Port Environmental Review System

2023/2025

ECOPORTS

GRONINGEN SEAPORTS

ESPO

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Abstract

This Port Environmental Review System (PERS) portrays developments in the port areas of Delfzijl and Eemshaven. It describes developments that stimulate the sustainability of the ports and industry. These are both sustainable economic and ecological developments.

The PERS is roughly composed of 3 parts. The first part (Chapters 1, 2 and 3) contains an introduction, general information about the port areas, and the environmental policy statement, signed by the CEO of Groningen Seaports. This statement further explains the course that Groningen Seaports wants to take, in terms of environmental policy.

Then, in the second part of the PERS (chapters 4 and 5), the environmental themes and associated environmental aspects are set out. For each environmental theme, the relevant legislation, regulations and other policies are combined in tables. This shows that for various themes, developments with a positive effect on the environment are or will be taking place within the management areas of Groningen Seaports. In this PERS, 8 themes have been distinguished that are relevant to the sustainability of the ports:

- Renewable energy
- Circular economy & Start-ups
- Corporate social responsibility
- Sustainable shipping
- Utilities
- Safety, spatial planning & settlement
- Nature
- Soil & sludge

Based on the above list, which is partly based on priority, it is visible that the themes of renewable energy and circular economy are of relatively high importance for the coming 2 years, due in part to the major developments that are underway. Examples include the 17th offshore wind farm to be installed from Eemshaven, the launch of the NorthH2 consortium, Groningen Seaports' circular economy proposition and the Sustainable Industry Challenge. Other examples are described per theme and by their associated environmental aspects. Underlying these themes is the environmental monitor which outlines the current status of the surroundings based on a number of environmental parameters is established (in subchapter 5.A). Many activities and measures which are part of the 8 themes are aimed at improving this environmental quality.

Following the above themes, the third part of the PERS consists of information about the organisational structure, the internal and external stakeholders involved, and the ways in which environmental awareness is created at Groningen Seaports (Chapter 6). Through several ways, Groningen Seaports is committed to working with governments, organisations, and other stakeholders. For example, there is active participation in several partnerships, such as SBE and E&E in balance. Groningen Seaports further wants to bring awareness, regarding environment and sustainability, to the attention (of employees) in several ways. The business plan 2020-2024 and the Port Vision 2030 are leading in this.

Chapter 7 discusses the environmental performance of the ports and whether the ports comply with the relevant laws and regulations. This is indeed the case; Groningen Seaports, with the developments made and in preparation, is in accordance with applicable policy. Chapter 8 contains the link to the public version of this PERS. To conclude, in Chapter 9, two best practices are described. These are two eye-catching examples of environmental measures (the clay refinery and the offshore wind sector, from chapter 5) that clearly proved their influence on the sustainable economic and ecological development of the port areas in the Eemsdelta region.

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1. Introduction

Sustainability is high on the agenda at Groningen Seaports. The Business Plan 2022-2024 and the Port Vision 2030 aim to make the port areas of Delfzijl and Eemshaven greener. Economic Growth = Green is indeed Groningen Seaports' starting point for the many activities that these port areas accommodate. In order to achieve this, Groningen Seaports stimulates, facilitates and executes sustainable activities at many points.

1.1 Targets

Together with various stakeholders, Groningen Seaports wants to make efforts to obtain the coveted EcoPorts Certificate for the 8th time. Groningen Seaports is a forerunner in comparison with other ports in the EcoPorts network and wishes to maintain this position. Groningen Seaports considers it of vital importance to combine the various functions in the port areas and to participate in environmental protection and environmental management.
European Sea Ports Organisation (ESPO), the organisation which issues the EcoPorts certificates, aims to raise awareness of measures which promote the environment. Besides creating awareness, intended aspects of ESPO are also the intensification of knowledge sharing and cooperation between ports and other external stakeholders instead of creating competition between ports. This report, further referred to as PERS, makes all environmental policies undertaken by Groningen Seaports and partners transparent so that they can be properly monitored and evaluated. The PERS (Port Environmental Review System) is used to assess the ports' environmental policies and to issue the EcoPorts certificate if and when environmental measures are effective. This way, environmental policy in Groningen Seaports' harbour areas can be strengthened. Recertification must take place every 2 years.

Groningen Seaports has previously received the EcoPorts certificate in 2006, 2008, 2010, 2013, 2015, 2018 and 2021. In order to receive the EcoPorts re-certification, this PERS outlines all (new) measures for 2023-2025 in the port areas of Groningen Seaports in the field of environment and sustainability.

1.2 Benefits

Not only for the environment are sustainability measures within the port areas positive. Also, for Groningen Seaports itself, these measures can lead to better synergy in the area. Certain activities in the port areas can reinforce each other so that a match can arise between different companies, which in turn can lead to various benefits and strong network clusters in the area, see chapter 5.2. This is something that benefits the sustainable economic development of the port areas. Thus, these actions contribute to both the ecological and economic value of Groningen Seaports' management areas. This is in line with Groningen Seaports' vision: Economic Growth = Green, to which we are proactively committed. With this policy Groningen Seaports wants to be an important player in the field of sustainable port development.

1.3 Procedures

1. Groningen Seaports shall compile a draft PERS using the standard outline for PERS as prescribed by ESPO.

2. The PERS will review the environmental performance of the past 2 years and present new goals for the period 2021-2023.
3. The independent agency Lloyds Register from Rotterdam assesses this draft and whether it demonstrates sufficient progress in environmental performance.
4. After adjustments based on the comments provided by Lloyds Register, Groningen Seaports submits the PERS and applies for a PERS certificate.

2. Port profile

Sustainable development and environmental protection are important themes in relation to ports. Ports are often located in densely populated areas and on the edge of important nature reserves such as estuaries. Care for the environment is an increasingly important precondition for economic

economic development in and around ports. This is also the case for the ports and industrial areas of Groningen Seaports. These areas are situated along the Wadden Sea and the Ems estuary. Part of this area is a UNESCO World Heritage Site and therefore has an internationally protected status. The largest wetland area of northwest Europe is pre-eminently an area where flora and fauna are allowed to flourish. There are many (protected) animal species in this Natura-2000 area, including seals, birds and fish. Partly because this nature area is of great importance to these species and because of its appearance on the UNESCO World Heritage list, this brings with it special responsibility and specific laws and regulations that Groningen Seaports takes extremely seriously. Expansion of our ports into these areas is therefore entirely ruled out. All of our growth initiatives are developed with respect for nature and living environment. This is also shown by the realization of compensation areas and temporary nature in the port areas of Groningen Seaports.

Besides the fact that the areas managed by Groningen Seaports have a high ecological value, Groningen Seaports is also economically a big party in the region. With about 80-85 direct employees, Groningen Seaports is fully committed to economic development, because green business is the future. Groningen Seaports has the ambition to bind many new companies to the area and creates many jobs in the region, stretching across the entire north of the Netherlands. Groningen Seaports' task packaged is not limited to the management, maintenance, port services and settlement of shipping traffic in the seaports of Delfzijl and Eemshaven, but the large industrial sites in the same areas, including the inner ports of Delfzijl, the Farmsumerhaven and Oosterhornhaven, with an open connection to the Eemskanaal, are equally under Groningen Seaports' supervision. In addition, the port and industrial area is surrounded by several residential areas in a cultural-historical valuable landscape. This creates a pleasant environment to work, live and recreate in.

Overview of port areas and activities

The seaports and businesses in Delfzijl and Eemshaven have a combined size of some 2 600 hectares. Via road, rail, deep sea and inland waterways, the port areas are quickly accessible. Since 2019, the Eemshaven has also been equipped with a helicopter landing site. A large share of the port areas consists of industrial areas. On these adjacent industrial areas of the ports there are several clustered business parks, with Delfzijl hosting the Nobian (formerly AkzoNobel) chlorine-related chemical cluster. The Eemshaven primarily houses an energy cluster with large energy producers and a large Datacentre from Google.

2.1 Port of Delfzijl

The port of Delfzijl (Figure 1) consists of an outer and an inner port. The Handelshaven is the logistical heart of the port area and is located near the old centre of Delfzijl. The eastern part of this port is intended for commercial shipping and the western part is reserved for pleasure craft.

The Handelshaven is accessible via the 6-kilometer long Zeehavenkanaal. The north side of this canal consists of a screen dike, on which 14 wind turbines producing green energy are located. Another 5 wind turbines are located on the Oterdumer Driehoek. On the south side of the Zeehavenkanaal there are various loading and unloading facilities for the transhipment of chemical products or raw materials for the chemical industry.

Activities

The activities of the port of Delfzijl are centred around the production of chemicals at the Chemport Europe site. About 15% of all chemical products produced in the Netherlands originate in Delfzijl. After the discovery of gas and salt in Groningen in the 1950's, Delfzijl became an industrial port with a strong chemical cluster. Because Groningen Seaports has facilitated many networking opportunities, the port of Delfzijl has largely grown into a chemical cluster, with many stakeholders sharing knowledge and working together. This creates many advantages for the area and the companies themselves. Some of these advantages for companies is that they can make use of each other's products, are connected to the same system, and reuse each other's energy, heat or water.

The circular economy plays an important role in the economic development of the Groningen Seaports ports, especially in Delfzijl. The recycling sector is very diverse and developing rapidly, mainly driven by the need for sustainability, the pressure on the consumption economy and the scarcity of raw materials. With its green energy mix, coming from the many wind turbines, biomass and hydropower, and the opportunities for agriculture, Delfzijl is the biobased location in Northwest Europe.

Facts and figures (2021)
Capacity: **6 034 855 tonnes**
Surface: **1.478 hectares**
Of which available: **360 hectares**
Length handelskade: **850 metres**
Depth seaport: **9 metres**
Depth inner docks: **5 metres**
15% of Dutch chemical production

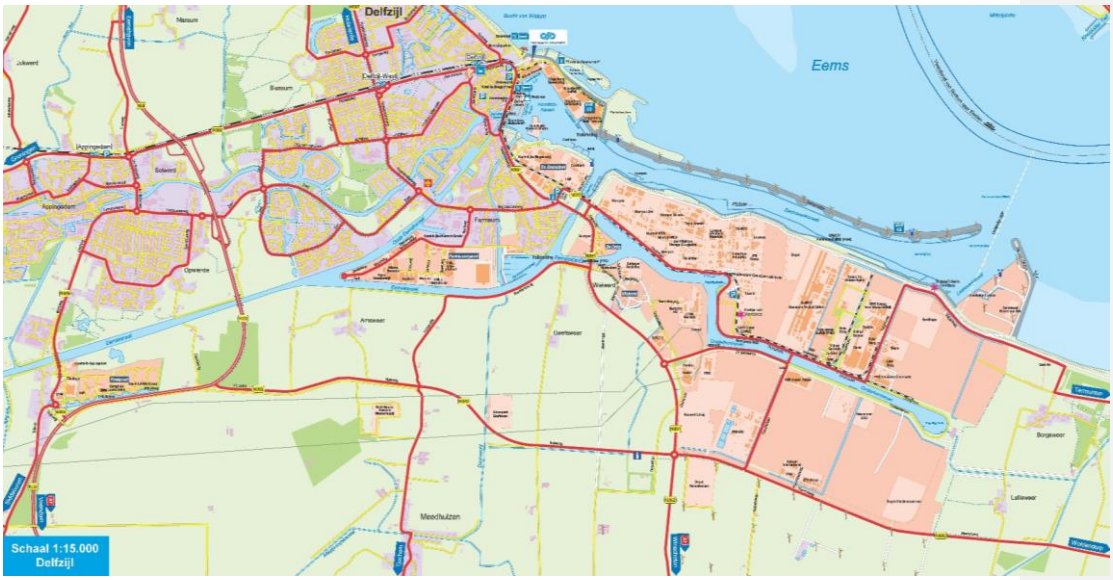


Figure 1: Map of the port at Delfzijl

2.2 Port of Eemshaven

In total there are more than 5 kilometres of quays spread over the four port basins of Eemshaven (Figure 2): the Juliana, Beatrix, Wilhelmina and Emma docks. Eemshaven has multimodal access and, in addition to the (heavy) quays and jetties, it also offers an unloading platform, business sites, service locations, storage facilities, office spaces, flexible workplaces, etc. This makes the port excellently suited as a service port and various logistics service providers have every opportunity to tranship goods. With a draft of 14 meters, this port is a real deep-sea port. The focus at Eemshaven is mainly on energy generation. In fact, the Eemshaven is also known as the energy port. Besides energy, data is of great importance, this is mainly due to the arrival of Google in 2016.

Activities

Google, the world's largest Internet search engine, has completed a data centre in Eemshaven and is in the process of expanding this immense data centre. It is the largest data centre in Europe. The port is also trying to attract other data centres by supporting and facilitating them in their requirements to establish themselves.

The Eemshaven is an international hub for renewable energy, 1/3 of the Netherlands' total energy production takes place at Eemshaven. Its current production exceeds 8000MW and there are several plans to increase the production capacity, partly at sea. This 8000MW capacity is composed of different forms of energy generation, such as generation by wind, solar, biomass and Norwegian hydropower. Naturally, Groningen Seaports aims to add more sustainable energy generation to this. Eemshaven is excellently located geographically, close to the North Sea, and well equipped to accommodate logistical (offshore) projects. The port meets the maritime requirements for the assembly and logistic handling of wind turbines. The

distance to the North Sea wind farms (under construction, planned or completed) is short and therefore advantageous, as the farms are easily accessible as a result.

