/km²=0,68 8 MW/km²=0,91 10 MW/km²=1,1
1b: Gemini-West+ Clearcamp + uitbreiding	254	239	6 MW/km²= 1,4 8 MW/km²= 1,9 10 MW/km²=2,4
2: Boven de Wadden Zuid	174	174	6 MW/km²=1,0 8 MW/km²=1,4 10 MW/km²=1,7
3a: Boven de vaargeul	3.094	138	6 MW/km²=0,83 8 MW/km²=1,0 10 MW/km²=1,4
3b: Boven de vaargeul		1.664	6 MW/km²=10,0 8 MW/km²=13,3 10 MW/km²=16,6
Totaal boven de Wadden:	**3.672**	**2.215**	**6 MW/km²=13,3** **8 MW/km²=17,7** **10 MW/km²=22,2**
Referentie: IJmuiden-Ver	1.171	785	6 MW/km²=4,7 8 MW/km²=6,3 10 MW/km²=7,9

Figure 13: Expansion scenario, offshore wind farms in the area north of the Wadden Islands Table 24: Expansion scenario offshore wind farms in the area north of the Wadden Islands compared to IJmijden-ver

Source: (Weekamp & van der Hem, 2017, p. 5) & (Weekamp & van der Hem, 2017, p. 7)

The overarching theory of ecological modernization is useful in explaining the current situation related to lobbying around the rollout of the Dutch offshore wind farms. As explained in the theory section of this thesis, the Paris Agreement has made the environment a part of prescriptive policy-making. From this perspective, it is understandable that the EHD-42 military airfield is under high pressure. Using the military field for only a singular purpose, and therefore obstructing the rollout of the production of offshore wind, is not acceptable in the current culture of international politics. Furthermore, nowadays every ministry in the Netherlands has the strict assignment to reduce CO_2 emissions. According to one of the interviewees, this change can be an opportunity window for North Groningen to force The Hague to rollout offshore wind farms in the area north of the Wadden Islands.

The second reason why the Dutch government is a bit conservative in constructing wind farms in the area north of the Wadden Islands is the relatively long distance to the coast. According to one of the interviewees, in general, 1 km of cable costs €1 million. In addition, as mentioned in the introduction, during converting and transport through a DC cable, massive amounts of electricity are lost. This effect is logically more problematic when distance become longer, which is the case for the area north of the Wadden Islands in comparison with designated zones in the west of the Dutch North Sea territory. Technological innovation in the form of hydrogen leads to a solution for these problems, as explained in the introduction of this thesis.

Although the area north of the Wadden Islands is much farther from the coast in comparison with other designated zones, it is clear, due to higher wind speed and lesser collaborative environmental damage, that this area has the best physical conditions for building wind farms. Therefore, North Groningen must lobby for relocating the military zone, making use of synergies, and, most importantly, for more wind farms to be built in the area north of the Wadden Islands. The recommendation for North Groningen is thus to convince the Dutch government to roll out wind farms in the area north of the Wadden Islands. The set of ideas underlying this recommendation is presented in the confrontation matrix in purple.

Recommendation 1: Lobbying for Dutch wind farms in the area north of the Wadden Islands

To overcome the challenge of being ignored by The Hague, it is essential to lobby with a plural story for the area north of the Wadden Islands. The offshore wind industry cannot longer be seen as a singular story, but it is inextricably linked with hydrogen, decommissioning, and the reuse of the offshore oil and gas infrastructure. This line of thought is widely supported by stakeholders who were interviewed for this thesis; however, it is still a blind spot for The Hague. The Ministry for Economic Affairs has pointed out five overarching pillars for the Dutch energy transition (Ministerie van Economische Zaken, 2016). According to one of the interviewees, it is very complicated to fit hydrogen and the reuse of the oil and gas infrastructure into one of those pillars. The industry's call is, however, so prominent and scientifically based that it is a matter of time that policies will follow the call. Until that time, North Groningen must play a leading role in the lobby for hydrogen. In the context of the theory of ecological modernization, this example perfectly explains the roles of the market and the state. Innovations from the market, in this case the offshore production of hydrogen and reuse of the offshore oil and gas infrastructure, change policy dynamics so that hydrogen will embedded in the energy transition vision of the Ministry of Economic Affairs.

The cruciality of hydrogen for North Groningen can be best explained by two scenarios for transporting harvested wind energy to land. The first scenario is that energy will be transported through electric cables to land, or in short, via the electrons pathway. As already mentioned in the introduction of this thesis, transporting energy through electric cables over long distances is very expensive, and the amount of energy lost is high. The second scenario is converting the harvested wind energy by electrolysis to hydrogen; subsequently, the hydrogen can be transported by the reused oil and gas infrastructure to land. This pathway is called the molecules pathway (World Energy Council Netherlands a, 2017). For the competitiveness of North Groningen, the second scenario, featuring hydrogen, is an essential one. Scientists claim that the break-even point lies 80 km off the coast (World Energy Council Netherlands a, 2017). The area north of the Wadden Islands lies approximately 150 km off the coast and is, for that reason, theoretically dependent on the molecules pathway. Moreover, with hydrogen and the use of the existing idle gas pipelines, the loss of energy can be reduced by 10% to 20%, or, when the gas pipelines are coated, even to 0.1% (World Energy Council Netherlands a, 2017). For this reason, hydrogen is a strong solution for North Groningen in the competition with other offshore wind regions.

In addition, the importance of hydrogen can be explained by technical questions, which are accompanied by the emergence of a larger portion of renewable energy in the electricity-generation mix. With a higher share of renewable energy, the human race is no longer in charge; Mother Nature is. Wind is of course not a constant factor, and one must consider periods of wind peaks and silence. Furthermore, the demand for energy will change during different time periods in a year. Therefore, the storage of energy will be one of the most crucial issues of the energy transition. An alluring solution for this problem is again hydrogen. Hydrogen can be stored in salt caverns or in empty offshore oil and gas fields, but can also be stored in the form of ammonia or methanol (World Energy Council Netherlands a, 2017). Siemens, one of the pioneers in the innovation of hydrogen, claimed that the production of hydrogen, accomplished by compressed air (CAES) and pumped hydro, is the only solution for large-scale energy storage (see figure 15) (van der Touw & Bolhuis, 2018).

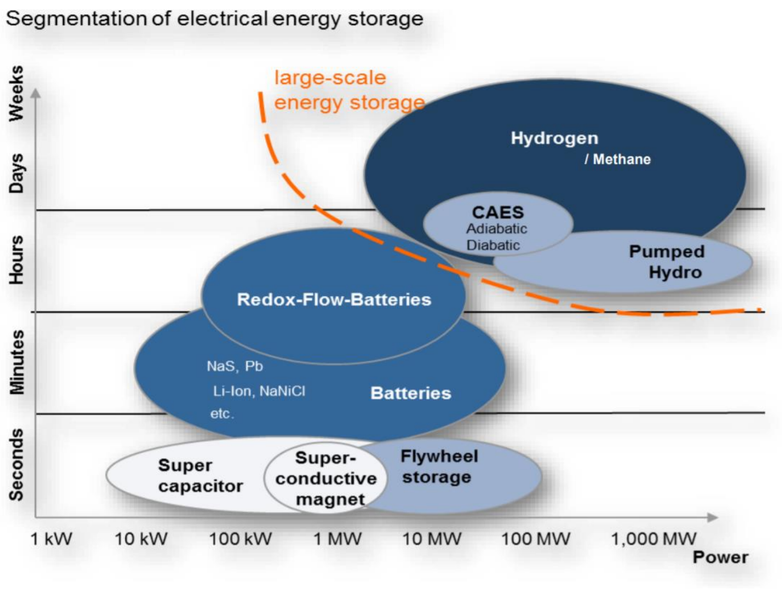


Figure 14: Energy storage

Source: (van der Touw & Bolhuis, 2018)

To bring the molecules pathway into practice, the cooperation of the oil and gas industry is vital. According to the interviewees from the oil and gas industry, the sector is willing to invest in reusing the offshore oil and gas infrastructure. The sector is well aware that it will run out of resources within 30 years (interviewees from the oil and gas sector). Therefore, the sector must involve in the transition toward a carbon-neutral energy system. Furthermore, the offshore oil and gas infrastructure has, even idle, a high value. Beside decommissioning, the platforms can have a wide range of applications for reusing. The interviewees sum them up: electrolysis, Power2Gas, Gas2Wigher, temporary storage, CCS, transformer stations, data centers, aquafarming, personnel hotels, tourism, and ecology on substructures. Explaining in depth all the different forms of reusing the oil and gas platforms goes beyond the scope of this thesis, but in short, electrolysis and Power2Gas are elements of the molecules pathway. Gas2Wigher can reform energy via a chemical process from molecules back to electrons. Temporary storage is the storage of molecules on a small scale on platforms, and carbon capture and storage (CCS) is the storage of CO2 on a grand scale in empty or partly empty oil and gas fields. Transformer stations, data centers, aquafarming, personnel hotels, and tourism do not need any further explanation, whereby a datacenter is attractive because this business is energy consuming and has cheap energy available close the source. Eventually, the ecologic value of the substructure is very high (Coolen & Jak, 2018). The North Sea has a lack of nature-made structures on which flora and fauna could live. The man-made structures of oil and gas platforms, among others, can therefore contribute to the biodiversity of the North Sea. Of all the forms of the reuse of oil and gas platforms, it seems that hydrogen, or Power2Gas, is overall the most promising one, according to market parties; this, of course, is favorable for North Groningen (see figure 16) (World Energy Council Netherlands b, 2017).