Facts and figures (2021)
Capacity: 7 272 407 tonnes
Surface: 1 324 hectares
Of which available: 207 hectares
Quay length Julianahaven: 2 300 metres
Quay length Beatrixhaven: 1 420 metres
Quay length Wilhelminahaven: 1 250 metres
Quay length Emmahaven: 220 metres
Depth: 14 meters
1/3 of Dutch energy production

Figure 2: Map of the Eemshaven port

2.3 Groningen Innovation Port

Ambitious start-ups and scale-ups are important for economic development in an area. They provide dynamism, innovation and attract talented people, often with a technological bent. Groningen Seaports is therefore working hard to be an attractive location for these types of new companies that have a lot of ambition and the potential to grow quickly. In Delfzijl and

Eemshaven all the ingredients are present to facilitate start-ups and scale-ups for a good start to what will hopefully be a long and successful development.
There are easily accessible spaces with facilities, a pleasant living environment and opportunities to easily scale up, with little regulatory work. In addition, there is a lot of support from large companies in the region, which allows for a close-knit community, something that is important for start-ups to be able to grow. Large companies are increasingly outsourcing their Research & Development to start-ups and scale-ups, also in the Eemsdelta. Partly due to the availability of pilot and demo facilities, the port area of Delfzijl and Eemshaven is ideal for the start-up sector. The chemical companies Avantium and Photanol have already started two pilot plants on the Nobian site and there are also spaces available on other industrial estates for laboratories or a demo plant. Furthermore, there are several collective buildings in the area with office spaces and the possibility for flexible workplaces.

3. Environmental policy statement

At Groningen Seaports, we aspire to become one of Europe's most sustainable ports and industrial regions by 2030. We regard sustainable economic growth as being the best possible pathway for the long term. Next the limitations on fossil fuels and reducing impacts on the environment, sustainable development also leads to added value and jobs in the region and our ports. The ratio between people, planet and profit needs to be balanced. To achieve this, sustainable measures need to be taken. This way we can create environments with care and respect for people and their living environment, investment in knowledge, innovation, and cooperation with economic core regions and logistic nodes. In this process we act as an initiator, facilitator and stimulator, based on the conviction that green, sustainable economic growth will benefit the region as a whole.

In this path to sustainability, we are facing a number of challenges such as reducing CO2-emissions, applying large-scale green hydrogen, and using smarter dredging methods which do not disrupt the environment. A great deal of work has already been invested into achieving green economic growth in our ports, including projects and studies in relation to clean shipping, alternatives methods for current dredging, reducing complaints and incidents as well as increasing safety in the ports and adjacent areas. We participate in several sustainable projects to reduce CO2-emissions, in order to increase corporate social responsibility or to conserve and improve nature.

The efforts towards achieving a circular economy form the basis for sustainably strengthening the spatial-economic structure of Delfzijl and Eemshaven. The cradle-to-cradle approach at regional level leads to lower costs, better environmental performance and improved competitiveness for local companies. That results in a successful economic cycle, not only per company, but also within entire branches of industry. Maximum synergy is a necessary component when it comes to economic and ecological added value. To this aim, five building blocks are operated at Delfzijl and Eemshaven for the establishment or expansion of companies: extending the utility infrastructure and connecting companies, setting aside preferred synergy search areas, co-siting, clustering and cluster management. Synergy, efficiency and sustainability benefit from balanced clusters.
Environmental objectives, quality of the living environment, and safety interests also call for a well-considered use of space. A wide range of legal frameworks must be considered when allocating and laying out locations. The new zoning plans account for the dynamism of the companies. These plans are adaptive, meaning they are flexible, but are set up with clear boundaries. Moreover, we offer a wide range of facilities and utilities in our ports, which directly contribute to the development of a renewable and sustainable industry and transport sector. They include infrastructure management, innovation and expansion programmes aimed at strengthening the competitiveness of local companies, boosting start-ups and scale-ups, promoting jobs, improving environmental performance and reducing costs.

Collaborating with governments, (non-governmental) organizations, businesses, lessees and contractors will ensure that our environmental developments are in line with the activities taking place in the ports and the industrial areas. An example of this is our participation in the Economy and Ecology in Balance platform, which entails that

cooperation with (local) companies, government agencies and nature organizations is enhanced. Next to these stakeholders, we aim to start dialogues with residents of the region, focusing on developments in these regions and their relationship with their living environment. We regularly publish the results of the developments at the ports on our website and social media services. Additionally, these developments and results at Groningen Seaports are mentioned and described in local newspapers, even in Germany. Employees of Groningen Seaports are also informed about the environmental plans and activities, when the Business Plan is drawn up. We provide training for employees of Groningen Seaports to create awareness about environmental issues and we strive to reach behavioural change in the daily work of employees in benefit of the environment. This is encouraged with forms of active participation. For us it is inevitable that above-mentioned stakeholders and internal personnel are actively engaged with our plans and activities in the ports and industrial areas. Furthermore, their input has been processed during the preparation of the progress reports on our Port Vision 2030, because this serves as input for the Business Plan 2022-2026 of Groningen Seaports.

We are committed to:

- Limit the environmental impacts of all our activities.
- Increase the sustainability of our activities and projects in the port and the adjacent areas.
- Make sure that all necessary resources for the implementation of our environmental policy are allocated.
- Keep up to date with developments in environmental and other legislation.
- Publish our developments and activities on our website and social media services.
- Encourage our internal employees and external stakeholders to actively participate in a sustainable environment.

Economic Growth = Green, that is our conviction! To achieve economic growth combined with our ambitions to strive for future-proof and dynamic sustainable environments in our ports and industrial areas. Hereby improving the status of important drivers of our ports and adjacent areas, such as water, air, soil, safety, nature and other surroundings in the living environment.

Location, date Delfzijl 15-9-2022

Cas König | CEO

4. Environmental aspects and actions per theme

In this chapter, various environmental aspects are discussed for each environmental theme. For each of these environmental aspects, different measures are mentioned which Groningen Seaports initiates, facilitates or stimulates. Furthermore, this chapter lists concrete actions which Groningen Seaports (together with partners) intends to implement. Subchapter 5.A below represents an introduction to Chapter 5. It discusses the current state of the Eemsdelta region in relation to various parameters regarding the environmental qualities. Thereafter, the 8 environmental themes are examined and explained in detail, including environmental performance indicators for each subchapter. The 3 most important United Nations (UN) Sustainable Development Goals affected by each particular environmental theme are presented at the end of the subchapters. At Groningen Seaports, it is our ambition to give substance to these globally applied goals. The developments and measures described in the subchapters are expected to have an effect on the compliance with these UN Sustainable Development Goals.

More information about the UN Sustainable Development Goals can be found via the link below: https://www.globalgoals.org/

4.A Environmental monitor of the Eemsdelta area

This subchapter discusses the status of the Eemsdelta area (Delfzijl and Eemshaven) by means of various maps and graphs, with regard to environmental quality. The purpose of this subchapter is to closely examinate the current state of affairs with regard the cumulation of noise and odour compared to previous years. It describes the current environmental situation of the following parameters: Noise nuisance, odour nuisance, water quality and scarcity, air quality, and nitrogen emissions.

For the required data Groningen Seaports depends on the information of the local authorities that carry out measurements and maintain models, mainly the province of Groningen. The *Eemsmond-Delfzijl Structuurvisie* provides the environmental framework for the industrial area; the monitoring of this policy document was developed by the Province of Groningen, together with local municipalities, NMFG, the business community (SBE) and Groningen Seaports. Environmental data has been processed and presented on the website "Staat van Groningen", see the link below for more information. As it is made redundant by the development of this joint data platform, it was decided that Groningen Seaports will abandon its internally developed environmental dashboard.

Website Staat van Groningen: https://destaatvangroningen.nl/milieumonitoreemsdelta.html

4.A.1 Noise nuisance

The Eemsdelta area has an accumulation of noise sources due to the concentration of different noise-sources like industry, shipping, road traffic, helicopters and wind energy. This can cause significant noise pollution in some places. The matter therefore requires an area-oriented approach to the aspect of noise exposure. For the same reasons, the Province of Groningen has set a limit of 65 dB to the cumulative noise impact (L_{CUM}) in the Structural Vision. Measurements are carried out by the municipalities. The suitable indicator for the measurement of nuisance is the number of dwellings per class of the cumulative noise level. The maps and tables hereunder are used to keep track of the consequences of certain developments and whether an acceptable living environment for the residents of the area remains in place. The cumulative noise levels are monitored using models. Only dwellings that are susceptible to suffer relevant levels of noise exposure are included. In consequence, it was decided to only include dwellings within a distance of 1500 meters from the wind farm areas. As previously mentioned, no dwellings may be exposed to an L_{CUM} higher than 65 dB. To guarantee this, companies have the obligation to apply the best available techniques to prevent unnecessary burdening.

Environmental performance indicator:

Figures 3a and 3b show the cumulative noise exposure for Delfzijl for 2018 and 2020 respectively (these are based on future reservations in addition to the current permits); Figure 4a and 4b do the same for the Eemshaven. Maps are included for both measurement years in order to facilitate comparison.

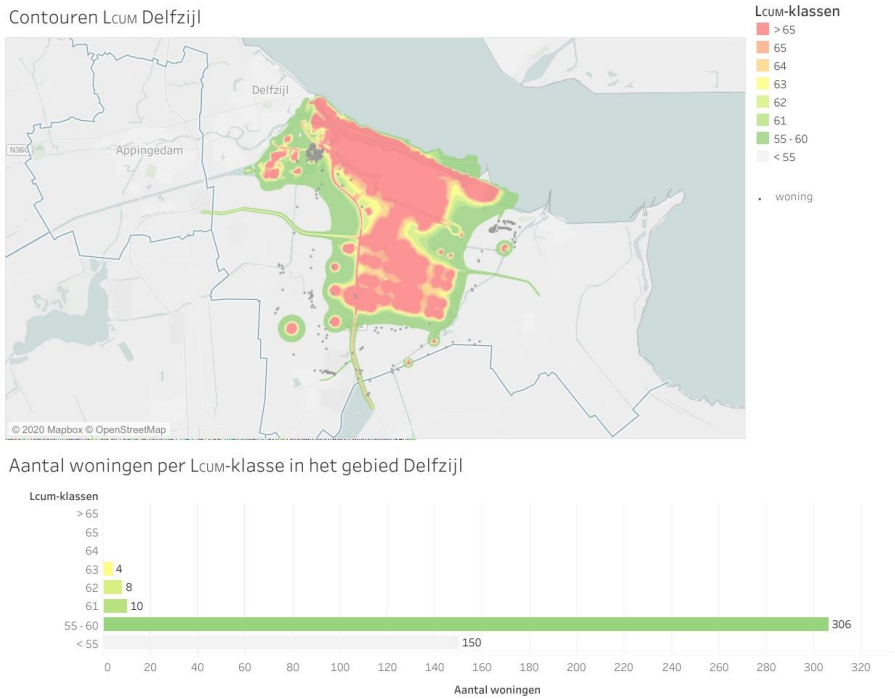


Figure 3a: Cumulative noise exposure Delfzijl (2020)

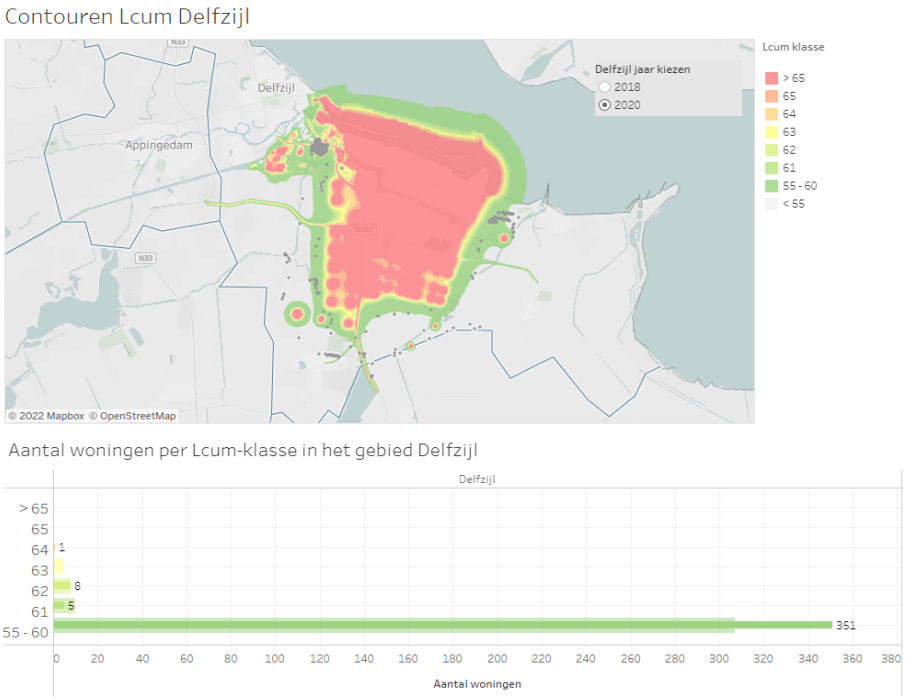


Figure 3b: Cumulative noise exposure Delfzijl (2020)

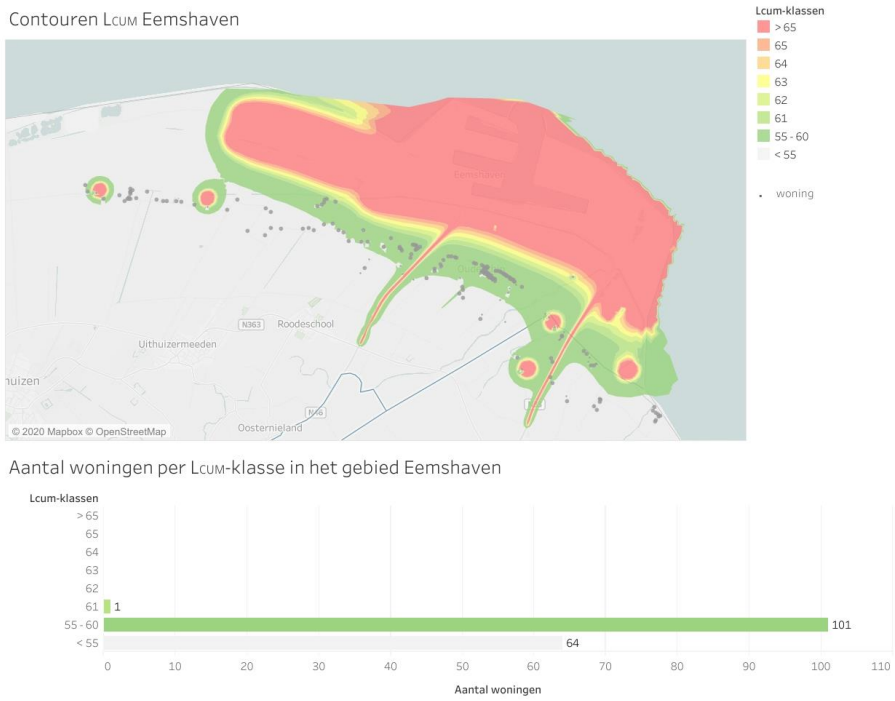


Figure 4a: Cumulative noise exposure Eemshaven (2018)

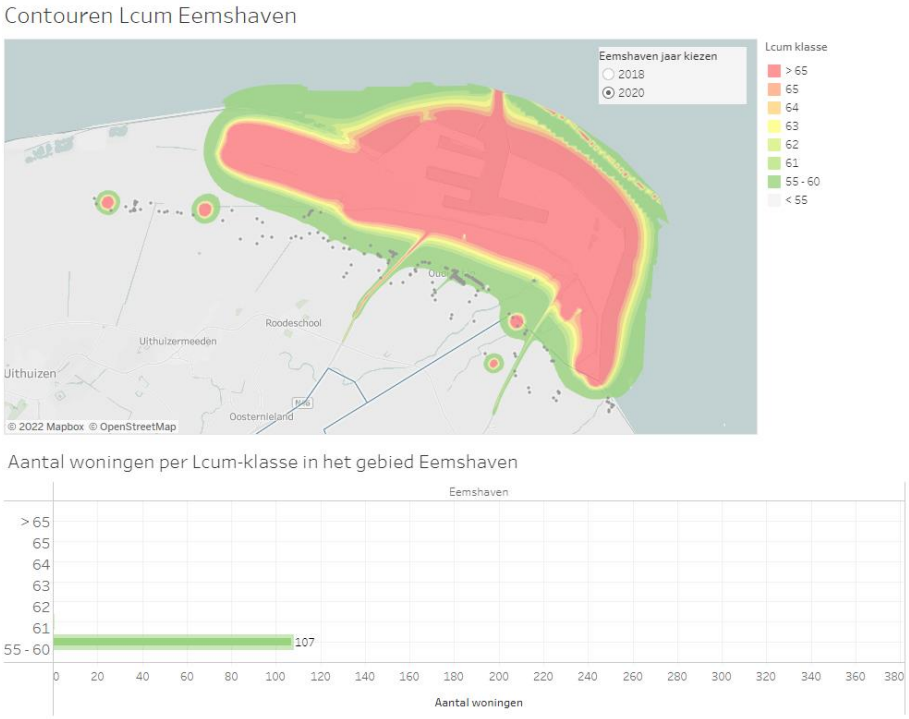


Figure 4a: Cumulative noise exposure Eemshaven (2020)

The Eemsmond-Delfzijl Structural Vision determines that dwellings should not be exposed to a higher cumulative noise level (L_{CUM}) than 65 decibels (dB). New provincial regulations allow for compensation between areas. This means that there can be an increase in the maximum dB threshold at specific plots of land if other plots have their maximum dB threshold reduced. The indicator used to verify compliance to the noise limitations is the number of dwellings per class dB L_{CUM} 55-60, 61, 62, 63, 64, 65, >65 dB, per area. The maps above show the calculated cumulative noise levels for industry, wind farms, shipping, rail, air and road traffic in Eemshaven and around Delfzijl, with reference dates at January 1st, 2018 and January 1st, 2020, but including reservations for the future. For companies and wind turbines, calculations account for the amount of noise that may be produced according to the permit. Industrial noise is standardised on a daily average. This means that calculations are based on the maximum average amount of noise that may be produced by industrial facilities on a day. For road and rail traffic, wind turbines and aircraft, the calculations are based on annual averages. For ships, a differentiation is made between nest sound and other noise emissions, a calculation choice originating at Groningen Seaports that has been taken over by other ports in the Netherlands. Nest sound is the noise produced by moored vessels at the quay when no work is being carried out on the vessels and when no loading and unloading activities are taking place. The noise of nesting is the noise of diesel-driven aggregates and/or main engines producing electricity throughout the 24-hour period.

The graphs below the maps show the number of dwellings per class of cumulative noise exposure. In order to be able to follow the development properly, the 5 dB class below 65 dB has been subdivided into classes of 1 dB. The map shows that the 65 dB limit is not exceeded at any dwelling. Moreover, the comparison between 2018 and 2020 show that for both areas, the number of dwellings with an exposure to an L_{CUM} of 60 or higher has decreased significantly, as shown on figure 6.

In addition to monitoring based on 3D noise models, a noise measurement network has been realised. In 2018, four permanent noise meters were installed and a fifth installation has been placed in Uithuizermeeden in May 2020. Three are located near the Eemshaven and two near the Oosterhorn industrial estate. These measuring points are intended to follow the long-term development of noise. Figure 5 shows the locations of the noise measurement installations.

Figure 5: Locations of the noise-measurement installations in the Eemsdelta region

Environmental performance indicator:

Figure 6 below shows the moving average of noise exposure. This is the average noise present at the noise measurement location.

If the year has not yet ended, this is the value from 1 January to the current date. Because this value is an average, the noise levels at a certain moment or in a certain period can occasionally be higher or lower. The measured values are given in dB L_{den}. The L_{den} is the average of noise levels over the day periods (07-19 hrs), the evening periods (19-23 hrs) increased by 5 dB and the night periods (23-07 hrs) increased by 10 dB. Supplements of 5 and 10 dB in the evening and night apply because in general, noise is experienced as more of a nuisance during these periods. The maximum limit of 65 dB is based on annual average. The calculation model is used to check whether this is complied with and its results are presented in figure 6.

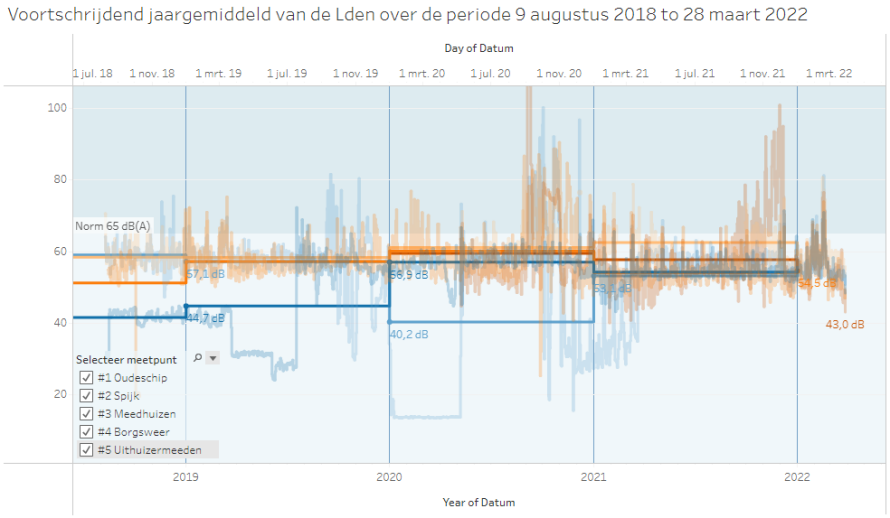


Figure 6: Moving yearly average of noise levels per measurement point in the Eemsdelta region

4.A.2 Odour nuisance

Since there are many companies located in the industrial areas of the ports of Delfzijl and Eemshaven, this can lead to complaints and reports about odour. Especially around the Oosterhorn industrial area, the production of chemicals can cause odour nuisance. In order to map this nuisance, research has been done by the province of Groningen into the odour contours of the region, as linked below:
Hinderapp Eemsdelta en Het Hogeland - Provincie Groningen

Environmental performance indicator:

The calculated contours of the cumulative odour load and the number of people bothered by the odour are shown in figure 7 below. Below this figure, the method and values are briefly explained. The map is based on figures from June 2018 and new data has not yet been made

available, but Groningen Seaports ensures that new developments and establishments operate within the legal restrictions.

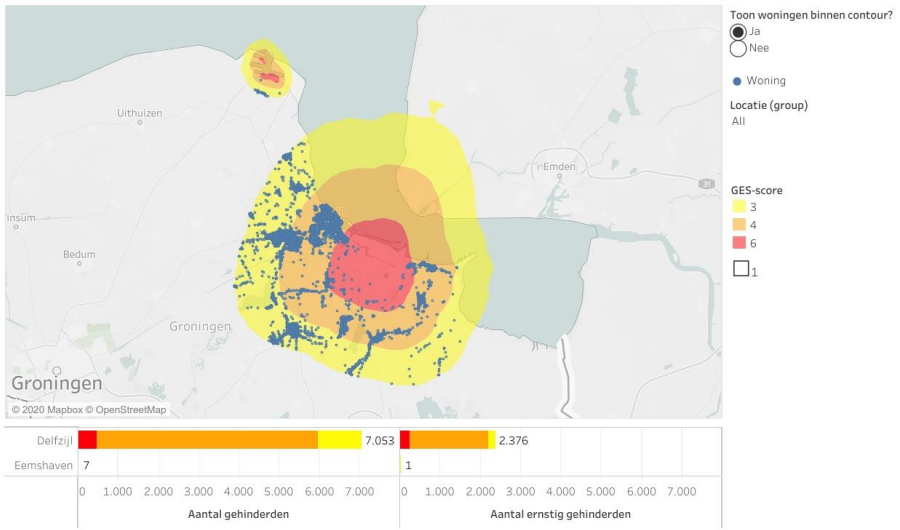


Figure 7: Cumulative odour exposure, including the number of exposed inhabitants of the region Eemsdelta

The map above shows the cumulative odour exposures of licensed activities at companies in the Structural Vision Area which fall under provincial authority. Most often, companies are located in each other's spread area and there is an accumulation of odour nuisance. This is expressed in a GES-class with a corresponding colouring and a percentage of annoyed and severely annoyed people. The odour policy is based on the GES-systematics. The GES stands for Health Impact Assessment and is used nationwide to provide insight into the environmental effects of industries on health.
The map shows a number of areas with an environmental health quality of GES-3 (rather poor) GES-4 (poor) and GES-6 (poor). The aim is for an environmental health quality of GES-1 around Eemshaven and GES 3+60% around the Oosterhorn industrial area near Delfzijl.
However, the licensed activities are not always carried out entirely by companies. It therefore does not reflect the situation at present, but the permitted situation, including potential future emissions. The situation is authorised, so any company in the region could develop activities in the future, using its authorised space. The table below the map shows for each area the number of people exposed and severely exposed per GES-class. The number of exposures is calculated with the number of dwellings, with an average number of inhabitants. The percentages of exposed persons are based on the GES-class. The map below shows the measurement locations around the Oosterhorn industrial area:

Figure 8: measurement locations for odour nuisance around Oosterhorn (TNO, 2020)

Odour reports

The following map and tables show the actual number of odour nuisance reports. The data used for these is from November 2019. As for the previous map, no new data has been provided over the last two years. The build-up of the graphs is detailed below figure 9.

Figure 9: Odour nuisance reports in the Eemsdelta region

The graph above shows the number of reports of odour nuisance in the Structure Plan area from 2017. The number of reports of odour nuisance in the Eemsdelta area, submitted via the provincial counter (or the counter of the Groningen Environmental Service), has decreased from 89 reports in 2017 to 80 reports in 2018. By keeping track of the actual number of reports per month, it may be possible to better deduce the causes of increases and decreases in reports.
The area east of Delfzijl receives the most reports of odour nuisance of the entire province. The table also shows that a relatively large number of reports of odour nuisance have been put in relation with the company ESD. In 2019, up to and including October, 38 odour reports had been submitted. A pilot project has subsequently been conducted to investigate the causes of odour nuisance and whether these can be reduced by encouraging interaction between companies and local residents. As part of this pilot, local residents were able to submit odour reports using an app (Luchtapp), starting 2019.
Most of the reported odour nuisance proved to be caused by dust explosions at ESD. In 2021, the number of dust explosions has been sharply reduced with prevention measures, resulting in a very substantial reduction in odour nuisance. In 2019, there were still 52 dust explosions while in 2020 there were only 6. From July 2020 to July 2021, not a single dust explosion has been recorded.

Air (odour) app

In reason of the strong local odour exposure, the “Luchtapp” pilot focuses on the industrial area around Oosterhorn and was conducted among 48 local residents and 4 companies in the area. In the Luchtapp, local residents can report odour nuisance in the Oosterhorn area. In addition, a measuring network has been set up. This will measure the air quality (see also chapter 5.A.4). From the beginning of January 2019, the measurements of the Monitoring Network could be actively consulted by the participants via the Luchtapp. Here, too, there appears to be a downward trend.

The Luchtapp is the first web application that works with a wind rose. The wind rose method is a method by which companies can be designated as a possible source of odour nuisance. The companies receive a message through the Luchtapp and are then considered “candidate”. This is done by performing a calculation based on the location of the reporter, the location of a company and the current wind direction. If they are candidates, they can claim or reject notifications and also provide an explanation. They can also distribute a pre-announcement to warn the surrounding area about possible odour nuisance.

The 2 figures below (Figures 10 and 11) are measurement results of the Luchtapp. The data is from December 2019. New data is being processed by the province of Groningen. Specific data is available for Oosterhorn via the link below the figures hereunder. The first figure shows the number of notifications and the percentage of notifications per odour category. The second figure shows the locations from which the report was made including which odour category it concerns.