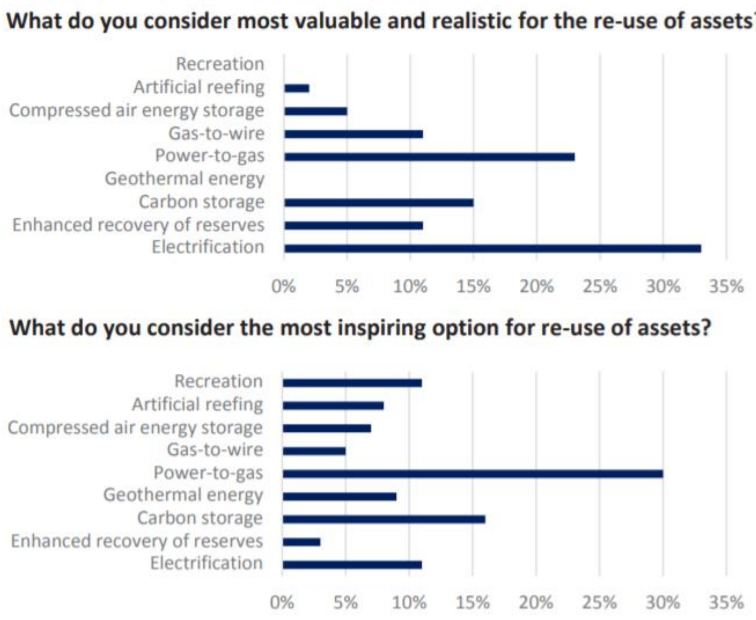


Figure 15: Opinion of market parties on reuse options

Source: (World Energy Council Netherlands b, 2017)

Again, according to the interviewees from the oil and gas sector, a third reason why the cooperation of the oil and gas industry is plausible is the emerged societal pressure on the industry. Society is well aware of climate change and the contribution of fossil fuels to it. More and more people want affordable green energy instead of gray energy. Businesses are well aware of their societal functions or images as well. For this reason, many multinationals, or large firms, have already chosen to run entirely on green energy. They are aware that using green energy creates shared value in society and sustainable value among their shareholders (Hart & Milstein, 2011). As already mentioned in the introduction, the establishment of Google in the Eemshaven is a perfect example of this mechanism.

The cooperation of the oil and gas industry provides another opportunity to consider the story of North Groningen in the perspective of the theory of ecological modernization in two ways. Firstly, the last paragraph explains that the oil and gas industry has chosen to be part of the energy transition, following pressure by consumers. Most consumers no longer want gray energy. They want green energy, because the current consumer is well informed about climate change and the negative impact the oil and gas industry has on the environment. In this way, they changed the dynamics between the state, the market, and society. Secondly, the cooperation of the oil and gas industry provides the opportunity to include the involvement of the oil and gas industry in the debate started by Schnaiberg in the 1980s. According to Schnaiberg's criticism, cooperation with the oil and gas industry is not beneficial for either the environment or the economy, but rather perpetuates the treadmill of capitalism. The gas and oil industry are only willing to cooperate due to scarcity. The condition for cooperation is to first use the entire reserve of oil and gas. To a certain extent, Schnaiberg's is accurate. However, without the cooperation of the oil and gas industry, the offshore wind industry will not be able to reuse the idle oil and gas infrastructure. Moreover, according to many of the interviewees, to make green hydrogen successful, first the technical possibilities of gray hydrogen must be tested. Only in this case can mass consumption of green hydrogen be developed and become competitive in terms of price with gray hydrogen, as explained below. In other words, only when the green energy and gray energy industries cooperate, will society be able to produce offshore wind in the area north of the Wadden Island and raise the environmental plafond.

After explaining why hydrogen is needed for the offshore wind industry in North Groningen and relating why the gas and oil industry shall cooperate, the researcher will now explain why North Groningen has a suitable proposition to make use of hydrogen. As already mentioned, the wind farm zone above the Wadden Islands is much further off the coast than the competitor zones in the Netherlands. As currently observable, most first-generation wind farms will be constructed on the west coast of the Dutch North Sea. With point-to-point cables the electrons, harvested at the Dutch west coast will be transported ashore. Therefore, it is very likely that ports on the west coast will be focused on the electron pathways. It is very paradoxical, but crucial in business, that due to this geographical disadvantage, there emerges a massive opportunity for North Groningen. When the maritime ports in the west focus on the electrons pathway, North Groningen can, in the meantime, focus as the first Dutch maritime port on the molecules pathway. Being the first in a new industry is crucial and advantageous, especially since (according to the interviewees) second-generation wind farms will surely be constructed at long distances off the coast. Because energy yields are higher far off the coast, and it will then be technologically and economically possible to bring the energy via the molecules pathway ashore.

The second reason why hydrogen and reuse of the oil and gas platforms are very promising innovations for North Groningen is the geographical location of the oil and gas platforms. As already mentioned, the geographical position of North Groningen regarding these platforms is such that it lies favorable to both platforms that are soon decommissioned or reused, and being located close to the wind farms in comparison with Dutch ports on the west coast (see figure 9). This position is even more in favor of North Groningen since first-generation wind farms will be made operational due to the electrons pathway. The platforms close to Vlissingen, Rotterdam, and IJmuiden will therefore not likely be reused for Power2Gas. According to one of the interviewees, the port of Rotterdam also has already made space for the decommissioning of the oil and gas platforms. Steel and other components still have value and can be recycled by waste companies. In other words, the port of Rotterdam has chosen to focus on decommissioning instead of reusing the oil and gas infrastructure.

Thirdly, the well-developed gas infrastructure of Groningen is a reason why hydrogen is very promising. Groningen is known in the Netherlands as the gas province of the country. Due to the gas production, the facilities and the infrastructure have, during the last few decades, developed a national, cross-border network. Currently, the Dutch government has decided to slow down the gas production in Groningen. Wind power, hydrogen, and the reuse of the offshore oil and gas infrastructure, can make it possible to continue gas production and transportation on the same speed. In this case, Groningen can still be the gas roundabout of Northwest Europe in the future (see figure 17) (Botzki, 2018).

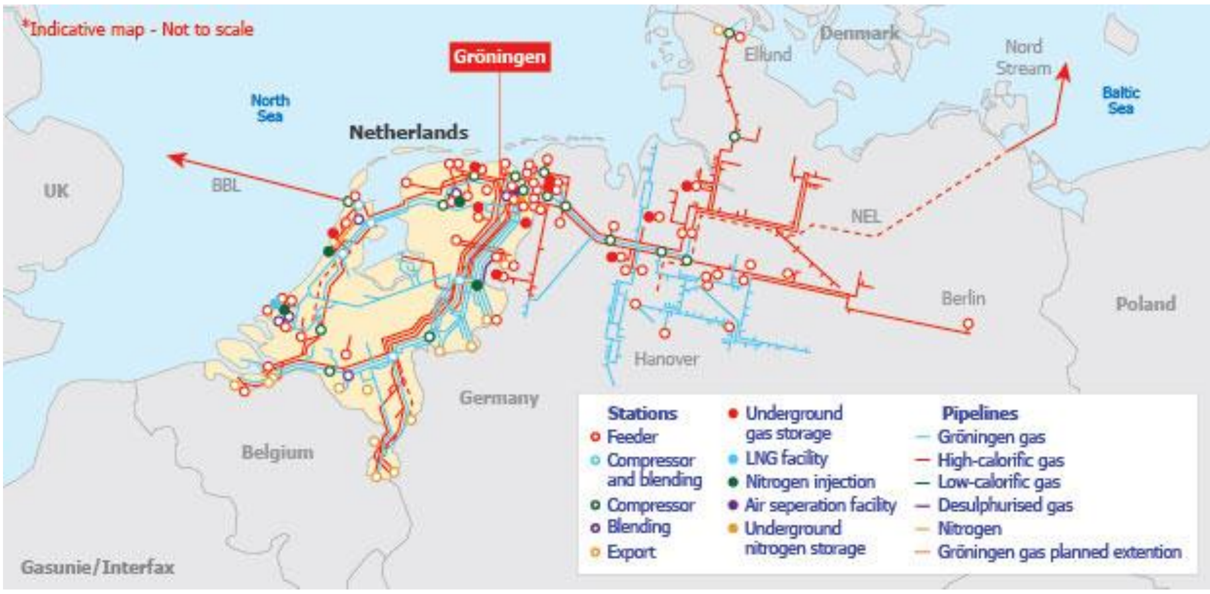


Figure 16: Gas network of Groningen

Source: (Botzki, 2018).

Cooperation with the Germans regarding hydrogen is also very likely. As already explained in the chapter about competitors, some of the German windfarms have launched or are in the pipeline to be constructed from the Eemshaven (see figure 11). According to some of the interviewees, it is cost efficient when those wind farms will be launched from the Eemshaven to bring the hydrogen ashore in the Eemshaven as well. The infrastructure to accomplish this is there, and via the current "gray gas" network, it can very easily be transported to Germany, (again, see figure 17).

Utilizing hydrogen as an energy source and reusing the idle oil and gas infrastructure are crucial for enable North Groningen to compete with other regions in the rollout of offshore wind farms in the Dutch North Sea. This lobby is asking for cooperation with the oil and gas industry, which is likely to happen because the oil and gas reserves will be depleted within 30 years. The idle oil and gas infrastructure still represent value, and social pressure on the oil and gas industry is increasing. Moreover, hydrogen energy can be the key in technical problems such as transporting energy and storage. The proposition of North Groningen to accomplish this is promising, since its location is convenient in relation to oil and gas platforms that must be decommissioned. Moreover, North Groningen has the oil and gas infrastructure to deal with all the hydrogen coming ashore. Therefore, investing in hydrogen and Power2Gas is the second recommendation for the sustainable region marketing strategy of North Groningen. This recommendation is represented in the confrontation matrix in orange.

Recommendation 2: Invest in hydrogen and Power2Gas

Although the business case for North Groningen as regards wind farms in the area north of the Wadden Islands, hydrogen, and the reuse of the oil and gas infrastructure is very promising, there are still three technical challenges to overcome. Firstly, the price of wind energy must become compatible with gray energy (Levitt, Kempton, Smith, Musial, & Firestone, 2011). Out of the three challenges, this is the easiest one because Germany and the Netherlands have already set out the first SDE+ subsidy-free (a direct example of a prescriptive policy measure) tenders. Moreover, according to data from Bloomberg (2018), the levelized cost of wind energy drops down in a rapid pace towards zero (see figure 18).