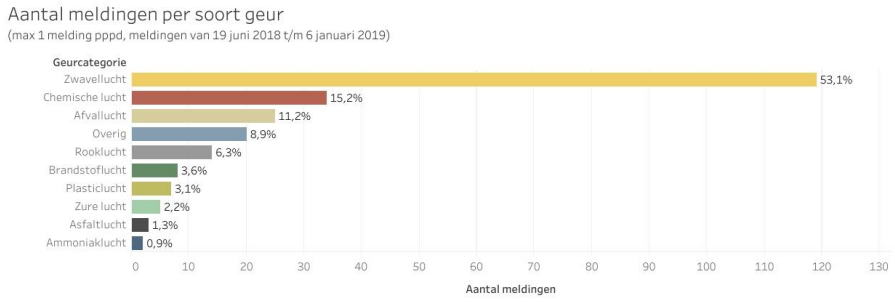


Figure 10: Odour reports per odour category in the Eemsdelta region

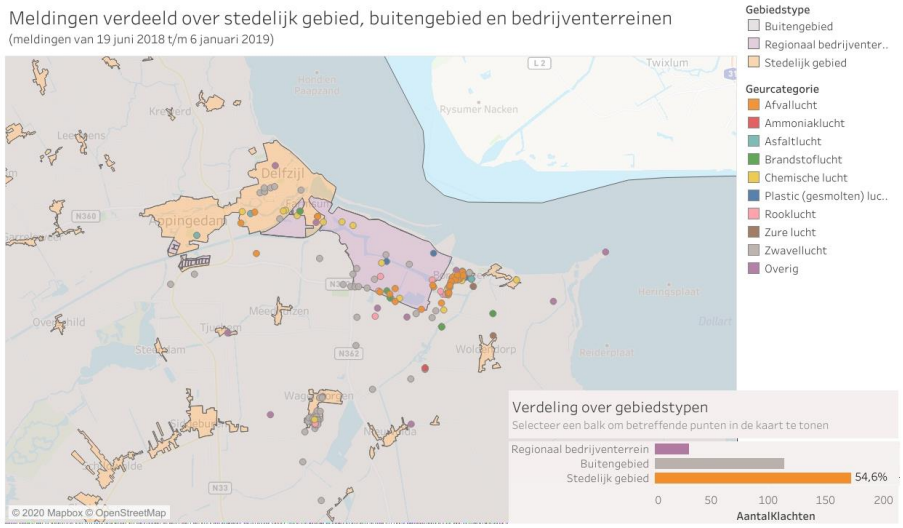


Figure 11: Locations of reports and odour categories in the Eemsdelta region

For more information, maps and charts about cumulative odour exposure, the number of exposed, reports and results of the Luchtapp, see: [Hinderapp Eemsdelta en Het Hogeland - Provincie Groningen]

4.A.3 Water quality and water scarcity

This subchapter discusses water quality and water scarcity in the Eemsdelta region and the industrial areas within Groningen Seaports' management areas. The use of residual water and industrial water is described in chapter 5.5.3.

An exploratory study on water purification executed in cooperation with Wetsus and Northwater has concluded that centralised purification is not feasible with the currently used biological process. The removal of metals therefore still takes place at the individual companies themselves. There is a possibility that a trial or research will be set up at a later stage to investigate this further, especially once Northwater will finish its new purification installations.

Many companies in the Oosterhorn industrial area are connected to the ZAWZI, operated by Northwater since 2008 (except companies that still have their own waste-water facility). This concerns 30 companies in the area, where the waste-water is treated by the ZAWZI. After treatment of brine wastewater from the companies, using a biological biomass process with active sludge flocks in the ZAWZI, this water is discharged into the Zeehavenkanaal. By commissioning the ZAWZI, the polluted brine wastewater (which has significantly higher salt concentrations than seawater) is purified in a sustainable way, so that the clean water can be responsibly discharged into the sea. In the past, industrial brine wastewater was discharged into the surface water (Zeehavenkanaal) by several companies, which led to excessively high salt concentrations in this surface water. In addition, the collective treatment of brine waste water in the ZAWZI saves on individual investments by the companies. Groningen Seaports facilitated the pipeline system for the companies so that they could be connected to the ZAWZI. Now, Northwater is planning to expand its purification system with a number of installations that are better suited to clean specific types of waste water.

The hot and dry summers of 2018 and 2019 have shown that water scarcity affects the business climate for industry in the Eemsdelta region. The province of Groningen has the policy that drinking water should not be used in industry. Chapter 5.5.3 describes Groningen Seaports' actions and plans towards this policy. The combination of scarcity in dry periods and this policy results in a need to have sufficient water of industrial quality in other ways.

4.A.4 Air quality

NO_x and PM10

Air pollution usually involves dust particles and harmful gases such as nitrogen oxides (NO_x) and particulate matter (PM10). In order to limit the harmful effects of air pollution, the government sets limit values for the concentration of such substances in the air. In doing so, the government weighs up the protection of public health and ecosystems, and economic interests. The province of Groningen aims to achieve a GES score of 4 or better (lower). With a GES score of 4 the value of nitrogen oxides and fine dust remains below 20 µg/m³, well below the limit values of 40 µg/m³. The Environmental Impact Report (EIA) shows that in 2016 in the Eemsdelta region the concentration of nitrogen oxides was mostly around 10 µg/m³, with some spots reaching a maximum of 15 µg/m³. As for particulate matter, the maximum concentration in the entire area is 20 µg/m³. This is well below the standard and barely higher than the normal background concentration of these substances. The EIA shows that due to current developments the concentrations in the Eemsdelta area will decrease in 2025 compared to the year 2016. This is confirmed by the graphs below, which show a clearly decreasing trend of emissions, with a particular acceleration in the province of Groningen over the last year. The maximum concentrations of NO_x in a large part of the planning area amount to a maximum of 10 µg/m³, while only a small part at the Oosterhorn industrial site has a maximum NO_x concentration of 15 µg/m³. In all cases, the standard maximum of 40 µg/m³ is met by far. The maximum concentration of particulate matter in the entire area is 20 µg/m³, except for a section near the Eemshaven, where the maximum concentration of

PM10 is 15 µg/m^3. Here too, values are well below the standard maximum of 40 µg/m^3. However, the decrease in emissions is expected to be lesser for the Groningen Seaports management area as compared to the province-wide developments, which has to do with an increase in industrial activity in the area. In fact, the emissions per company are decreasing for both new and established companies, but this decrease in individual emissions is counteracted by an increase in the overall number of establishments. In consequence, emissions are expected to stabilise for the next years.

Environmental performance indicator:

Figure 12 displays the values of population-weighted exposure to nitrogen oxides and particulate matters in the province of Groningen and in the Netherlands.

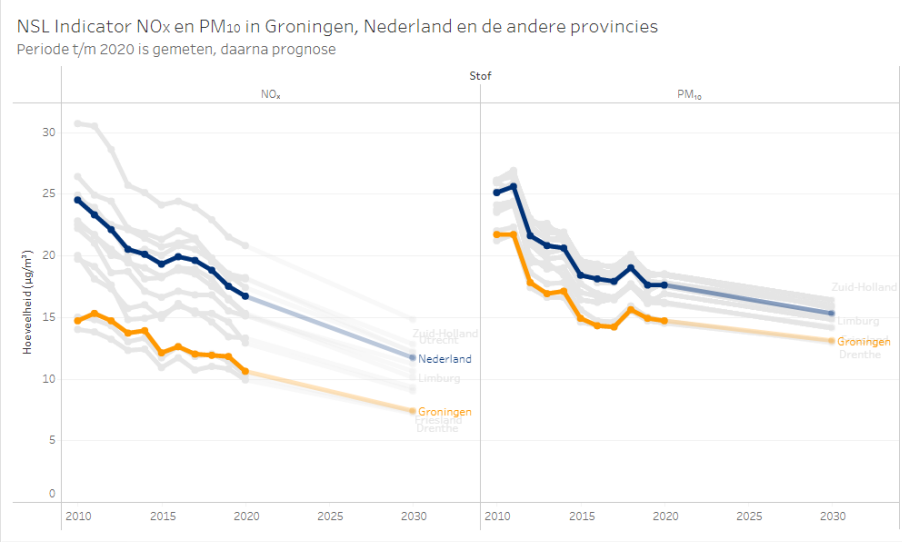


Figure 12: Population-weighted exposure to nitrogen oxides and particulate matters in the province of Groningen and in the Netherlands (2020)

The National Air Quality Cooperation Programme (NSL) originally aimed to ensure that the Netherlands would meet the European limit values for nitrogen oxides and particulate matter on time (in 2015 and 2011 respectively). To this end it monitored the air quality nationwide. The NSL ran until 1 January 2017, but has been extended until the new *Omgevingswet* takes effect (expected for the 1st of January, 2023). The goals of the NSL are monitored nationwide by the Monitoring Bureau of the Ministry of Infrastructure and the Environment. Nitrogen oxides (NO_x) and particulates (PM10) have the greatest impact on air quality in the Netherlands. Monitoring of the NSL is coordinated by the National Institute for Public Health and the Environment (RIVM). The province of Groningen, like the other implementing authorities, provides relevant local and regional information for the national monitoring. The graph showing the population-weighted exposure to nitrogen oxides and particulate matter is used to monitor progress towards the NSL objectives for these substances. This is an annual average concentration.

Agreements were made in 2015 with Groningen Seaports, SBE (cooperation of enterprises Eemsdelta) and NMFG (Groningen Federation for Nature and Environment) about the area-specific elaboration of the provincial environmental policy for NO_x and heavy metals, and are combined into the Integral Environmental Policy (IMB) for the Eemsdelta region.

As part of this, the following agreements have been made:

- Nitrogen oxides: Groningen Seaports will monitor the emission of NO_x as well as the reduction of CO_2 within its energy-saving programme, in the form of a pilot project at three companies. Given the developments in the field of the PAS ruling and the nitrogen crisis, the effects of nitrogen oxides on the environment is discussed in more detail in the following section 5.A.5 Nitrogen.

- Heavy metals: A study is being conducted into the effects of heavy metals on nature and the environment in the Eemsdelta. Based on the analysis of research results, a monitoring programme will be set up (see below).

- Monitoring network: A monitoring network is being prepared. The aim is to objectively and independently measure the air quality and odour-causing substances in and around the Oosterhorn industrial area, in order to gain insight into the air quality and odour nuisance around the area (see section 5.A.2 Odour nuisance).

Heavy metals

From 2010 onwards, the development of emissions into the air and precipitation of arsenic, lead, cadmium and mercury from companies in the Eems-Dollard area have been monitored. It is necessary to keep in check the influence of the industry's contribution on the total presence of these substances in the Eems-Dollard area, because the Eems-Dollard region is a Natura-2000 area, which means that flora and fauna in this area have a protected status. The policy on "Substances of Very High Concern" (ZZS) requires a location- and situation-specific assessment for new initiatives and changes to permits. For each company, this involves looking at the emission of substances into the air and water in relation to their concentrations at ground level. Heavy metals count as so-called "Substances of Very High Concern" (ZZS). A number of companies in the Eemshaven and around Delfzijl emit heavy metals into the air and water. There are various reasons for the presence of heavy metals in the Eems-Dollard area. Companies in the Netherlands and abroad, but also ship and air traffic contribute to the contamination of this area via the North Sea, the Eems and the surface water in Groningen.

Environmental performance indicator:

The tables in figure 13 show the total emission of heavy metals in the surroundings and which percentage is deposited into the water of the Eems-Dollard area.

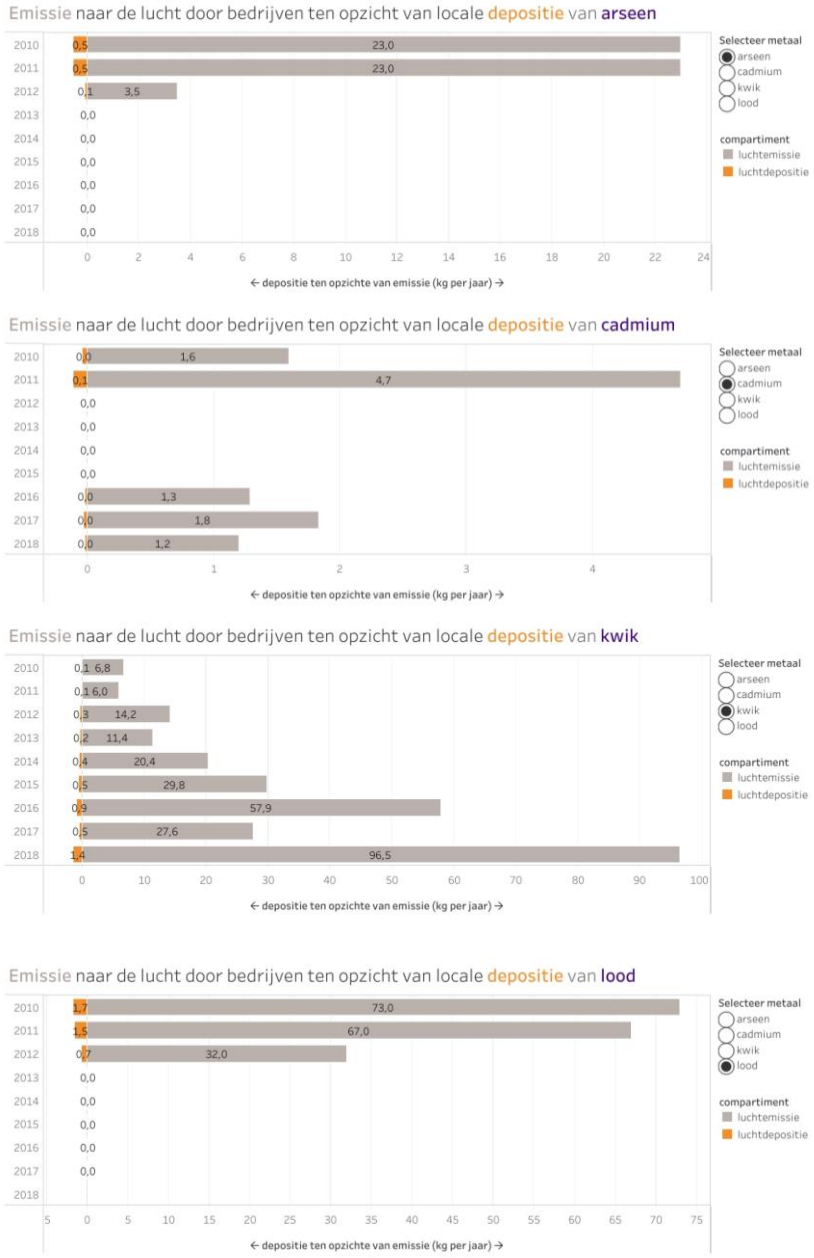


Figure 13: Emissions from enterprises into air, compared to local deposition of heavy metals in the Eemsdelta region (Last updated in 2018)

Environmental performance indicator:

The graph in figure 14 represents the development over multiple years of the total contribution of enterprises per metal. This contribution thus also accounts for emissions into water and deposition on water from the air. The most recent available data is from 2018.

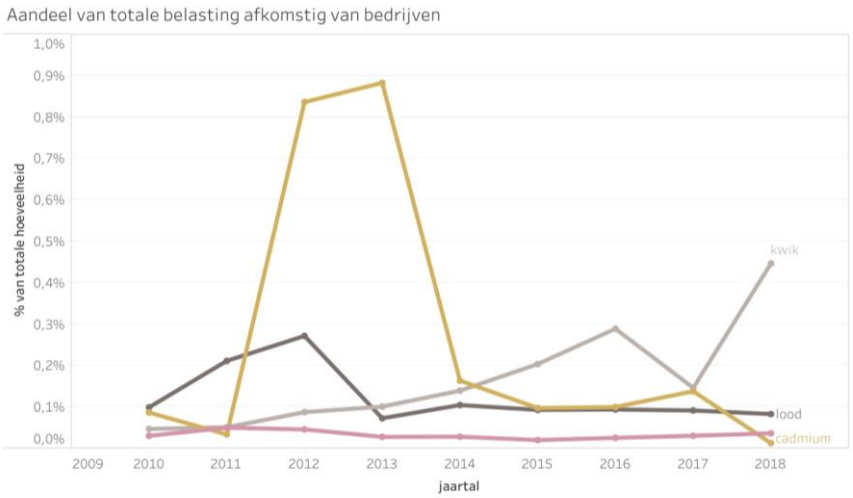


Figure 14: Share of heavy metals originating from enterprises in the Eemsdelta region

The above data shows that only a small proportion of the emissions of the depositions in the Eems-Dollard region originates from companies in the Eemsdelta. The quantity of heavy metals which eventually ends up in the water of the Eems-Dollard is therefore very small in relation to the total quantity from various sources. The graph in figure 14 shows that the contribution from companies (via water and air) has been fairly stable since 2014, with the exception of mercury, where the percentage of mercury emissions from companies has increased slightly in recent years. In total however, the emissions from companies amount to less than 0.5% of the total load in the area.

This subchapter focused on the emissions of nitrogen oxides, particulate matter and heavy metals into the air and their impact on the region. The emission of CO_2 in Groningen Seaports' management areas is not discussed here, partly because this has no direct effect on the local living environment, but on a global level in the form of climate change. Therefore, the current status and future expectations for CO_2 emissions from Groningen Seaports are discussed in chapter 5.1.1. In general terms, Groningen Seaports, other partners and companies are committed to reducing CO_2 emissions in line with the National Climate Agreement of the Netherlands (2019) and the Climate Accords (2015, Paris; 2019, Madrid), as well as internal policy. The measures taken in various areas to reduce CO_2 emissions, such as increasing the share of sustainable shipping and renewable energy, are described per corresponding subchapter.

4.A.5 Nitrogen

On 29 May 2019, the Raad van State issued a ruling on the Programma Aanpak Stikstof (PAS), see https://www.raadvanstate.nl/programma-aanpak/. This ruling has had major consequences for various sectors in the Netherlands.

Procedures and permits

In order to apply for a nature permit, a calculation of the nitrogen emissions of a project is required. The national government has decided that from July 2021 onwards, a fixed distance limit of 25 kilometres will apply for all emission sources (housing, agriculture and industry/energy and infrastructure projects). Only the nitrogen precipitation caused by a project within 25 kilometres of a nitrogen-sensitive Natura 2000 area must be limited. Ecological research or nitrogen-reducing measures outside this zone, often involving low-level emissions at a great distance, are no longer necessary. For the effect of projects on the total national nitrogen precipitation outside the 25 kilometres, the national government takes (source) measures.

Companies in the Eems-Delta have no nitrogen-sensitive Natura 2000 area within 25 kilometres. This means that they no longer have to obtain a permit. Although the fixed distance limit for all emission sources has led to more clarity when assessing a permit application, there is still uncertainty about its legal tenability. A ruling on this from the Council of State is still expected.

Many companies within the Eems-Delta have reduced their nitrogen emissions to 0 in 2019, by internal offsetting, or in a few cases by external offsetting. Because of the continuing legal uncertainty, companies continue to make every effort to reduce their nitrogen emissions as much as possible.

Groningen Seaports can also assist companies with information about the requirements and with assistance to meet these in case of new establishments or expansions. Groningen Seaports helps with the purchase and transfer of the nitrogen permits and the necessary compensations.

Positive effects of nitrogen crisis

A positive effect of the PAS ruling is that companies have proven to be able to significantly reduce their nitrogen emissions in a relatively short period of time. This is partly arithmetical, as the companies used to keep wide margins and are now eliminating these margins. On the other hand, new techniques lead to significant emission reductions. Some factories are trying to switch to a completely zero-emission plant by using totally different techniques. This is particularly true of new initiatives that are still in the design phase. Realisation of these projects is still very uncertain however, because the business case is altering so quickly that economic feasibility is at stake. Companies like to make use of proven techniques. Nevertheless, a big leap forward can be seen in relation to technological innovation, which will eventually make it possible to further green the industrial areas of Groningen Seaports. In other words, this means that the industrial area as a whole, Oosterhorn and Eemshaven combined, will emit fewer emissions.
Together with the provincial authorities of Groningen, involved municipalities, the E&E in balance platform and the local nature and environmental organisations, Groningen Seaports

is intensively investigating whether a regional approach can be made for the province of Groningen. The parties are willing to develop such an approach and are thinking together about good and useful initiatives for the entire Eemsdelta region. However, this is a long-term process. Groningen Seaports also tries to bring various parties together and give information and presentations. This is especially necessary in order to dispel misunderstandings about the nitrogen crisis. In addition, there is a lot of consultation with other ports in the Netherlands. Solutions are being sought in terms of mutual support. In addition, the BOZ (Branche Organisatie Zeehavens) is lobbying the relevant ministries in The Hague regarding the nitrogen crisis.

Environmental performance indicator:

Groningen Seaports tries to keep stakeholders and interested parties informed about the developments and effects in this area within the framework of communication and information. The Industrietafel Noord-Nederland also keeps track of nitrogen emissions in the region and their figures are displayed below:

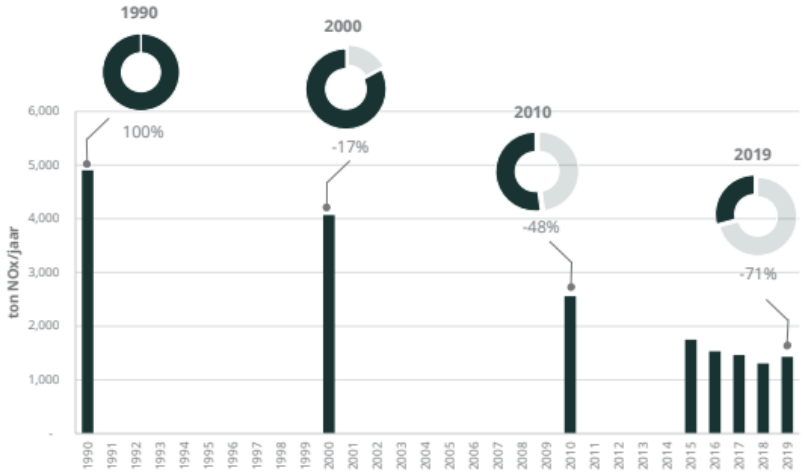


Figure 15a: Nitrogen emissions for the industrial sector in the Northern Netherlands (Industrietafel Noord Nederland)

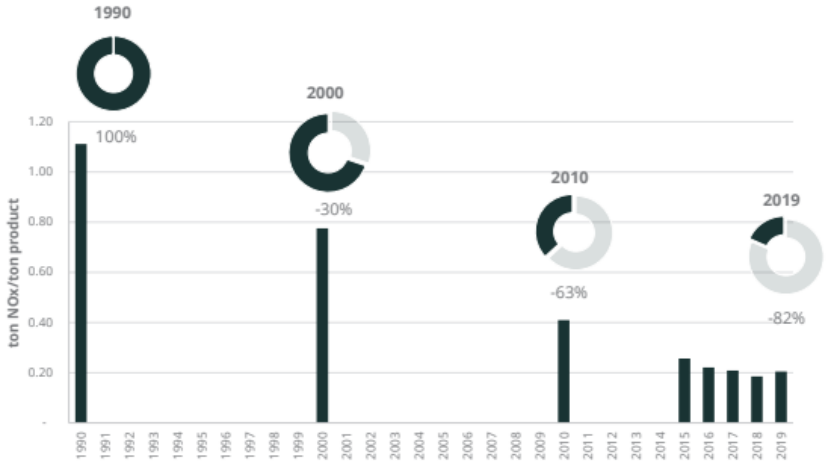


Figure 15b: Nitrogen emissions per tonnes of production for the industrial sector in the Northern Netherlands (Industrietafel Noord Nederland)

Action: Groningen Seaports develops its utilities to support alternative energy sources (such as steam for instance) that contribute to the reduction of emissions

4.1 Renewable energy

Companies and customers of Groningen Seaports increasingly want to buy local green power when establishing themselves at a location in the management areas of Groningen Seaports. Existing companies also ask to switch to green power. This type of electricity is purchased by means of GoO certificates, Guarantees of Origin certificates, in principle not linked to a location and freely tradable in the EU. Groningen Seaports aim is however to keep these certificates local. This means that green power that is delivered in Groningen is effectively produced in Groningen. This local green power has important marketing value and constitutes a location factor for companies, such as data centres. The demand for green locally generated power by companies in the region is considerably higher than the supply at present. To address this, Groningen Seaports is fully committed to realise various green energy projects and to keep the GO certificates from these projects available locally.

4.1.1 CO_2 reduction

At the moment natural gas (natural gas from Groningen and high calorific gas) is still being used as a raw material within the Groningen Seaports management areas. Groningen Seaports is working out alternatives to no longer use natural gas, so that emissions will decrease and the use of fossil fuels will gradually stop. Correspondingly, over the past 30 years (since 1990), CO_2-emissions per tonne of product from industry in the Northern Netherlands have decreased by 54% (see graph below). In absolute terms, there is a slight stabilization of the emissions over the last year, but a large decrease relative to the first measurements in 1990. Moreover, the current decrease is intended and expected to be continued over the next years and into the next decade. It is foreseen that in 2030 absolute CO_2-emissions will decrease by 52-62% compared to 1990. With these figures, the region is very close to already complying with the Paris objectives for 2030.

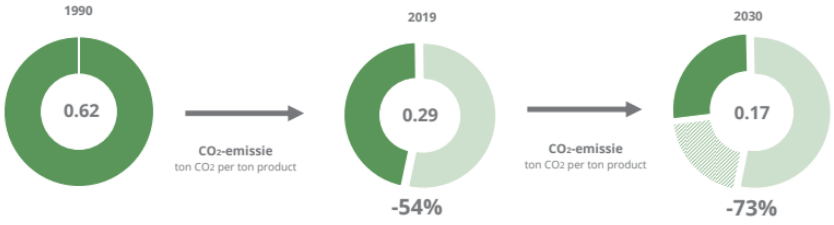


Figure 16: CO_2-emissions per tonne of production for the industrial sector in the Northern Netherlands in 1990 and 2019, and expectations for 2030 (Industrietafel Noord Nederland, 2020)

Figure 17: Absolute CO_2-emissions in kilotons for the industrial sector in the Northern Netherlands in 1990, 2017, 2018 and 2019 (Industrietafel Noord Nederland, 2020)

The "*Industrietafel Noord Nederland*" was established in order to come to national climate and energy agreements. Groningen Seaports is chairman of the Industrietafel Noord-Nederland. It discusses goals, actions and measures concerning CO_2-emissions reduction and sustainability for industrial businesses in the Northern provinces. The vision and elaboration have been drawn up in a report called *Industrieagenda Noord-Nederland*. The CO_2 reduction targets of the Industrietafel Noord-Nederland (Figure 18) are leading for Groningen Seaports' plans and policies, since Groningen Seaports is an active participant in the Industrietafel Noord-Nederland and the Hydrogen investment agenda. In addition to these platforms, the national Climate and Energy Agreements and associated reports are also leading policy documents. These directly translate into Groningen Seaports' internal policies and directives. Groningen Seaports encourages the development of renewable energy production within its management area and is currently drafting a risk-assessment for its energy transition. Groningen Seaports further stimulates the reduction of CO_2 emissions by exerting influence on the development of as many offshore wind farms as possible and by participating in the NortH2 consortium. Many of these developments are described in this chapter. Groningen Seaports is therefore making efforts in various areas to achieve the 2030 objective. This objective is to achieve 95% CO_2 reduction by 2050, notwithstanding growth in employment, based on a strong northern industrial cluster in which all relevant sectors participate.

The updated report of the Industrietafel Noord-Nederland has been issued in 2020 and is consultable via the link below. The status, actions and activities already undertaken and initiated to reduce CO_2 emissions in order to comply with the objectives of the Industrietafel Noord-Nederland have been collected from the companies involved and included in the report, together with future plans.

2020 report of the Industrietafel about reduction and related objectives:
https://www.groningen-seaports.com/wp-content/uploads/Voortgang-Regioplannen-2017-2019-2030-Industrietafel-Noord-Nederland-mei-2020.pdf

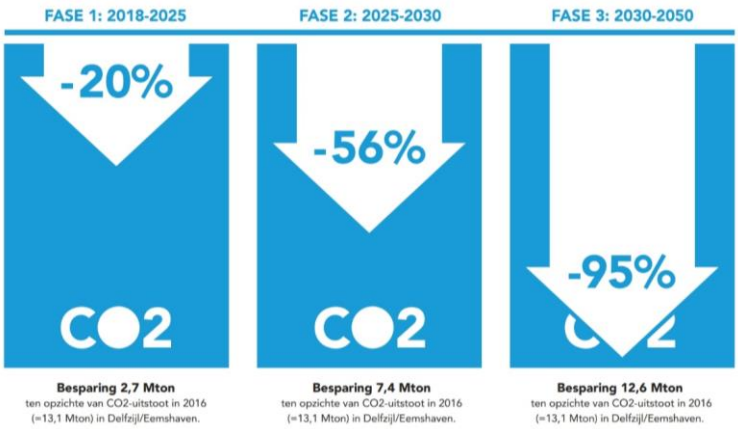


Figure 18: Established CO_2 reduction goals (Industrietafel Noord Nederland)

Action: Groningen Seaports develops a risk-based assessment framework for scaling up renewable energy in the industrial area.