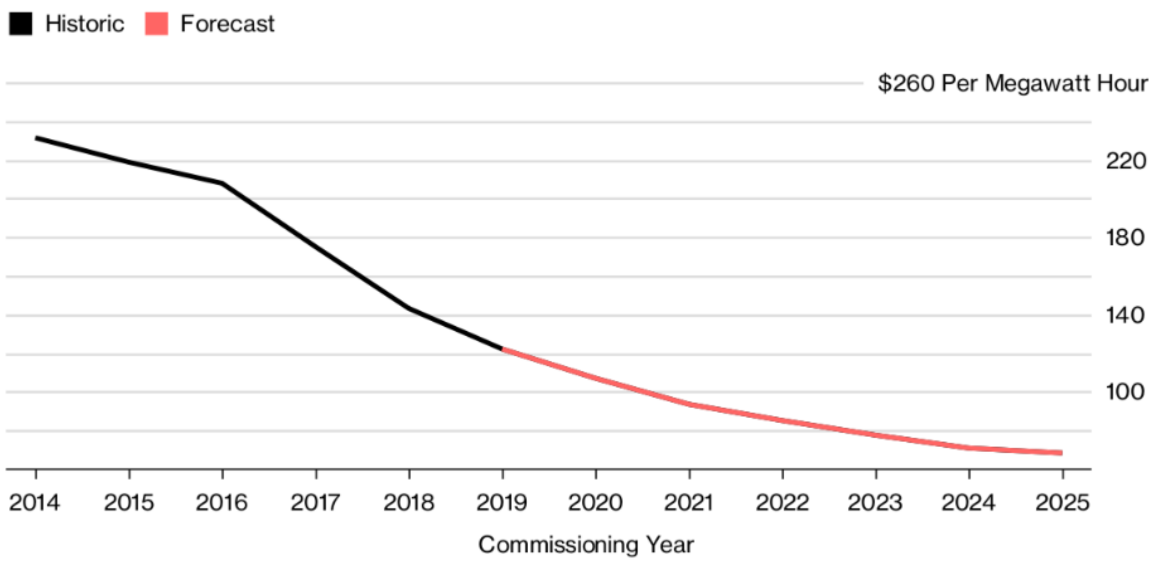


Figure 17: Levelized cost of offshore wind energy is falling to zero

Source (Shankleman, 2018)

Instead of the first challenge, the second challenge is much more complicated. Moreover, this challenge is not a general one but is a specific challenge for the hydrogen and reuse business case of North Groningen. Additionally, the levelized cost for wind energy must be compatible with traditional energy; green hydrogen also must become compatible to gray hydrogen. Currently, the price of gray hydrogen produced via steam methane refining is €1.5 per kilogram. To be competitive with gray hydrogen, the price of green hydrogen must drop down to €2.8 to €3.2 per kilogram. In the future, the cost of gray hydrogen will increase as natural gas will become more expensive due to scarcity, and taxes on CO2 emissions are expected to increase (World Energy Council Netherlands a, 2017).

Lastly, electrolysis must become cheaper and more efficient. One of the reasons why the prices of green hydrogen are not yet compatible to those of gray hydrogen is the high cost of electrolysis. The second problem is the space that is needed on the oil and gas platforms. A complete production platform can host up to about 250 MW electrolyze capability; for example, Gemini needs 600 MW (Jepma, 2017).

As mentioned, the technological challenges above must be overcome to be competitive as a region. Of course, innovation will contribute to cost reduction and more efficient electrolysis, but gray energy also will become more expensive due to scarcity and taxes for CO2 emission. There are also more futuristic, but still realistic, scenarios imaginable that will contribute to the breakthrough for the plural vision of North Groningen.

Firstly and most importantly, energy will become a world market, according to Ad van Wijk. The approach to transport electrons ashore through point-to-point cables is efficient at a very short distance and in the short term, but in the long term, there is a network approach needed to be competitive with fossil fuels. After all, when the electrons are ashore, it is still almost impossible to store and transport the generated power on large-scale to the hinterland. This principle is comparable with the coal mining industry in Limburg. The mines were not closed out of scarcity but because it was cheaper to mine coal elsewhere. The future energy market will work in the same way. Energy will be produced where it is the cheapest: solar power in Australia, California, Qatar, the Sahara, and Southern Spain; hydropower in Norway; and wind power in the North Sea. Hydrogen is the missing link to make it possible to transport the generated energy not only ashore, but through the current onshore infrastructure to the rest of the world, which is now happening with fossil fuels.

Offshore wind energy is thus the opportunity for the North Sea region countries to participate in the world market of energy. Figure 19 visualizes the North Sea at the end of the energy transition in 2050. Throughout the North Sea, there will be 25,000 10 MW turbines situated that will provide 90% of the North Sea-bordering countries' electricity needs. This will leave additional capacity potential to partly provide the rest of Europe with their energy needs as well (IABR: 2050 - An Energetic Odyssey, 2017).

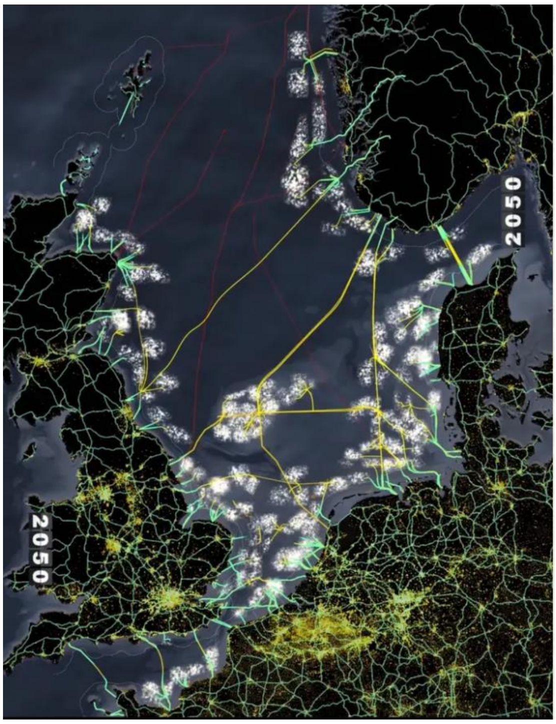


Figure 18: The energy transition at the North Sea

Source: (IABR: 2050 - An Energetic Odyssey, 2017)

The situation of 25,000 wind turbines in 2050 is still far away, but remember that Rome was not built in a day. As mentioned, first-generation wind farms are through point-to-point cables already on large-scale installed in the North Sea. According to the interviewees, from 2020 onwards, we are facing a new period of offshore wind. The second generation of wind farms will then be in the pipeline to be constructed. The main difference with the first generation of wind farms is that the second generation will no longer be working with point-to-point cables, but with a network approach. From this point of view, it is not hard to image that the grid connection costs will drop dramatically. For the search areas for offshore wind north of the Wadden Islands, visualized in figure 14 and table 24, this assumption is, of course, applicable as well. According to the network approach and other current market conditions, the levelized costs of energy, including grid-connection costs, will be almost comparable with IJmuiden-far (see table 25). The conclusion from the table is that the wind speed north of the Wadden Islands already compensates most of the grid connection costs compared with IJmuiden-far. The levelized costs of energy, including grid-connection costs, will be even more equalized since an interviewee from the oil and gas sector related that his company or organization will likely invest in Power2Gas when the network approach becomes practice.

Table 25: Levelized cost of energy for the investigated wind farms north of the Wadden Islands compared to IJmuiden-far

		1a	1b	2	3a	3b	IJm-Ver
Geïnstalleerd vermogen	MW	700	1000	1000	1000	1000	1000
Gemiddelde windsnelheid	m/s	9,75	9,75	9,68	9,80	9,79	9,58
LCoE	€/MWh	63	61	60	60	63	61
Netaansluitkosten	€/MWh	17	17	14	18	21	16
LCoE incl. netaansluitkosten	€/MWh	81	78	75	78	82	77

Source (Weekamp & van der Ham, 2017, p.8)

According to the interviewees, a third period of offshore wind will start approximately in 2035, which can help amongst other the developments of the efficiency of electrolyzers. As mentioned in the previous section, the size of electolyzers is still quite a significant technological issue. Currently, a complete production platform can host up to about 250 MW electrolysis capability, while wind farms over 600 MW already are installed in the first generation. Additionally, to make the electrolyzers themselves more efficient, installing them on a human-made island on the Doggersbank instead of on platforms is a promising solution. The Doggersbank is situated at the center of the North Sea, upon which a human-made island can be situated. This artificial island of 30 GW and 6 km2 will host a hub of offshore wind turbines and must bring the interconnectors between the different North Sea countries together (see figures 19 and 20). Constructing an artificial island on the Doggersbank is the last step in situating 25,000 10MW turbines on the North Sea. Knowing that in 2050, the energy harvested from 25,000 wind turbines on the North Sea will transported ashore brings up two questions—firstly, where this energy will come ashore, and secondly and subsequently, whether enough grid or gas infrastructure capacity will be available at that port.

Figure 19: Artificial offshore wind island on the Doggersbank

Source: (Eckert, 2018)

In figure 19, the yellow lines visualizes the (possible future) interconnectors of the North Sea. One of the lines begins on the artificial island and leads to the NORNED. From there, energy can be transported to the Eemshaven. In the section about competitors, the interconnectors and the well-established international name of the Eemshaven have already been mentioned (see figure 10). Due to the already constructed interconnectors and the future Cobra cable, it is plausible that the Eemshaven is one of the ports where the harvested energy may come ashore.

If the Eemshaven is indeed one of the ports where the massive amounts of energy come ashore, then the second question of whether there is enough grid and gas infrastructure capacity in the Eemshaven must be answered. To do this, the interconnectors (the reasons why it is likely that the Eemshaven will be chosen to receive the energy) must be assessed. Taking in account that the electricity market will change from regional to international, the interconnectors can have three base modes: export, off, and import modes (see figure 21). Logically, there is only congestion (11 GW) in the grid network of North Groningen when all the interconnectors are in import mode (see figure 22). However, this is a worst-case scenario because in practice, energy will (in most cases) be transported via the Eemshaven to Germany, and the situation of only importing is thus very rare. That congestion in practice is very rare and will only happen after 2027, when the network approach is already in advanced stadium can be explained by means of the convertor stations, which are situated in the Eemshaven, with a total capacity of 8000 MW (Bertholet & Groningen Seaports, 2017). Furthermore, electrolysis is again an alluring solution. Partly because of this reason, the Magnum power plant will be situated in the Eemshaven. This power plant must have significant ammonia storage to exclude the option of congestion in the grid. Lastly, the surplus of energy can take the form of hydrogen and be transported through the high-profile gas infrastructure in North Groningen to the hinterland. Figure 22, and the arguments above prove that congestion in the grid is very rare and that it is indeed plausible that the harvested energy on the Doggersbank may come ashore in the Eemshaven.

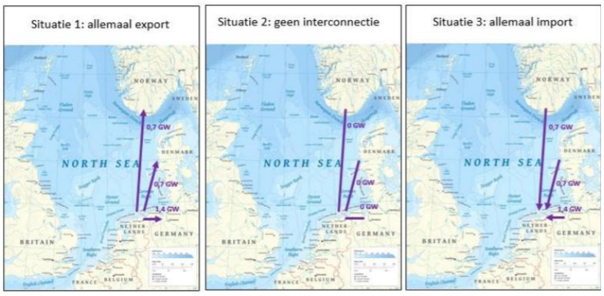
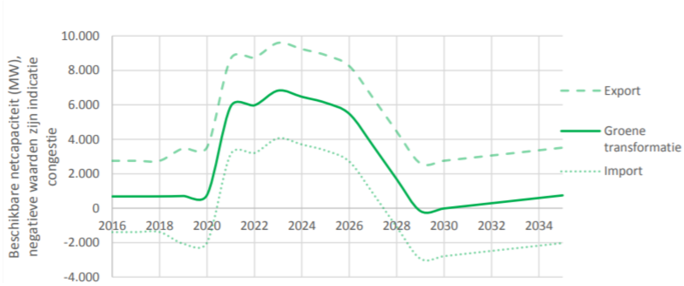


Figure 20: Interconnector situation North Groningen

Figure 21: Prospected available grid capacity for offshore wind



Source (Weekamp & van der Ham, 2017, p. 56) & (Weekamp & van der Ham, 2017, p. 59)

For North Groningen to be competitive, the business case of the molecules pathway must be competitive with the electrons pathway. This means that the price of green hydrogen must be equalized or become cheaper compared to gray hydrogen. In addition, eletrolyzers must become more efficient and their price must decrease. However, there are other future developments that will make the business case for hydrogen and Power2Gas more realistic. Sustainable energy will become a part of the world market, whereby the only solution for transporting energy over large distances is hydrogen. Also, second, and third generation wind farms on an artificial island will be built to meet Europe's ambition to be CO_2 neutral by 2050. These second and third generation wind farms located a large distance away from the coast need the molecules pathway to bring the energy ashore efficiently. Due to the interconnectors, the Eemshaven is likely one of the ports where energy will come ashore. Moreover, the Eemshaven has sufficient grid capacity and possibilities for avoiding congestion. The last recommendation for the business case of North Groningen is to bring the energy ashore in the Eemshaven. This recommendation is portrayed in the confrontation matrix in brown.

Recommendation 3: Bring the energy ashore in the Eemshaven

In conclusion, in addition to the niches of quick-reaction ports and construction ports, North Groningen has to focus on three elements in its sustainable region marketing plan: firstly, the lobby for offshore wind farms in the area north of the Wadden Islands; secondly, the innovations of hydrogen and Power2Gas; and lastly, the transport of harvested energy ashore on the North Sea in the Eemshaven to act as the conduit of energy in the North Sea region. All three recommendations indicate that technical innovation is key to raise the environmental plafond. Building 25,000 10 MW wind turbines on the North Sea that provide 90% of the North Sea-bordering countries' electricity needs will help the North Sea region in it energy transition. Moreover, North Groningen can profit economically from these technical innovations. In the end, offshore wind in the area North of the Wadden Islands can prevent demographic shrinkage and economic decline.

5. Conclusion and Discussion

5.1 Conclusion

On the basis of six subquestions the main research question, what are the economic opportunities for making North-Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline, ca be answered. The first subquestion addresses how the theory of ecological modernization can help to explain whether regions can grow economically without harming the environment, and what is the role of sustainable region marketing in this theory. The theory explains that technological innovation, such as offshore wind, hydrogen, and reuse of the oil and gas infrastructure, help to raise the environmental plafond. Oil and gas are unrenewable and scarce, but with sustainable energy, society can continue to live and consume, admittedly in a more efficient way, in the same manner as it currently does. Moreover, these technical innovations are beneficial for the economy of North Groningen. Due to these innovations, the region has a strong lobby for the rollout of offshore wind farms in the area north of the Wadden Islands. Sustainable region marketing helps, as political framework, to analyze how these technical innovations can be utilized to encourage green growth, and thus to attract and retain citizens, businesses, and forward-thinking citizens for the region.

The second subquestion, what is the theoretically relation between the offshore wind industry and migration flows in North Groningen has learned that sustainable region marketing can attract and retain citizens, businesses, and forward-thinking citizens. To achieve this, it is essential to focus on and select target audiences for the sustainable region marketing strategy. Moreover, some target audience groups must be approached by cold place marketing and others by hot place marketing. On the basis of cold place marketing, new and growing companies can be attracted, as well as young people, singles, students, technical workers, and returning migrants. The approach of hot place marketing must lead to retaining residents, a workforce, current offshore wind companies, and gas and oil companies. Furthermore, hot place marketing has to avoid brain drain.

The third, theoretical subquestion was which niches for maritime offshore wind ports exist. In addition, that sustainable region marketing must have a focus on target audiences, it must also focus on a certain niche or niches. To select this niche or these niches, addressing this theoretical subquestion helps to distinguish the different niches of the offshore wind industry. There are two main categories in which a port can be active: major component ports and service ports. The major component ports can be subdivided into: import/export ports, construction ports, manufacturing ports, ocean energy ports, and shelter ports. Service ports can be distinguished further as: quick-reaction ports and supply ports.

After conducting a competitor analysis, the researcher was able to answer subquestion 4, in which niche is the Eemshaven, the core of the offshore wind activities in North Groningen, involved and who are the competitors of the Eemshaven. The conclusion was that the Eemshaven is active in the quick-reaction and construction niches. Regarding quick-reaction ports, the only competitor was the port of Den Helder. However, geographically, the Eemshaven is located more favorably to the German wind farms than the port of Den Helder. This is an advantage for the Eemshaven, since the Germans have no meaningful quick-reaction ports. Therefore, economies of scale can emerge, in comparison with Den Helder. Moreover, the way of providing services and maintenance to offshore wind farms changes from one-stop services to services that have multiple stops. For this reason, a partnership with the Germans is essential as well, because there are too few Dutch wind farms in the area north of the Wadden Islands to create sufficient economies of scale. Additionally, the Eemshaven is involved in the niche construction ports. Of the construction ports, the Eemshaven is located closest to the wind farms in the area north of the Wadden Islands, Germany, and Denmark (the latter two have no construction ports). Furthermore, the Eemshaven is a well-established port in the offshore industry due to its interconnectors located in the Eemshaven. Consequently, a partnership as a construction port with ocean-energy and manufacturing ports in Denmark and Germany seems to be logical. The supply chain analyses was conducted to answer subquestion 5, how the supply chain of the Northern Netherlands' offshore wind market is organized. It confirmed the conclusion of subquestion 4. Moreover, the supply chain analysis has given new insights into business opportunities in the research and development sector and also in the sector of the decommissioning of wind farms. The supply chain analysis is important, because the current business profile forms the best bellwether for future activities.

After having made a choice in a focus on target audiences and niches, sustainable region marketing requires also a focus on concrete business opportunities. Subquestion 6, what are the concrete business opportunities in the offshore wind industry for North Groningen to build a region marketing strategy on, was therefore formulated. The first concrete business opportunity was to lobby for Dutch wind farms in the area north of the Wadden Islands. This is necessary to fulfill the potential as both quick-reaction port and construction port. Secondly, North Groningen must invest in hydrogen and Power2Gas to be part of the rollout of the Dutch wind farms. The price of green hydrogen must therefore become compatible to gray hydrogen, and electrolyzers must become cheaper and more efficient. Lastly, when the North Sea region has rollout it total capacity of offshore wind farms on the North Sea, the Eemshaven must be the energy conduit of the North Sea. The Eemshaven is already the gas center of Northwest Europe, but this position must be retained when the energy transition towards among others offshore wind farms in completed. In other words, the harvested energy on the North Sea must be brought ashore in the Eemshaven.

The six subquestions of this thesis are now answered. However, there is still one missing link to answer the main research question, what are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline. Developing the Eemshaven as the quick-reaction and construction port center of the North Sea region will succeed or fail based on whether there are enough residents, businesses and forward-thinking citizens. The three concrete business opportunities depend on there being adequate qualified personnel, especially since when the hydrogen comes ashore in the Eemshaven, there must be enough end users in North Groningen.

5.2 Discussion

As explained in the introduction, North Groningen, as top shrinkage area, has many demographic problems, such as shrinkage, aging, and brain drain. To counteract this rather negative spiral, a combined strategy of cold and hot sustainable region marketing to attract and retain end users, as explained in section 2.2.2. (table 1; the pink recommendation in appendix IV), is needed. End users in the context of this research must be seen in the way region marketing is defined for this research project, so the concept refers to residents, businesses, and forward-thinking citizens. In addition, the creation of end users in North Groningen must therefore result in establishing business, the creation of jobs, and positive influences on migration flows. This section will elaborate on the red part of the conceptual model (see figure 4c).