CO_2 capture, storage and utilization

Groningen Seaports is trying to encourage the organisation of CO_2 capture. Both in Delfzijl and in Eemshaven an inventory is being made as to whether capture, utilization and storage is possible or can be developed. Currently Groningen Seaports is looking for applications of CO_2 capture in the (blue) hydrogen chain, as well as in other industries.
At the moment there is an investigation on a new pipeline between EEW and BioMCN for this process. In Delfzijl, CO_2 (including biogenic CO_2) is mixed into products such as methanol. When sufficient (green) hydrogen is present, a possible cycle can be closed. This means that CO_2 emissions are reused in the process.

Action: In cooperation with the companies involved, Groningen Seaports is investigating the possibilities of capturing, storing and utilizing CO2 on a larger scale.

Energy scans

Groningen Seaports carries out energy studies at a large number of companies, with the aim of achieving relatively large energy savings. One study is now being completed, and a few energy studies are still possible. At several companies this has led to actual energy savings. Groningen Seaports facilitates companies in this on the basis of a “No cure, No pay” method. Under this program, Groningen Seaports proposes an investigation on potential energy savings to industrial companies with the following deal: Groningen Seaports commits itself to come with a plan that saves a pre-defined percentage of its energy consumption, and this is paid for by the company. If the resulting plan does not exceed the set percentage of savings, the payment obligations of the company are cancelled. Other provinces in the Netherlands find the concept very interesting and some have therefore also partly adopted it.

4.1.2 Solar energy

Met opmerkingen [BvdK1]: @Martijn Pilon wil jij dit document plaatsen op de website als vervanger voor het document Ecoports publieksversie 2021-2023?

Since 2018, Groningen Seaports participates in the realisation of solar parks, whereby Groningen Seaports itself has a share of approximately 20%/25%. Through Groningen Seaports' participation, the feasibility of solar parks in the region is increased. From the beginning Groningen Seaports buys into a solar park and participates in its development. As co-owner of the park, Groningen Seaports has more control over the certificates to be sold with the aim of linking them to Groningen Seaports' management areas. Three new solar parks were developed over the last years or are currently in development. A unique project in the Netherlands is the large-scale solar park that is being realised on an inner dike in Eemshaven (Kwelderdijk). The solar dyke stretches about 5 kilometres and permits double use of its space. All three parks were realised around the end of 2020, with a combined capacity of 39,6MW. Groningen Seaports is co-owner and shareholder of these solar parks, which means that compared to previous projects, Groningen Seaports now plays a more active role, since it now participates in the development of those solar parks. This increases the chance of success of those projects and keeps the revenues within the region.

Overview of solar energy in Delfzijl and Eemshaven

Another example of locally generated green solar energy that flows back to the region by its linkage to local customers is Google's data centre in Eemshaven, which buys all locally generated power from Sunport Delfzijl with a contract for 10 years (and is doubling its data storage). The own office of Groningen Seaports, similarly buys all power from solar park Geefsweer (Solarfields/Vattenfall). In addition, Groningen Seaports supports partners such as Vattenfall at the new solar park on the Kwelderdijk (Eemshaven) to sell the certificates to local customers.

Environmental performance indicator:

Name/location	Surface	Capacity	Number of solar panels	Status
SunPort Delfzijl	30 Ha	30,8 MW	123 000	Operational
Geefsweer	7 Ha	7,3 MW	28 000	Operational
Oosterhorn-Valgenweg	15 Ha	17,4 MW	64 000	In development
Heveskeslaan	14 Ha	16,4 MW	58 000	In development

Table 3a: Overview current and planned solar parks Delfzijl.

Name/location	Surface	Capacity	Number of solar panels	Status:
Kwelderdijk	7 Ha	5,8 MW	18 500	Operational
Vattenfall	3,4 Ha	5,7 MW	17 727	Operational
Vopak	19 Ha	25 MW	80 000	Operational
Engie	4 Ha	4,2 MW	15 000	Operational

Table 3b: Overview current and planned solar parks Eemshaven.

- Current total combined capacity solar parks Delfzijl and Eemshaven: 78,8 MW.
- Total expected combined capacity solar parks Delfzijl and Eemshaven after realisation projects: 112,6 MW

As space within the Groningen Seaports management is increasingly demanded, Groningen Seaports is looking to take part in investments in solar energy elsewhere. Moreover, Groningen Seaports investigates the possibilities for solar energy on roofs of buildings within the management area. For many companies, the roofs aren't correctly outfitted to realise this, but Groningen Seaports wants to encourage it where it is possible, especially for new constructions. Unfortunately, the roof of the Groningen Seaports office building is unsuitable for such an initiative because of potential interference with the nautical service radar facilities installed there.

Action: Groningen Seaports will finalise the development of the solar park Valgenweg

4.1.3 Wind energy

Dozens of wind turbines have been located on the Groningen Seaports site for many years, and the port also plays a prominent role in the development of offshore wind farms; not only during construction but also with regard to the subsequent maintenance of the wind turbines. Eemshaven is one of the most important offshore wind ports in the North Sea, partly due to its strategic location and partly to local expertise. With all these turbines, the Eemshaven adds a considerable amount of sustainable energy to the energy supply in the Netherlands. It is expected that the share of wind energy will continue to increase considerably in the near future and new business opportunities will arise. Moreover, a number of existing windmills within the Groningen Seaports area are being repowered, a process in which their energy capacity and durability are increased.

Groningen Seaports facilitates wind energy logistics projects in the port. Furthermore, Groningen Seaports strives to take an interest in the onshore wind parks, just like it does with solar parks. This is an important starting point for Groningen Seaports, because regionally generated sustainable energy is becoming more and more important as a location factor for new companies.

In addition, several studies in the field of wind energy are currently under development. The first of these is MARS4Earth (Modular Aerial Robotic Systems for Sustainable living on Earth). This is an ongoing four-year cooperation project of the Saxion University of Applied Sciences, NHM Stenden and Groningen Seaports (among others) which studies the use of drones to inspect and possibly repair wind turbines at sea. The plan is to test this at a pilot site in Eemshaven and the research has been started, supported by the new Droneport Eemshaven and executed by DroneQ Robotics. This may lead to optimisation of the maintenance of wind turbines and to a reduction in CO_2-emissions, because at the moment maintenance operations are carried out by ship mainly. Secondly, in collaboration with the University of Groningen, the SLOEP project (Service Logistics for Offshore Energy Production) investigates how the production and supply chain of wind farms can be optimised. This project is set to end in August 2022 and a list of their findings is available via the link below.

Service Logistics for Offshore Energy Production (SLOEP) | NWO

Further initiatives have been set up in relation to the environmental impact of wind turbines. Examples include the project Decom North, which deals with the integration of wind turbines into the circular economy (see 5.2.3), and a study on bird lethality, in which wind turbines are fitted out with a blade painted in black in order to reduce the amount of bird collisions (see 5.7.3).

Overview of onshore wind energy in Delfzijl and Eemshaven

Within the industrial area of Delfzijl, the construction of a new onshore wind farm (Windpark Oosterhorn) started in early 2020. The park consists of 18 turbines and has been completed in 2021. The revenues of its green electricity will contribute to the region and the local companies within the management areas of Groningen Seaports. The expansion of the existing wind farm Delfzijl Zuid has also been completed recently.
As wind energy technologies are in rapid development, in the Eemshaven, some of the turbines are being replaced by newer turbines with a greater capacity (repowering), in order to produce a greater wind energy yield.

Environmental performance indicator:

Name/location	Number of turbines	Total Capacity
Delfzijl Noord	19	62,7 MW
Delfzijl Zuid	34	75 MW
Delfzijl Zuid (expansion)	16	65 MW
Geefsweer	14	60,2 MW
Oosterhorn	18	75 MW

Table 4: Overview current and planned onshore windfarms Delfzijl

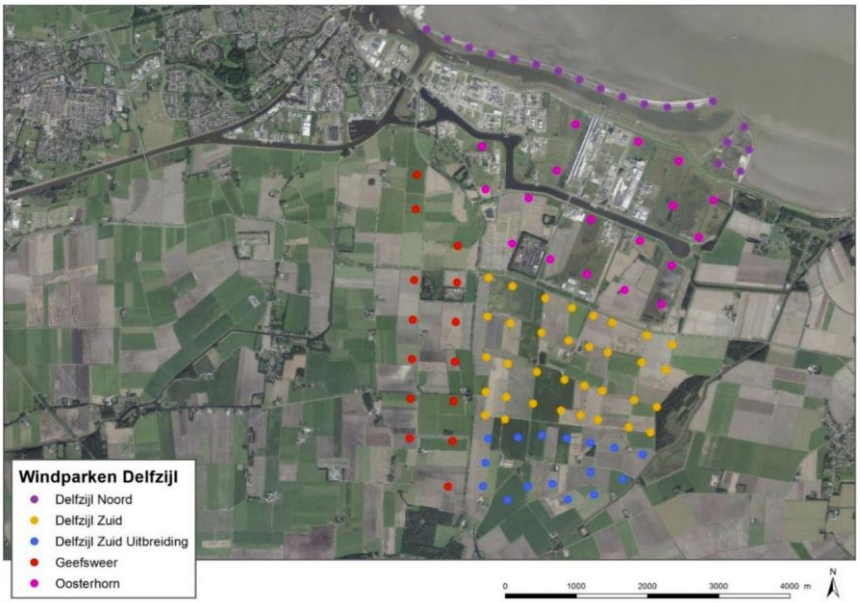


Figure 19a: Current and planned onshore wind turbines Delfzijl

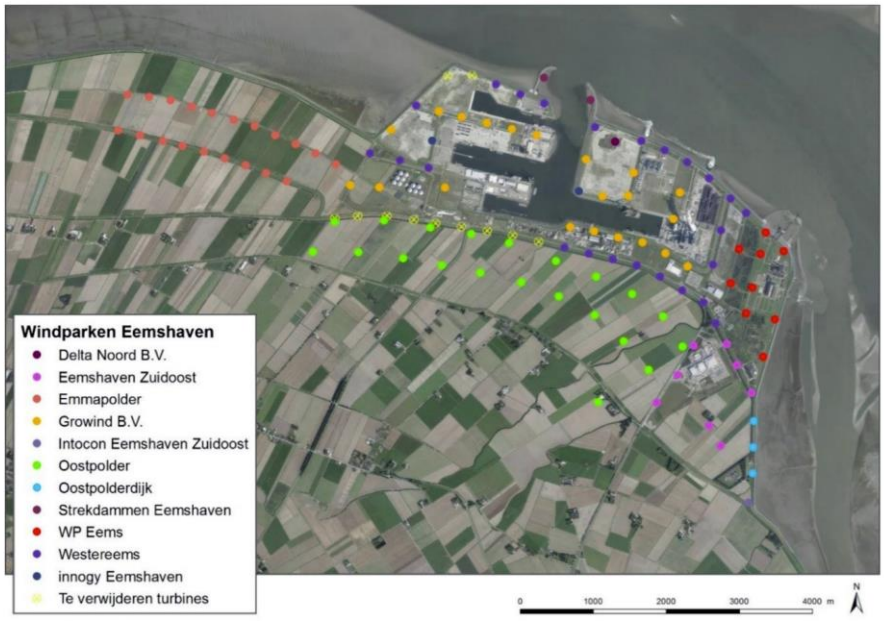


Figure 19a: Current and planned onshore wind turbines Eemshaven

- Current total combined capacity onshore wind turbines Delfzijl and Eemshaven: 414 MW.
- Total combined capacity onshore wind turbines Delfzijl and Eemshaven after realisation of projects: Yet unknown in reason of various factors that can influence the ultimate combined capacity.

Overview of offshore wind energy

Since 2009, the docks of the Eemshaven have played an important role in the assembly and logistical handling of wind turbines, resulting in an impressive track record of wind farms constructed via the Eemshaven: Alpha Ventus, Bard Offshore I, Borkum Riffgat, Borkum Riffgrund I, Trianel Windpark Borkum I, Global Tech I, Gemini, Gode Wind I & II, Veja Mate, Race Bank (UK), Nordsee One, Merkur Offshore, Borkum Riffgrund II, Hohe See, Albatros, Trianel Windpark Borkum II and Hornsea Two respectively. In addition, Eemshaven serves as an important base port for offshore wind turbines maintenance. Heliport Eemshaven is full in operation and by the arrival of the Offshore Wind Innovation Centre (OWIC), Cable Centre Eemshaven and a training centre of RelyOn Nutec the position of Eemshaven as offshore wind port is further strengthened. The Eemshaven has thus grown to become one of the most important offshore wind ports in the North Sea. An overview of the offshore wind farms is given in Figure 20 below.

The next wind farm to be installed via the Eemshaven is Kaskasi, located in the German part of the North Sea. This park is currently under construction and will have a total capacity of 342 MW. Its first monopiles have been installed in March 2022. Its turbines are expected to be put in operation towards the end of the same year. Buss Terminal Eemshaven will also play a role in the development of the new HKN windfarm off the Dutch west coast, and an expansion of the terminal is currently planned. Moreover, the Dutch government is appointing new areas north of the Wadden islands as potential wind farms. These wind farms are expected to be built via the Eemshaven and to be brought in connection with the hydrogen electrolysers there. Groningen Seaports is actively lobbying in favour of these developments. They are however still in their planning phases.

Action: Groningen Seaports is actively lobbying in favour of a 10GW production increase of wind farms in the North Sea in order to ensure renewable energy supply for green hydrogen production in the Eemshaven and wants to contribute to such developments with its harbour facilities. Groningen Seaports also dedicates its infrastructure at the Eemshaven to connect the supplementary offshore production to the national power grid.