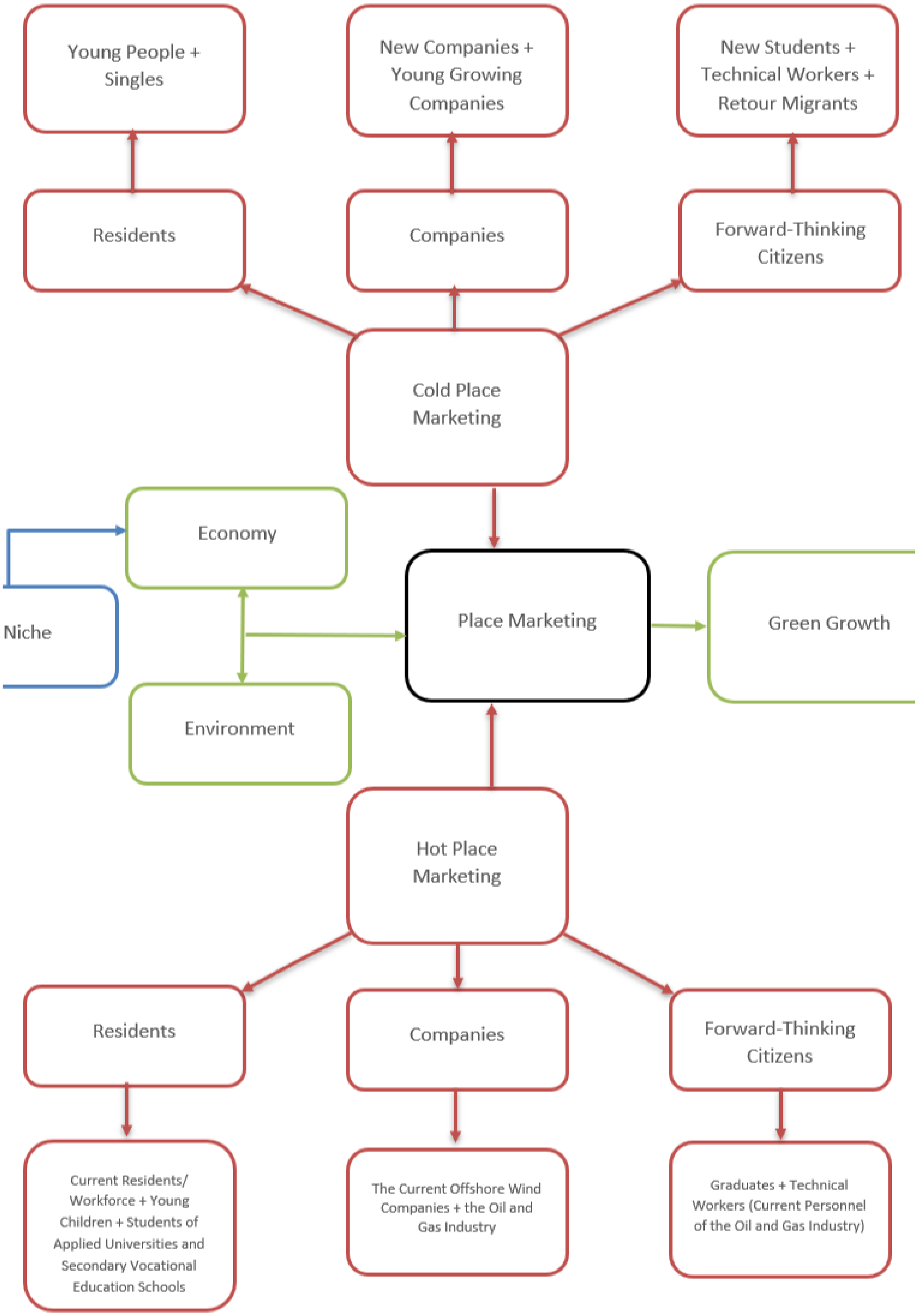


Figure 4c: the red part of the conceptual model about migration flows

In regard to residents, the creation of jobs is the simplest policy to retain the current residents or workforce of North Groningen. As mentioned, the concept of location-specific capital explained that jobs comprise one of the main reasons to stay in a region. Weekamp and van der Hem (2017) have calculated the expected direct employment per phase per 700 MW offshore wind (see table 26).

Table 26: The expected direct employment due to offshore wind

Fase	Type werkgelegenheid	Hoeveelheid arbeidsjaren NL (per 700 MW)	Hoeveelheid arbeidsjaren prov. Gron. (per 700 MW)
Vergunning- en ontwerpfase	- Voorbereidende werkzaamheden overheid - Milieu-onderzoeken en site data verzameling - Consortia bereiden tender voor	~450	5-10% NL= 23- 45
Constructiefase[29]	- Constructie monopiles - Fabricage elektrische werken - Toelevering turbine fabrikanten - Overige constructie van onderdelen	~4200	3-5% NL=126-210
Aanlegfase	- Installatie turbines en funderingen + aanleg kabels	~1600	10%-25% NL=~160-400
Exploitatiefase	- Management en onderhoud van windparken	~115 per jaar	10-20% NL= ~12-23 per jaar

Source (Weekamp & van der Hem, 2017)

Table 26 shows that the permitting and development phase create between 23 and 45 man-years in the province of Groningen per 700 MW (Weekamp & van der Hem, 2017). The supply chain analysis has shown that in the Northern Netherlands, research companies will be established throughout the entire development phase of the supply chain. Logically, jobs will therefore be expected in the sector of environmental surveys and offshore impact assessments. As explained by this thesis, there is less potential in the manufacturing of wind turbines, caused by competition of other North Sea region countries. As a consequence, there are only between 126 and 210 man-years per 700 MW to be expected in this phase (Weekamp & van der Hem, 2017). The expected employment that will arise in the Netherlands will be emerge in the steel industry, but as shown in the section about the supply chain, these types of businesses have barely been established in the Northern Netherlands. As also explained in this thesis, the niche of construction ports is a promising one for the Eemshaven. Many wind farms will be installed from the Eemshaven; therefore the expected employment is between 160 and 400 man-year per 700 MW (Weekamp & van der Hem, 2017). However, this expectation only includes jobs that are created by the installation of Dutch wind farms, but as explained in the section about the competitors, the Eemshaven has already been chosen in multiple cases as construction port for neighboring North Sea region countries. Therefore, a multiplication is expected. A disadvantage for the economy of North Groningen is the fact that these jobs will disappear again after installing the wind farms. However, since the supply chain analysis has shown that the decommissioning of the wind farms included an equal process in reverse order, the expected employment will reflect this. Lastly, the exploitation phase has massive potential for the Eemshaven. Between 12 and 23 man-years per 700 MW per year are expected in North Groningen (Weekamp & van der Hem, 2017). The service of the wind farms is a constant process and is therefore needed throughout the entire lifespan of the wind farm, which will make it even more fruitful for the economy of the region. Moreover, this statistic does not include the service that can be conducted on the German wind farms, which implies again a multiplication of the expected employment in North Groningen.

The prediction of the direct employment caused by the offshore wind industry for North Groningen explained above is based on a capacity of 700 MW offshore wind power north of the Wadden Islands. Chronologically the installation of wind turbines that will be constructed in the area north of the Wadden Islands will increase in the next 35 years. Weekamp and van der Hem (2017) claim that a capacity 11 GW of offshore wind in the area north of the Wadden Islands is a very imaginable scenario in 2050. Based on the scalability of the direct employment, the expectation in the 11 GW scenario will be between the 5,000 and 10,000 man-years in the permit and development, manufacturing, and construction phases and between 180 and 360 man-years per year in the exploitation phase. Logically, the scalability of the prediction excludes the cooperation with foreign ports and the decommissioning of the offshore wind farms, as explained in the previous paragraph. The role of the Eemshaven in the plans as regards the offshore wind islands is not included in the prediction as well. Still allows the prediction of Weekamp and van der Hem (2017) to conclude that the directly created employment caused by the offshore wind industry will be massive for the region.

To counteract the demographic problems of North Groningen, the region needs more than the creation of jobs. Companies and governments must work together against shrinkage. Hydrogen and the reuse of the oil and gas infrastructure can be seen as key elements in this cooperation. Table 1 and the section about the target audience have thus explained that a well-coordinated, sustainable region marketing strategy can help authorities to attract and retain residents, businesses, and forward-thinking citizens, which goes beyond the creation of only employment. In other words, the offshore wind, hydrogen, and the reuse of the oil and gas infrastructure must lead to a well-coordinated program, in which companies need to make investments and governments must create the right conditions.

In a society which has become increasingly dependent on technology, it is crucial to create knowledge about the offshore wind industry early on; this is key in developing a hub around offshore wind in the region. North Groningen has been known in the past as a region where education and knowledge institutions where underdeveloped (Lindenbergh & Zonnevijlle, 2014). Currently, an opposite movement is developing. The city of Groningen houses the Energy Academy Europe on the grounds of the university, where businesses and scientists work together to generate new knowledge in the field of sustainable energy. In addition, the academy has an educational function for students of both the university and the university of applied sciences. This academy must be exploited by the region as a pioneer or educational leader in the field of sustainable energy. Scientific programs, which are important for the plural story of North Groningen, must be facilitated by the academy; one of the interviewees gives the examples of programs related to how to deal with the volatility of hydrogen, how and when the oil and gas infrastructure will be reused, and how to improve the efficiency of electrolyzers. Additionally, the Eemshaven has a test location that is unique on the basis of physical conditions in the Netherlands. Since the Northern Netherlands has quite a developed blades industry (see section 4.2) the test site must be used for the research and development for offshore wind turbine blades. All these technical programs are suggestion for follow-up studies as well.

Education and science must be intertwined with society. Energy transition is not only a technical or political transition but also a social transition, according to the theory of ecological modernization. So it is important that on all educational levels, the offshore wind industry become part of the curriculum. In primary school, children must be introduced to the offshore wind industry in an age-appropriate manner. Children in high schools should visit the Eemshaven, and on all the different levels of vocational or scientific education, studies must be designed to educate offshore wind professionals. The triple-helix model can be used to bring authorities, businesses, and knowledge institutes together. The three parties must design together all types of internships to bring students into the early stages of the offshore wind transition. Only with this approach can the region be unique in comparison with competitors, and it will lead to attract students with distinctive programs, to retain children who will become offshore wind professionals in the region, and to avoid brain drain because of a lack of job opportunities. In addition, the triple-helix model must help to design retaining programs for the personnel of the oil and gas companies so they can easily acclimate to a hydrogen company.

With regard to businesses, table 1 shows that the current offshore wind and oil and gas companies must be retained for the region. The approach to accomplish this is hot place marketing, which directs that authorities must made the business climate as favorable as possible. According to the interviewees, examples of this are tax advantages, investing grants (such as Capex investments and the Earthquake funds), assistance with permits, favorable arrangements to bind personnel to new businesses, and tuning the infrastructure to offshore wind (all are direct examples of a prescriptive policy measures). In addition, for the oil and gas companies, the authorities must help them with the transition towards hydrogen. This is important because a massive loss of jobs is at stake, since the Netherlands will run out of reserves within 30 years. On European level the oil and gas industries claims that 280,000 jobs will be lost, but the offshore wind industry, including hydrogen and reusing the oil and gas infrastructure can compensate this lost with 310,000 new jobs (IABR in coopertaion with inisterie van Economische Zaken, 2017). New and young growing companies must be approached with cold place marketing, whereby the new created business climate for offshore wind companies must also be helpful. According to the interviewees, a new pattern regarding companies and energy emerges. In the past, energy must have been transported to companies, but now companies will establish their premises at the energy sources—and mostly at green energy sources where power is the cheapest. As mentioned, Google is a perfect example in the Eemshaven, but other industrial leaders are also established in the Eemshaven, such Siemens, around which can emerge an energy cluster, as Klepper (2010) has explained. Together with the chain, as described in the section about the supply chain, the oil and gas companies and the industrial leaders in the region must act as a magnet for all types of offshore wind or related companies and spinoffs. According to one of the interviewees, an example of a new pilot program in the Eemshaven is the experiences with blue lights that avoid light pollution but deter birds, and the warning lights, which only turn on when a plane is nearby. These are examples of new pilot programs that have emerged in the Eemshaven.

To create enough demand for all the hydrogen that comes ashore or is stored in the Eemshaven, the transport sector in North Groningen and the chemical industry, mostly established in Delfzijl, must be aware that the best way to be carbon-neutral in the future is by using hydrogen (Kerkhoven, Berkhout, & Colijn, 2017). Arranging this as a total network or green hydrogen society can emerge in North Groningen, which is profitable for the industry but also very visible for society (for example, by using hydrogen fueling stations; figure 23).