Environmental performance indicator:

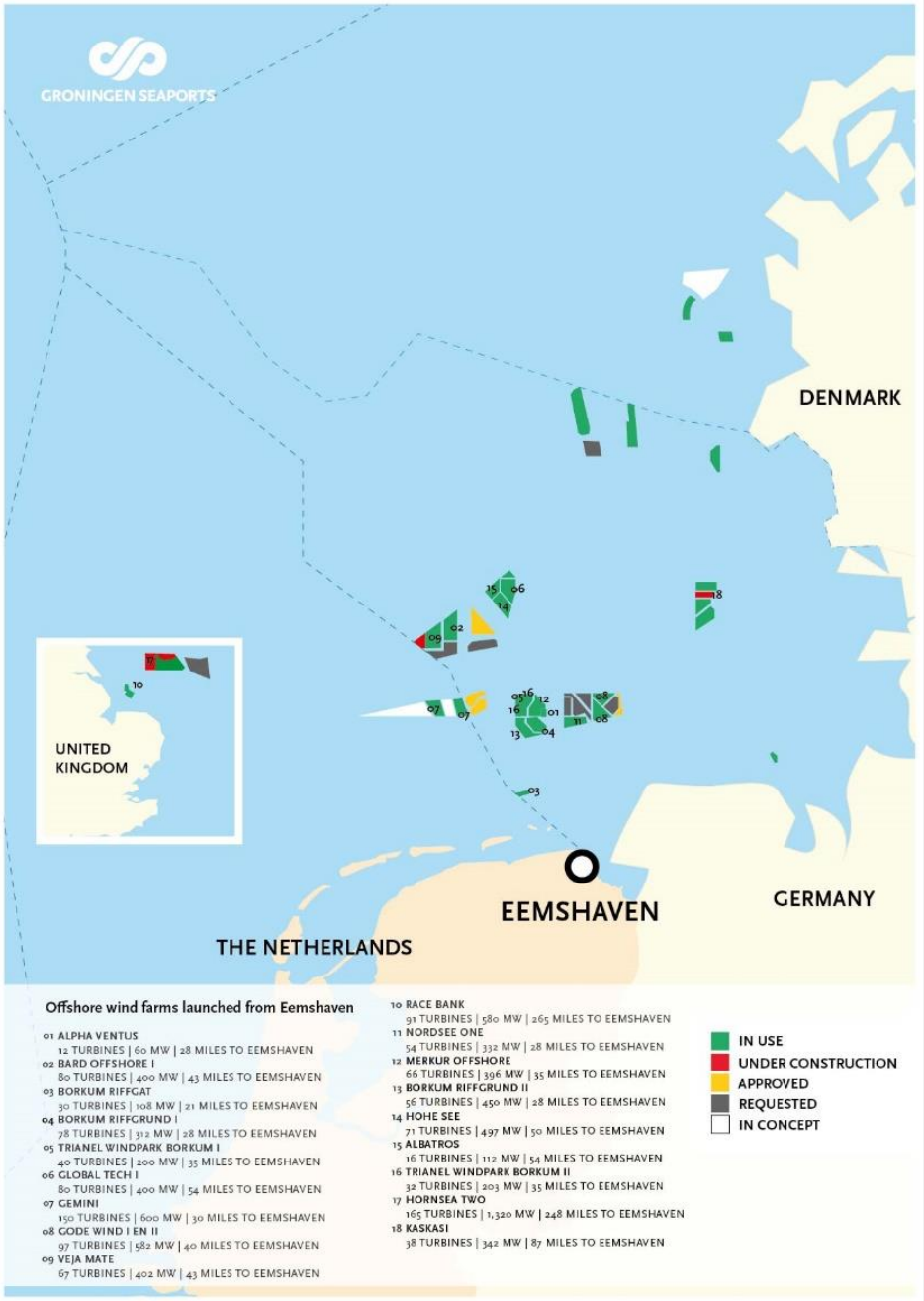


Figure 20: Offshore wind farms launched Eemshaven

4.1.4 Other sustainable energy sources

Energy from waste

EEW has been operational in Delfzijl since 2010. With now three waste incineration lines, approximately 576 000 tonnes of (industrial and household) waste and reserve fuels are incinerated by the company annually and converted into electricity (219 000 MWh) and steam (710 000 MWh). The steam and electricity output thus have significantly increased over the past years (185 000 MWh and 463 000 MWh respectively in 2019). With its activities, EEW contributes to a more sustainable living environment, as its production diminishes the need for fossil resources in the energy chain. In addition, nearby industry partners gain access to reliable and environmentally friendly energy.

EEW is currently expanding the Delfzijl site with a mono-silt incineration plant (SVI). This fourth line is only an SVI and differs from the first three in fuel, as it will run on sewage sludge instead of waste. It will have a capacity of up to 185 000 tonnes of steam per year. In addition, it is possible to recover phosphate from the fly ash after the incineration process. This project is based on a combination of the growing market demand for green steam, the demand for sales opportunities for sewage sludge and the recovery of phosphate. This is a more sustainable production of steam with a secondary fuel (such as sludge) instead of a primary fuel (such as gas) reduces greenhouse gas emissions. By creating the possibility of recovering phosphate from the sludge in the future, EEW wants to contribute to the realisation of the circular economy. The permits for this SVI line have been obtained in 2022 and the construction is currently under progression.
EEW has also announced its intention to capture the CO_2 from its combustion processes. This initiative has recently been coupled to the HyNetherlands consortium with OCI and Engie, and aims to develop, build, and operate one of the first large-scale industrial value chains in Europe for the production of e-methanol by combining renewable hydrogen and biogenic CO_2. Depending on the market opportunities and market demand, Groningen Seaports is aiming for an area-wide approach. Groningen Seaports has explicitly joined in to stimulate/facilitate CO_2 capture at several companies based on previous projects (see also chapter 5.1.1).

Biomass

The Eneco Bio Golden Raand bio-energy power plant has been in operation since 2014. It converts wood chips and waste wood into green electricity and green steam. Eneco Bio Golden Raand has a capacity of about 50 MW electrical and 135 MW thermal, making it 97% climate neutral. Every year, the power plant processes about 300 000 tons of waste wood that arrives by ship and truck in Delfzijl from the Netherlands and surrounding countries. Compared to the electricity production of an average power station, this wood-fired power station saves 210 000 tonnes of CO_2 emissions per year.
Biomass is available in many varieties. Many of them are questioned by nature and environmental organisations. This is partly justified, as plantations for biomass around the world threaten nature and food supply. That is why Eneco Bio Golden Raand uses waste wood from the B category. This waste wood comes from construction and demolition waste, bulky household waste and municipal waste centres, and is collected and processed into wood chips by specialised recycling companies. In 2015, the plant became the first in the world to obtain the Better Biomass certificate.

The impending establishment of a sawmill in the Oosterhorn area could be brought into the biomass value chain, as it will produce biomass material as a by-product. The by-product has a potential offset for the production of green chemicals. Construction is expected to take place in the course of 2023 and the sawmill should be operational in 2025 at the latest.
The Torrgas project aims to realise a commercial gasification plant and is equally based on residual flows of wood in Delfzijl. This installation produces syngas, green gas, carbon and steam based on torrefied waste wood with the aim of supplying green gas through the natural gas network, as well as steam to the local network. Gasunie is developing this installation in a joint venture with Perpetual Next.
Groningen Seaports has identified sugars as a suitable building block for a green chemical sector and it has potential to replace the traditional fossil resources. In order to promote this development, Groningen Seaports has actively facilitated the establishment of Avantium on its management area. Avantium is a company that processes industrial sugars into chemicals for the production of PEF. Cosun Beet Company (formerly Suikerunie) is equally investigating sustainable applications for sugar, and already produces a sustainable thickener from sugar beet pulp. Together with Cosun Beet company, Nobian, and Avantium, Groningen Seaports has drawn up a roadmap to 2030 or 2050 for the replacement of fossil resources with sugar within the chemical industry.

Since 2019, 15% of RWE's power generation is based on biomass (according to RWE's website). Groningen Seaports facilitated the construction of the biomass quay. As a result, coal usage and their consequent CO_2-emissions have been reduced. On an annual basis, the co-combustion of biomass saves 1 248 megatons of CO_2. RWE's ambition is to fully convert the plant into a biomass power station in the long term, when that becomes economically feasible, and the right permits are in place. As of now, the permits have been extended to 30%. In concordance with this development, Groningen Seaports expects the transport of coal towards the Eemshaven to decrease over time, while there will be an increase of biomass import. This also means that the transport ships will be smaller but have a more frequent schedule.

International Connections

Since September 2019, the so-called "Green cable" between the Netherlands and Denmark is available for the electricity market. The COBRAcable is an initiative of TenneT (NL) and Energinet (DK) and runs from the Eemshaven via Germany to Endrup (Denmark). The capacity of this connection is 700 MW. A similar cable (NorNed) of the same capacity is in use between Norway and the Netherlands. These cables allow to improve grid stability and to ensure that sustainably produced energy is not wasted but is optimally used in both countries, allowing for a lower use of fossil carburants and the resulting reduction in CO_2-emissions. Finally, they improve the position of the Eemshaven as an international sustainable energy hub. Groningen Seaports has the ambition to grow further into its role as an international connector for data and clean energy and is looking to establish more connections similar to the aforementioned cables.

Thermal heat

The area managed by Groningen Seaports at Fivelpoort is entirely heated with thermal energy, and this has been made an inherent part of its establishment policy, as it is required for new companies to connect to this utility.

Action: Prepare the area for the investments of the companies by rolling out the business case for Oosterhorn-Zuid, Valgen, Heveskes. These companies will contribute to the circular economy and to a biobased chemical sector.

Environmental performance indicator:

Energy source	Name	Capacity
Waste	EEW	710 000 MWh in steam 219 000 MWh in electricity
Biomass	Eneco Bio Golden Raand RWE	135 MW thermic energy 50 MW electrical power (15% of total production)
International connections	COBRA Cable NorNed Cable	700 MW 700 MW

Table 5: Other green energy sources and production capacity

4.1.5 Hydrogen initiatives

In the various clusters in the field of hydrogen in which Groningen Seaports is an important partner, Groningen Seaports' ambition is to promote, stimulate and facilitate activities and projects that contribute positively to the development of the region and to the availability of hydrogen for Dutch industry. The section below describes the initiatives and collaborations from Groningen Seaports for the development of a hydrogen value chain. It covers the partnerships and consortiums involving Groningen Seaports and the developments and actions around the promotion and research around hydrogen. Concrete developments around hydrogen, such as the national pipeline network and the hydrogen-hub, are described in the subchapter on utilities (5.5.1).

Consortium NortH2

The large-scale hydrogen project NortH2 was launched on 27 February 2020. The initial partners for this project were Shell, Gasunie, the Province of Groningen, and Groningen Seaports. More partners were however needed as it concerns very large investments. Over the past two years, the partnership has been expanded with different companies such as Equinor, Eneco and RWE. Gasunie will retire from the consortium in fall 2022, because of their restricted position as a state company in the next phases of the project. The cooperation within NortH2 aims to kick off large-scale production, storage and transportation of green hydrogen. The plan is that green hydrogen production will mainly take place in the Eemshaven, after which the hydrogen will be transported via the national network. Initially, this transport will also go to Delfzijl. The plan designates green power generated by offshore wind turbines as the main energy source for the hydrogen production at the Eemshaven. The first wind turbines to this effect should be ready by 2030. Their green power will then be converted into hydrogen in Eemshaven. The next step is that the produced hydrogen will be transported to the industrial clusters in the Netherlands and even to clusters outside the

country. Ambitious hydrogen production objectives have been set at 4 Gigawatt in 2030, and potentially 10 Gigawatt in 2040. This project is set to reduce CO_2-emissions by a grand total of 1 000 000 ton.
Despite the fact that preparations have been going on for quite some time, NortH2 is still at a fairly early stage. In the past two years, studies have been initiated to investigate how this project can be realised. These studies are still on-going and are important to determine the ultimate feasibility of the whole project. Currently, the initiative lays with the individual partaking companies and the government (in relation to subsidies).

Other developments

Groningen Seaports is part of a number of projects concerning the total value chain of hydrogen. Groningen Seaports tries to enlarge the whole chain of sustainable hydrogen production and to make the use of wind energy and hydrogen cheaper so that it can be used more attractively as an alternative for fossil fuels for which the key question is: "How can hydrogen be suitably and widely deployed?"

The great ambition of Groningen Seaports and the ports is also shown by the many projects that have been included in the Investment Agenda for Hydrogen in the Northern Netherlands. Some examples of these developments are listed below:

- Together with Gasunie and the provinces of Groningen and Drenthe, Groningen Seaports participated in the formulation of the *Northern Netherlands Hydrogen Investment Plan* (see link below). This agenda encompasses more than 50 hydrogen projects in the provinces of Groningen and Drenthe, and functions as a roadmap for the development and upscaling of the hydrogen ecosystem of the Northern Netherlands. It also provides a good overview of on-going and planned ventures that use hydrogen as a resource. *Northern Netherlands Hydrogen Investment Plan:* investment-plan-hydrogen-northern-netherlands-2020-min.pdf (newenergycoalition.org)
- To help realizing the *Northern Netherlands Hydrogen Investment Plan* Groningen Seaports participates in HyNorth, a consortium that acts as a supply chain director supported by the local government and business community. It bundles knowledge about the hydrogen industry and facilitates its development, provides substantive advice and promotes the use of hydrogen in the industry and transport sectors.
- "Mission H_2", the combination of six important Dutch companies from within the energy chain, has entered into a partnership with TeamNL (the Dutch Olympic team). Gasunie, Shell Nederland, Remeha, Toyota, Stedin Groep, Port of Amsterdam and Groningen Seaports have promoted hydrogen as an important and sustainable energy carrier for the (near) future during the Olympic and Paralympic Games of Tokyo 2020. Simultaneously, Mission H_2 supports TeamNL on their way to the Tokyo 2020 Games. This partnership was officially launched on Friday 30 August 2019. This cooperation will be renewed for the 2024 Olympics in Paris.
- The ports of Amsterdam, Den Helder and Groningen have started a cooperation under the name Hydroports with the aim to become the hydrogen hub of Europe. The multi-year collaboration between these ports should lead to the development of an extensive hydrogen infrastructure in the Netherlands. In 2020, they have laid out a proposal for the evolution of this hydrogen hub

- Previously, Groningen Seaports has been investigating whether an innovative filling station along the A28 near Pesse can be fed with hydrogen from Delfzijl. This project has now been incorporated in the HEAVENN-programme, a large-scale programme of demo projects. The station at Pesse has been completed and Four hydrogen refuelling stations are being built in Groningen and Delfzijl. Groningen Seaports is a partner of HEAVENN and aims to supply more companies outside its management areas with hydrogen.
- Groningen Seaports participates in the Hydrohub Megawatt Test Centre Groningen, of which the installations are currently under construction at the Zernike campus, in cooperation with the University of Groningen and the Hanze University of Applied Sciences, as well as other corporations. It performs research and testing around hydrogen electrolysis in order to increase the efficiency and transparency of this process, and tests for applications of the residual heat that it produces. The following link provides extra information on this initiative: https://ispt.eu/projects/hydrohub-megawatt-test-centre/
- In reaction to the growing demand for climate-neutral hydrogen and the need for good market functioning as well as transparent and efficient pricing, Groningen Seaports is cooperating with several important partners on the development of a hydrogen exchange platform called HyXchange. The initial research has been concluded in 2021 and follow-up studies are being conducted with pilots and simulations to test the first trading products and to further integrate the market.