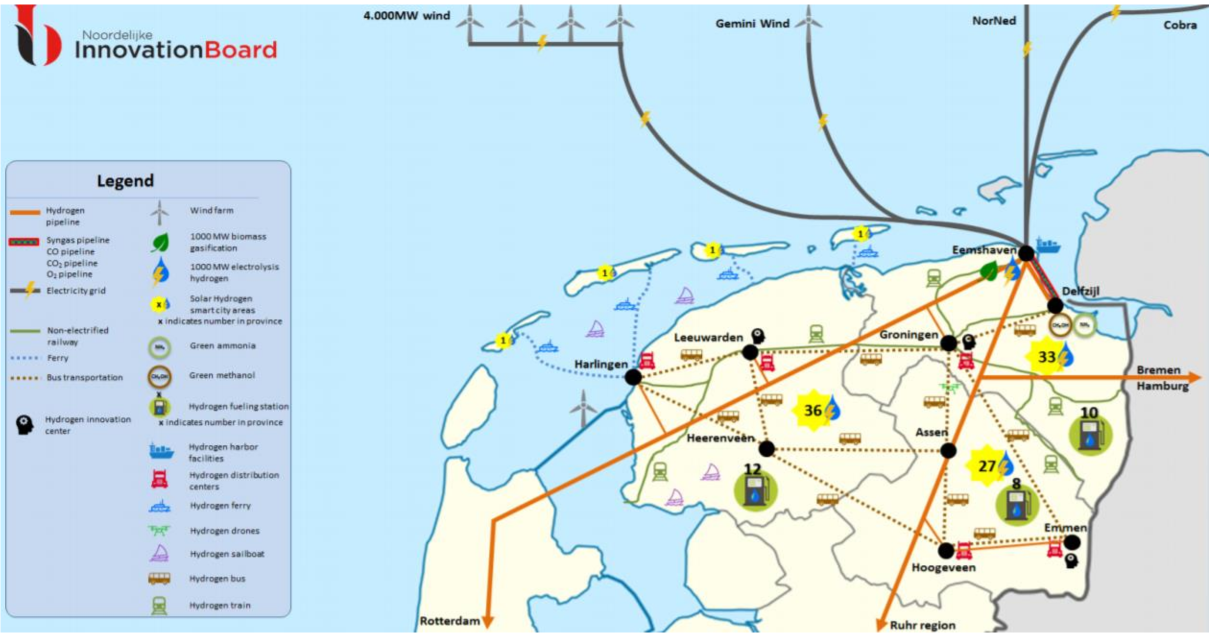


Figure 23: Future offshore wind scenario North Groningen

Source (van Wijk, 2017)

According to the interviewees, hydrogen is the future for North Groningen in the offshore wind market. Slowly, the state is committing itself as well to the innovation of offshore hydrogen production. According to the theory of ecological modernization, the transition to an offshore wind and hydrogen economy can only be successful to the extent that the society benefits as well. The last section concludes that the offshore wind economy provides a wide range of educational opportunities and creates massive employment opportunities. In other words, the offshore wind industry can bring greater wellbeing and satisfaction to North Groningen. But to effectively counteract shrinkage and economic decline, the livability of North Groningen must rise to a higher level. Only then will the last step of attracting more singles, young people, retour migrants and new technical workers be achieved. In addition to the technical suggestion for follow-up studies, the researcher strongly recommends an assessment of the livability of North Groningen as a topic for a social follow-up study.

In conclusion, to answer the main research question, what are the economic opportunities for making North Groningen the offshore wind hub in the Netherlands, on which North Groningen can create a sustainable region marketing strategy, with the goal to avoid shrinkage and economic decline, are this the creation of jobs in the niches quick-reaction and construction ports, but also the hydrogen economy in combination with reusing the oil and gas infrastructure can create a massive amounts of jobs to avoid shrinkage and economic decline. Moreover, North Groningen must act as conduit of energy in the North Sea region. Only then will the region be able to prevent the shrinkage and economic decline that would otherwise be caused by slowing down and eventually ending gas pumping in North Groningen. Providing the invisible hand of the market in North Groningen with green gloves will make the region the offshore wind hub in the Netherlands and thereby counteract the negative side effects of ending gas pumping in the region.

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Appendices

Appendix I: Requirements for the different types of maritime offshore wind ports

Requirements for import/ export ports:

- "Sufficient storage areas,
- Quays able to withstand high loads,
- Appropriate crane capabilities,
- Heavy duty land-side transport capabilities,
- Good reachability.

Requirements for construction ports (100 turbines per year):

- Free area of 80,000+ m² (8+ ha) suitable for lay down and pre-assembly of components,
- 200 to 300 m length of quayside with high load bearing capacity and adjacent access for installation vessels,
- Permanent water access to accommodate vessels up to 140 m length, 45 m beam and 8 m draught without tidal or other access restrictions like locks, (depend as well from ship length and how many ships you will (un)load simultaneously)
- Overhead clearance to sea of 100+ m to allow vertical shipment of towers,
- An additional lay-down area, up to 300,000 m² (30 ha), for sites with greater weather restrictions on construction.

Requirements for manufacturing ports:
All requirements proposed for construction ports apply to manufacturing ports as well, with the following additions and differences:

- Up to 5 km² (500 ha) of flat area for factory and product storage,
- Direct access to dedicated high load bearing deep water quayside (minimum 500 m length),
- Ease of landside logistics and access to skilled workforce.

Requirements for ocean energy ports:

- Heavy lift capacity of up to 1,000 t,
- Large lay-down and storage areas of several hectares to enable assembly of components and rapid deployment of devices for larger scale developments,
- Suitable space for final assembly adjacent to the quayside,
- Dry and potentially wet commissioning of electrical parts with the need for a sufficient quay length for in-water activities that could exceed 200 m;
- Supply of support vessels and personnel. During installation of an individual project phase up to six vessels and several person years of support are required on site,

- Sufficient draught and beam to facilitate movement of vessels and devices at a range of tides.

Requirements for shelter ports:

- Not additional requirements beyond the sheltered anchoring places for vessels.

Requirements for quick-reaction ports:

- The designated wind farm must be reachable in 2 h maximum,
- Quay of at least 80 m length, suitable for docking and sheltering CTVs,
- Tide independent berth depth of at least 3.5 m,
- Unrestricted water access and 24 h work allowance for personnel,
- Bunkering capabilities,
- Sufficient storage area of 2,000 m² minimum for tools, small spare parts and components and general operating resources,
- Nearby store houses and office space of about 500 m² and max. loads of 5 t/m²,
- Appropriate accommodation and shelter for 15 to 20 personnel with supply of water and electricity,
- Good connection the public road network.

Requirements for supply ports:

- Quay of 80 to 100 m, suitable for docking CTVs and MPVs,
- Berth depth of at least 3.5 m,
- Permanent, tide independent access is not necessary due to planned transports,
- Appropriate facilities for loading and unloading medium wind turbine components (capable cranes, possibly reinforced quays),
- Bunkering capabilities as well as supply of water and electricity,
- Sufficient supplies storage area of at least 2,000 m² and store houses of at least 500 m² for tools, medium spare parts and components and general operating resources,
- Personnel-, office- and social facilities,
- Good connection the public road- and possibly rail network,
- Short distances to airports or helicopter landing pads,
- Availability of local component suppliers is of advantage”.

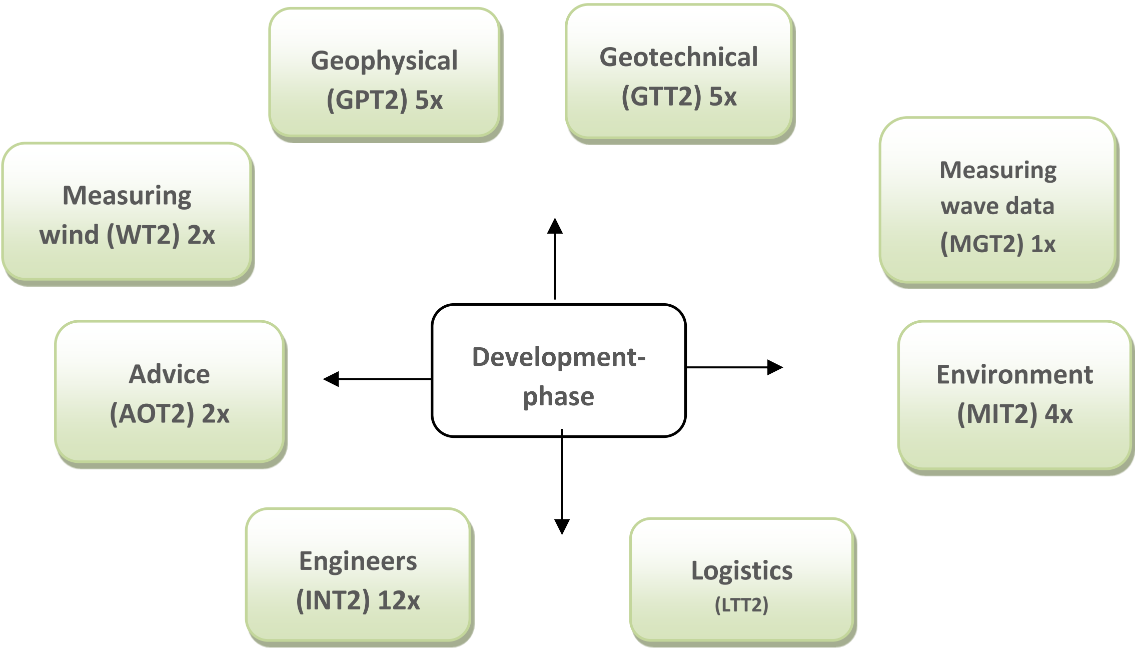
Source: (Bard & Thalemann, n.d.)

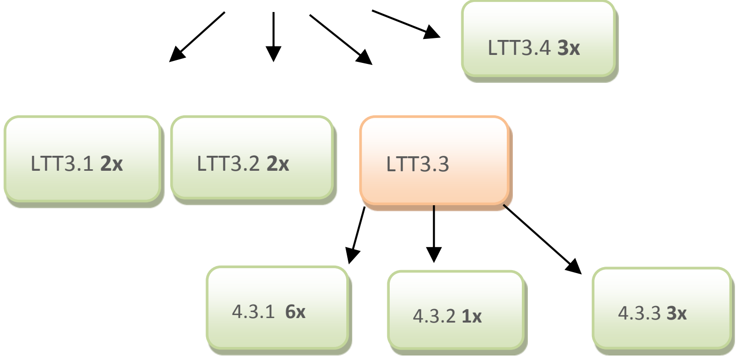
Appendix II: List of respondents

	Organization	Person	Function	Reason for interview
1	TKI	Bob Meijer, Enst van Zuylen, John Baaken	Director & Project employee & CFO	Offshore wind
2	Groningen Seaports	Erik Bertholet	Business manager offshore wind	Local governance
3	BLIX	Albert van der Hem	Director	Supply chain
4	Province of Groningen	Ilja van de Veen, Peter Smale	Senior policy officer offshore wind & Senior policy officer energy grids	Local governance
5	ECN	Aart van der Pal	Director	Decommissioning/ reusing
6	TNO	Rene Peters	Secretary General	Decommissioning/ reusing
7	Noordelijke Innovation Board	Ad van Wijk	Professor TU Delft & Ambassador NIB	Supply chain
8	NWEA	Hans Timmers	Director	Offshore wind
9	NOGEPA	Jo Peters	Director	Decommissioning/ reusing
10	North Sea Energy Challenge + Dröge and van Drimmelen	Marieke van der Werff	Consultant & Partner Dröge en van Drimmelen + Old member of the House of Representatives (CDA)	National governance
11	Shell	Ewald Breunesse	Manager Energy Transitions	Decommissioning/ reusing
12	EDI	Cartrinus Jepma	Scientific director	Ocean energy
13	EBN	Berend Scheffers	Adjunct director	Decommissioning/ reusing
14	Project Synergy	Patrick Cnubben	Project leader Synergy	Ocean energy

Appendix III: The supply chain of the offshore wind industry in the Northern Netherlands

Development phase T1





<u>Legend</u>
Development phase T1

Geophysical survey Tier 2 (GPT2)

Geotechnical survey Tier 2 (GTT2)

Measuring wave data Tier 2 (MGT2)

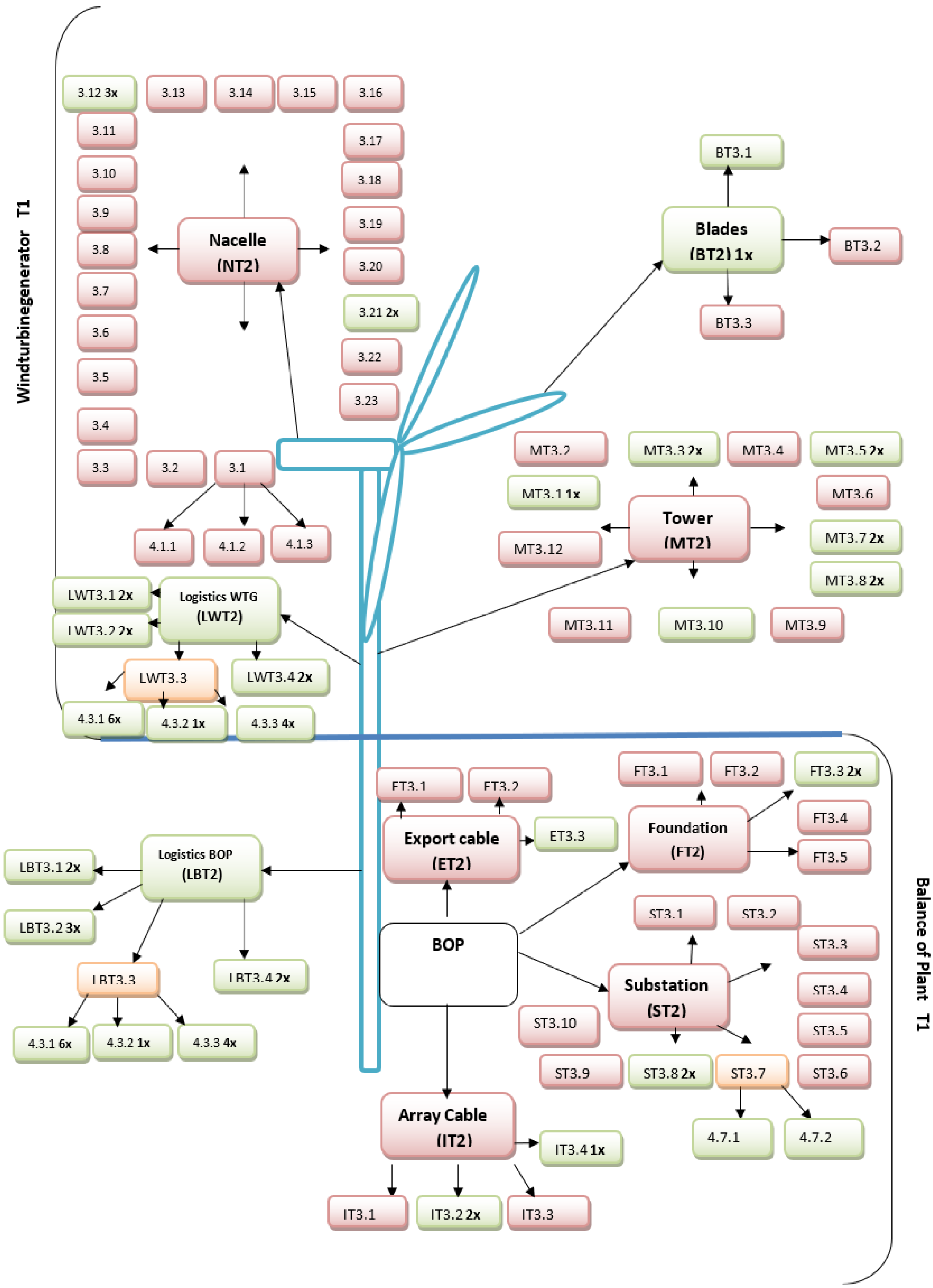
Environmental data Tier 2 (MIT2)

Wind measurement masts and equipment (WT2)

Advice development phase; Technical, Juridical, Financial, Contractually (AOT2)

Logistics(LTT2)
LTT3.1 = Port
LTT3.2 = Vessels
LTT3.3 = Transport
- LTT 4.3.1 = Transport over water
- LTT 4.3.2 = Transport through the air
- LTT 4.3.3 = Transport over land
LTT3.4 = Storage

Engineers (INT2)


Windturbinegenerator T1
3.12 3x
3.13
3.14
3.15
3.16
3.11
3.17
3.10
3.18
3.9
3.19
3.8
Nacelle
(NT2)
3.20
3.7
3.21 2x
3.6
3.22
3.5
3.23
3.4
3.3
3.2
3.1
4.1.1
4.1.2
4.1.3
BT3.1
Blades
(BT2) 1x
BT3.2
BT3.3
MT3.2
MT3.3 2x
MT3.4
MT3.5 2x
MT3.1 1x
Tower
(MT2)
MT3.6
MT3.12
MT3.7 2x
MT3.8 2x
MT3.11
MT3.10
MT3.9
LWT3.1 2x
Logistics WTG
(LWT2)
LWT3.2 2x
LWT3.3
LWT3.4 2x
4.3.1 6x
4.3.2 1x
4.3.3 4x
FT3.1
FT3.2
FT3.3 2x
ET3.1
ET3.2
Export cable
(ET2)
ET3.3
Foundation
(FT2)
FT3.4
FT3.5
Logistics BOP
(LBT2)
LBT3.1 2x
LBT3.2 3x
LBT3.3
LBT3.4 2x
4.3.1 6x
4.3.2 1x
4.3.3 4x
BOP
ST3.1
ST3.2
ST3.3
Substation
(ST2)
ST3.4
ST3.10
ST3.5
ST3.9
ST3.8 2x
ST3.7
ST3.6
4.7.1
4.7.2
Array Cable
(IT2)
IT3.4 1x
IT3.1
IT3.2 2x
IT3.3
Balance of Plant T1

Legend

Wind Turbine generator Tier 1:

Nacelle Tier 2:

NT3.1 = Nacelle
Frame
- NT4.1.1 = Main frame
- NT4.1.2 = Castings
- NT4.1.3 = Construction part

NT3.2 = Hydraulics
NT3.3 = Sensors
NT3.4 = Generator
NT3.5= (navigation) Lightning
NT3.6= Other small mechanics
NT3.7= Cooling regulator
NT3.8 = Heat exchanger
NT3.9 = Oil system of dry transformer 690V/22KV
NT3.10 = Gearbox
NT 3.11 = Condition monitoring
NT 3.12 = Nacelle cover; polyester of aluminum (depending on brand)
NT 3.13 = Main shaft castings
NT 3.14 = Main bearing with housing
NT3.15 = Lubrication system
NT 3.16 = Wind measure system
NT 3.17 = Wind turbine control system (Turbine computer)
NT 3.18 = YAW bearing (YAW Gear)
NT3.19 = Power take-off for control generator (Depending on turbine type)
NT 3.20 = Hub castings
NT 3.21 = Spinner construction + housing (Polyester/ aluminum)
NT 3.22 = Rotor auxiliary systems (Electric / hydraulic)
NT 3.23 = Bolts and nuts

Blades Tier 2:
BT3.1 = Material selection (Plastic processing, composite or carbon)
BT 3.2 = Lightning distraction system (Copper)
BT 3.3 = Blade bearings

Mast tier 2:
MT3.1 = Service lift
MT3.2 = Electrical systems
MT3.3 = Stairs
MT3.4 = Transformer (Optional)
MT3.5 = Material selection (Plastic processing and composite)
MT3.6 = Lightning
MT3.7 = Fall protection system
MT3.8 = Housing (Steel or concrete)
MT3.9 = Flanges and connection systems
MT3.10 = Bolts and nuts etc.
MT3.11 = Mast damping systems
MT3.12 = HV switch for coupling to HV net

Logistics WTG tier 2:
LWT3.1 = Port
LWT3.2 = Vessels
LWT3.3 = Transport
- LWT 4.3.1 = Transport over water
- LWT 4.3.2 = Transport through the air
- LWT 4.3.3 = Transport over land

LWT3.4 = Storage

Balance of plant T1:

Substation Tier 2:
ST3.1 = HV switch (For cables)
ST3.2 = Transformers
ST3.3 = Power electronics
ST3.4 = Fire protection system
ST3.5 = Meteorological system (Weather forecast)
ST3.6 = Monitoring systems
ST3.7 = Platform
- ST4.7.1 = Ladders
-ST4.7.2 = Steel

ST3.8 = Cabling incl. ropeways
ST3.9 = Emergency systems for substations and turbines
ST3.10 Communication system OA: AIS –telephone (substations)-Camera monitor system

Array cables Tier 2:
IT3.1= Array cable-laying vessel
IT3.2= Cable protection in J tube (Supply to turbine) and seabed
IT3.3 = Temperature measurement system for protecting cables
IT3.4 = Fiberglass for communication

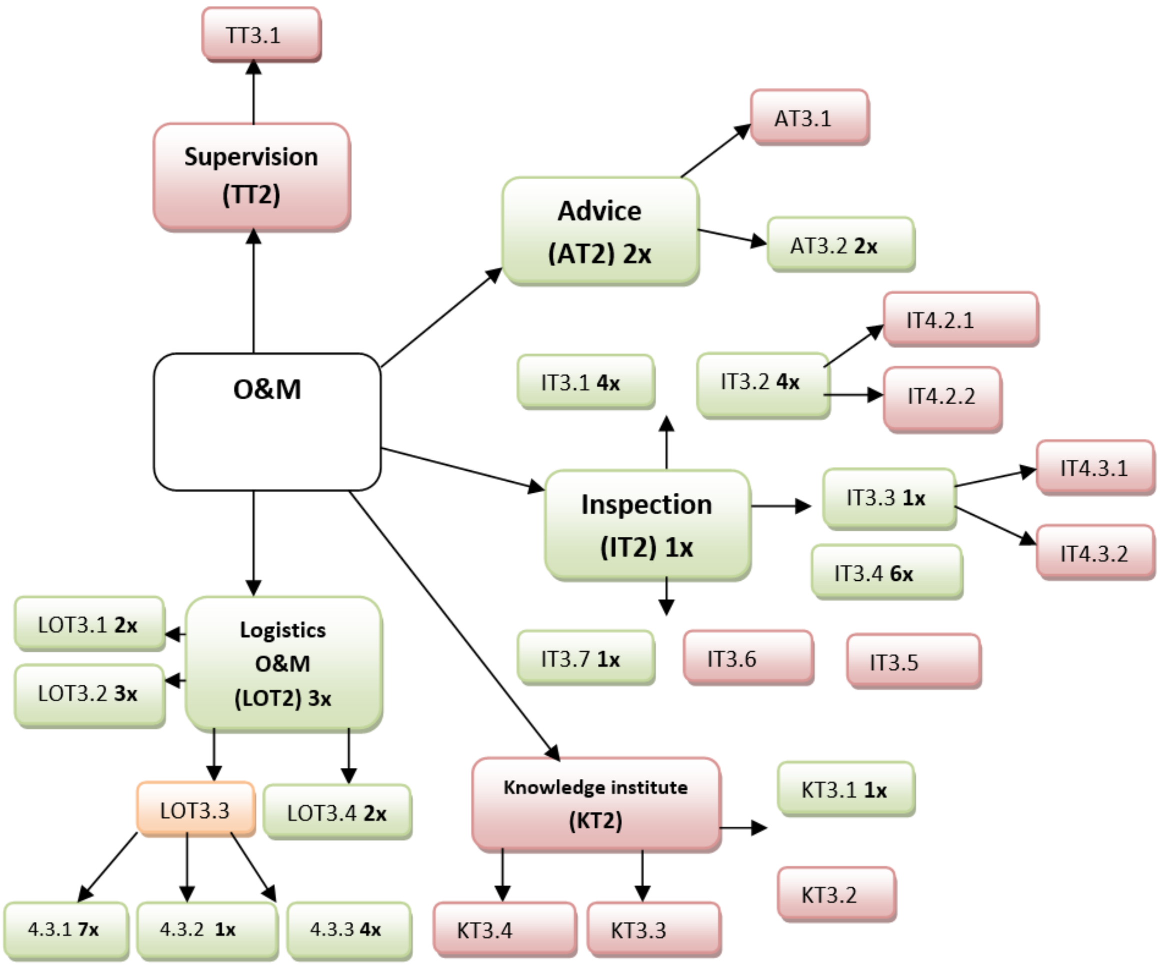
Export cables Tier 2:
ET3.1= Export cable-laying vessel
ET3.2 = Temperature measurement for protecting cables
ET3.3= Protection for cable in J tube (Supply to turbine) and Seabed

Foundations Tier 2:
FT3.1= Steel
FT 3.2= Concrete
FT 3.3= Grating platforms (Second Steel)
FT3.4= Shiploads
FT3.5= Rolling mill

Logistics BOP Tier 2:
LBT3.1 = Ports
LBT3.2 = Vessels
LBT3.3 = Transport (water, air, land)
-LBT 4.3.1 = Transport over water
- LBT 4.3.2 = Transport through the air
- LBT 4.3.3 = Transport over land

LBT3.4 = Storage

Operation and Maintenance T1



Legend

Operation and Maintenance T1

Knowledge institute Tier 2
KT3.1= Monitor system for data collection
KT3.2= Tool for data analyses
KT3.3 = Warning message system
KT3.4 = Personnel

Advice Tier 2
AT3.1= Knowledge to translate analyzes, and to discuss with owner and supplier
AT3.2= Advice in corrective and preventive maintenance

Supervision Tier 2
TT3.1= Checking agreements with suppliers

Inspection tier 2
IT3.1= Fall protection systems
IT3.2 = Supervision
- IT4.2.1= Audit work
- IT4.2.2= Service reports

IT3.3= Owner inspection
- IT4.3.1= Surface treatment
- IT4.3.2= Painting and Coating

IT3.4= Ladders / work platforms (elevators) cranes / hoists
IT3.5 = Scour protection around the foundation
IT3.6 = Corrosion protection foundation under water (Anodes)
IT3.7 = Location and depth measurement of the array and export cable

Logistics O&M Tier 2
LOT3.1= Ports
LOT3.2= Vessels
LOT3.3= Transport
- LOT 4.3.1 = Transport over water
- LOT4.3.2 = Transport through the air
- LOT4.3.3 = Transport over land

LOT3.4= Storage

Appendix IV: Confrontation matrix based on the SWOT analyses about the potential of the offshore wind industry in North Groningen

Confrantion matrix — Opportunities

		Hydrogen	Pioneer hydrogen project like OS 2020	Decommissioning oil- and gas infrastructure	Ru-use of oil- and gas infrastructure	North Sea Agenda 2050/ synergy	Societal pressure/ public opinion	Sustainable- and shared value	Earthquakes funds and Capex investments	Cooperation with other ports	Shape German North Sea territory	Decommissioning offshore wind turbines	New wind farms/ Rollout programs North Sea Region Countries	Higher wind speed	Limited environmental damage	Decreasing Costs (sustainable energy, electrolyze)	Offshore wind island	Cold/ Hot region marketing	Technological development	System integration	Norwegian situation: Free energy, CO2 taxes, and Carbon Capture an
Strenghts	Heliport	0	0	0	0	0	0	0	0	2	2	0	2	0	0	0	0	1	0	0	0
	Short distance to offshore wind farms	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	2	2	0
	Port authority is road authority as well	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0
	Experience with onshore wind projects logistics	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
	Experience in recent offshore wind projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
	Empty space	0	0	0	0	0	0	0	0	2	2	2	2	2	1	1	0	0	0	0	0
	Convenient location with respect to offshore oil-and gas platforms	2	0	2	2	2	0	0	0	0	0	0	2	0	0	0	0	0	2	1	1
	Gas- and oil infrastructure	2	0	2	2	1	0	0	0	0	0	0	2	0	0	0	0	0	2	1	1
	End-users Hydrogen Eemshaven and Delfzijl (Magnum power plant)	2	0	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	2	2	2
	Big amount of grid capacity	2	0	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	2	2	2
	Appearance of several converter stations	2	0	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	2	2	1
	Interconnectors	2	0	0	0	0	0	0	0	2	2	0	1	0	0	1	2	0	2	2	1
	Google	0	1	0	0	0	2	2	0	1	1	0	1	1	1	2	1	2	2	2	0
	Test site Eemshaven	1	1	0	0	0	0	0	2	0	0	0	1	2	0	2	0	2	2	0	0
	Research and design sector	2	0	1	2	0	0	0	2	0	0	0	1	1	0	2	2	1	2	2	1
	Competitive purchase and lease prices	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
	Tax advantages	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weaknesses	Limited number of end-users	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0
	Limited number of end-users of hydrogen	2	0	1	1	0	0	0	0	0	0	0	2	0	0	2	0	2	2	2	1
	Distance to end-users/ Randstad	2	0	1	1	0	2	2	2	0	2	0	2	0	0	2	0	1	2	2	1
	Lack of manufacturers	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0	0	0
	Big distance to designated zone in comparison with other Dutch port regions	2	0	0	0	2	0	0	0	1	0	0	2	2	2	2	2	0	2	2	1
	Total	22	2	7	8	5	4	4	6	12	12	7	28	10	6	21	13	16	28	22	12

Confrantion matrix — Threats

		Competitive ports	Steel Industry	High investments in other forms of renewable energy and hydrogen	Offshore wind island	Continue oil- and gas extraction	Disappearance of oil -and gas companies	Hydrogen economy blind spot EZ	Shrinkage	Brain drain	Aging	Livability	New wind farms/ Rollout programs North Sea Region Countries	Military zone	Priority Provence	Lobbying	Wind silence	Storage	Total
Strenghts	Heliport	0	0	0	-2	0	-1	0	-1	-1	-1	-1	0	-1	-1	-1	0	0	-3
	Short distance to offshore wind farms	0	0	0	0	0	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0
	Port authority is road authority as well	-1	0	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-4
	Experience with onshore wind projects logistics	-1	0	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-5
	Experience in recent offshore wind projects	-1	0	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-6
	Empty space	0	-1	0	0	0	-2	0	-2	-2	-2	-2	0	0	-2	-2	0	0	-3
	Convenient location with respect to offshore oil-and gas platforms	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-12
	Gas- and oil infrastructure	-2	0	0	-2	0	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-13
	End-users Hydrogen Eemshaven and Delfzijl (Magnum power plant)	-2	0	0	-2	0	-1	-2	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-2
	Big amount of grid capacity	-2	0	0	-2	0	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-1	-1	-11
	Appearance of several converter stations	-2	0	0	-2	0	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-1	-1	-12
	Interconnectors	-2	0	0	-2	0	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-11
	Google	-1	0	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	11
	Test site Eemshaven	-1	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	2
	Research and design sector	-2	-1	0	0	0	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-4
	Competitive purchase and lease prices	-1	-1	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-7
	Tax advantages	-1	-1	0	0	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-9
Weaknesses	Limited number of end-users	-2	0	0	-2	0	-1	0	-1	-1	-1	-1	0	0	-1	-1	0	0	-7
	Limited number of end-users of hydrogen	-2	0	0	-2	0	-2	0	-2	-2	-2	-2	-2	0	-2	-2	0	0	-5
	Distance to end-users/ Randstad	-2	0	0	0	0	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	0	0	2
	Lack of manufacturers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	Big distance to designated zone in comparison with other Dutch port regions	0	-1	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	17
	Total	-25	-5	0	-18	-2	-30	-17	-30	-30	-30	-30	-16	-5	-30	-30	-12	-12	

Quick reaction- and construction ports
Lobbying for Dutch wind farms in the Area North of the Wadden Islands
Invest in hydrogen and Power2Gas
Bring the energy ashore in the Eemshaven
Create end-users and jobs