Action: Groningen Seaports takes part in the consortium HyNorth in order to promote and realize the Northern Netherlands Hydrogen Investment plan. Within this consortium, Groningen Seaports actively promotes the development of a hydrogen value chain, from production to end-consumer, in the Northern Netherlands

4.2 Circular Economy and Start-ups

Groningen Seaports works and thinks in forming clusters and chains, as this has many proven (sustainable) economic advantages and has a positive impact on the ecology in the region and the environment. To create a circular economy Groningen Seaports has specifically looked at the main points where a port can distinguish itself when it comes to circular business cases and recycling.

4.2.1 General trends in circular economy

Circular economy aims to reach maximum efficiency in the use of finite resources, and a gradual transition to renewable resources. It implicates recovery of materials and products at the end of their useful life and can be seen as a regenerative economic system. The transition towards a circular economy is adopted as an aim by the EU, which has drawn up its new circular economy action plan in March 2020. The Dutch government set a goal for the Dutch economy to be completely circular by 2050. Groningen Seaports is of course aiming to be a forerunner of national importance in this field.

The emerging scarcities in resources and the rise of resource prices witnessed in 2021 and early 2022 are seen as important stimulators for the circular economy as they highlight the vulnerability of economic dependence on non-regional producers of raw material, while logistics have become increasingly expensive and complicated in consequence of higher fuel prices, the impacts of the Coronavirus, and the war in Ukraine. Especially the rising prices of fuel and construction materials improve the relative attractivity of recycled materials.

At the same time, the current nitrogen crisis (in the Netherlands) is somewhat hindering the development of recycling industries which generally need heavier processes. Additionally, Groningen Seaports expects stronger governmental commitment on purchase requirements policies in order to improve the competitiveness of recycling products, using well-defined minimal percentages. Current enforcement must be intensified and expanded on a national scale.

4.2.2 Feedstock, technology, and market

Groningen Seaports has developed a proposition in which it distinguishes three different facets. These are: Feedstock (raw materials), Technology (recycling) and Market (products). These three facets should be linked (spatially) so that a chain can be created. Numerous examples of this are described further in this chapter. Within the circular economy and recycling theme, Groningen Seaports focuses on five important feedstock sectors that are abundantly present in the ports. It concerns building materials (sludge, concrete, cement, etc.), decommissioned wind turbine blades, e-waste, plastic waste, and textile. The latter is a recent development and has been included in Groningen Seaports' recycling industry in the last two years. Groningen Seaports has described a value chain for these five sectors. Groningen Seaports' main goal is to attract partners and parties to fill up the missing links in these chains and to connect them with the existing companies. Groningen Seaports presents itself as the connecting factor and the linking piece between the established order and new companies. In theory Groningen Seaports simply sells land, but in actuality Groningen Seaports sells a complete ecosystem. A recycler needs other existing large parties at a short distance to ensure its right to exist and to serve these and other parties, thus creating clusters of feedstock, technology, and market.

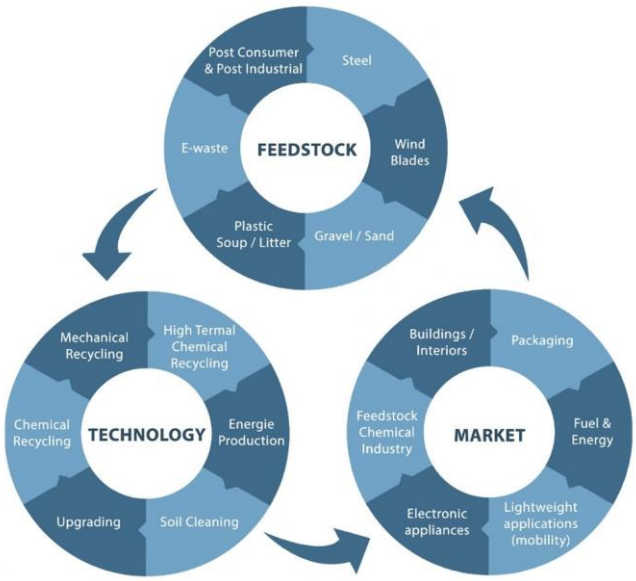


Figure 11: Feedstock, technology, and market

4.2.3 Circular economy sectors in the port areas

Building materials

Groningen Seaports facilitates various companies in their recycling practices. For instance, companies like Theo Pouw and Purified Metal Company are established in the Eemshaven since 2004 and 2020, respectively. These companies are specialised in the cleaning processes of contaminated soil and steel waste, and their recycling into raw material for applications such as raising the level of roads or as building blocks for the metal industry.

Decommissioned wind turbine blades

Few companies can recycle the hard composites contained in wind blades into certain fibres that can be used in the automotive and infrastructure industries, among others. Until recently, recycling wind turbine blades was considered a large challenge in the wind energy sector. Groningen Seaports wants to play a pioneering role in this activity and attracted the establishment of Decom North in the Eemshaven to this end. Decom North specialises in circular dismantling methods for wind turbines and aims to prevent the creation of residual products with a negative impact on the environment that usually takes place when wind turbines reach the end of their lifecycle. It represents a uniquely comprehensive operation: With the dismantling of written-off wind turbines and the transport of their rotor blades to the recycling plant in the Eemshaven where they will be broken down into granules, Decom North takes the first steps in the development of entirely recyclable wind turbines. As such, it constitutes a full value chain within Groningen Seaports that starts at the dismantling of wind turbines and ends with an entirely new product.

E-waste

The digital industry sector is currently looking for new developments in the field of recycling e-waste. Because this market is in active development, we are looking to recycle more specifically per component instead of recycling the entire product. Groningen Seaports is now in the initial stages of taking stock of the involvement of data centres within the management areas in e-waste recycling, as these parties produce significant amounts of e-waste. Groningen Seaports is in search of partners that offer solutions to e-waste recycling and can provide support for their establishment in the area.

Plastic waste

Tackling plastic waste is an especially important task for Groningen Seaports. The first objective is to reduce it, followed by possible follow-up steps with regards to potential re-use. The paragraphs below describe these steps in more detail.

Reduction of plastic waste

The first step towards a solution for plastic waste is the reduction of plastic usage. Ultimately, Groningen Seaports wants to eliminate the use of single-use plastics globally. Groningen Seaports stimulates this not only from a commercial point of view, but also because we assume responsibility towards the environment in which we operate. Groningen Seaports has access to governments, companies, schools, and citizens and wants to use these connections to reduce the production of plastic waste.

Groningen Seaports has a threefold objective related to plastic pollution: Firstly, Groningen Seaports wants its chemical cluster to switch to bio-packaging. Secondly, Groningen Seaports promotes the use and production of bioplastics and recycled plastic. Attracting Avantium to the management area has been an important step towards this. Thirdly, Groningen Seaports raises public awareness by taking part in the organisation of the yearly World Clean Up Day. This event gives citizens the opportunity to clean up in the ports, attend information sessions and workshops, and to talk to waste-processing companies. The aim of this initiative is to give citizens an idea and raise awareness of what happens to their waste.

In addition, Groningen Seaports is setting up cooperation with schools to give students examples of how to use plastic packaging in an environmentally friendly way. In May 2021 for example, Groningen Seaports (in cooperation with Biblionet, NNPF, and other partners) organised a challenge for children in primary education called "*Your class plastic-free!",* in which pupils were asked to replace plastic with sustainable materials. In addition, the way in which students can dispose of plastics in a proper way was discussed. Groningen Seaports wants to continue its cooperation with public education and form talented professionals for the Circular economy.

Collection of plastic waste

Groningen Seaports tries to support innovative parties with initiatives to collect plastic waste and allows them to use the port to test innovative approaches to plastic pollution. Noria is one of such parties and is working on sustainable and affordable solutions to the plastic waste problem in inland waters. In cooperation with Rijkswaterstaat, it maps out the locations where plastic can be captured, removes the plastic from the water with its energy-efficient and fish-friendly systems and then processes the plastic into new products. The start-up has been welcomed in the Eemshaven during the Start-up Residence Noord-Nederland 2021

event and has consequently been invited to test run its CanalCleaner in Groningen Seaports' port areas. Groningen Seaports also cooperates with Bollegraaf for the pre-sorting of plastic waste.

Recycling of plastic waste

Groningen Seaports stimulates the conversion of plastic waste into feedstock for the Delfzijl Chemical Park (for example, by producing biofuels in the heavier chemical processes). Secondly, the aim is for recyclers to make products from the plastics. Groningen Seaports therefore stimulates developments in the plastic recycling industry, with the ultimate aim of moving towards a market where all plastic products are fully recycled. As part of this process, Groningen Seaports is investigating the match between feedstock products and mechanical or chemical recycling methods with the aim to determine which method is of best use for each of the five feedstock sectors established within the management area.
In addition, Circular Design is a leading concept at Groningen Seaports. It implies that the components/building blocks/raw materials are processed in products in such manner that they can be easily recycled. The development of this market is however making steady progress and Groningen Seaports is actively looking for these parties to establish themselves in the port.

Action: In addition to the support of current initiatives**,** implement the circular economy within the Groningen Seaports management areas as much as possible by including missing links in the relevant chain.

Action: Further facilitate start-ups that offer solutions to plastic waste and monitor their results.

Action: Promote and enhance the cooperation within circular economy chains

4.2.4 Circular economy trends in the port areas

In comparison to other ports, Groningen Seaports has quickly focused on a green strategy, for example by scaling up green energy, hydrogen, and sustainable chemistry. Innovative sustainable companies experience this favourable establishment climate, which leads to extra development in Groningen Seaports' management areas.

SkyNRG is a company that looks to move into the Chemical Park Delfzijl. It uses glycerine and biodiesel to develop solutions for bio-jet fuel (bio paraffin). The Corona-crisis has however caused significant delay for this project.

Avantium has recently established itself in the Groningen Seaports management area and is scaling up a technology that is part of a circular value chain, as described in 5.1.4.
Ensartech (IVER) is a company that can process heavy chemical waste through a melting process that can create basalt/rock/asphalt in which the contaminants are encapsulated. The produced rock has many applications, for instance for processing in roads or coastal protection. In 2015, this company went bankrupt, and its projects stood still for a few years. Groningen Seaports is now working, with several new investors, to restart the plant. While

the project was delayed by the corona-crisis, Groningen Seaports expects an investment decision to be made by mid-2022 to get the plant operational again.

Another company that recently established itself in Groningen Seaports' management area is Photanol. It uses carbon-dioxide or flue gas to produce building blocks for the chemical industry with their technology based on genetically modified cyanobacteria. Since 2021, Photanol has an operational plant nearby Nobian.

Bek & Verburg (B&V) is one of the largest maritime waste collectors in the Netherlands and is now also located in the Groningen Seaports harbours. B&V is now also a link in the plastic recycling chain; they collect and manually separate the collected plastic soup and deliver it to the plastic recyclers. Moreover, B&V recently accommodated two circular and international initiatives on its two-hectare site in Eemshaven:
Impact Recycling (UK), and Uppact BV (Australia and the Netherlands). Both of these focus on the recycling of plastics, notably used fishing nets.
At this point, most old fishing nets end up as waste, some of which remains in the oceans. Up to 46% of all plastic in the oceans comes from old fishing nets. The United Nations Environment Program (UNEP) estimates that discarded waste from fishing accounts for 10% of the total annual marine waste. This amounts to 640 000 tonnes of marine waste per year. Groningen Seaports aims to play an active pioneering role in the reduction of fishing net waste. As part of the Green Deal Fishing for a Clean Sea, Impact Recycling was established in cooperation with other partners (amongst which Rijkswaterstaat) as a unique pilot installation in the Eemshaven that processes and uses old fishing nets. The materials of the old fishing nets are separated and processed into Polypropylene and Polyethylene. With Impact Recycling's machine and the so-called innovative BOSS technique, plastic (fish) net material can be recycled into raw materials for plastic furniture, baby bottles, lunch boxes and drinking cups, toys, car parts and jerrycans (Innovative Origins, 2022).
Uppact BV uses innovative technology to process the stream of non-recyclable plastic and textile waste into a new material and into robust and recyclable new products.

Three other companies have announced their upcoming establishment in the Groningen Seaports management area:

Clariter provides a new upcycling technology that transforms plastic waste into oils, waxes, and solvents in order to manufacture multiple crude oil-free consumer products.

BioBTX creates sustainable BTX from non-food biomass and plastic waste. BTX are vital components needed to create high performance materials, such as new plastics, and can reduce the use of fossil resources to produce plastics.

SFP-Group BV produces biofuels from organic waste streams, such as residual products from the food processing industry which are no longer used for direct consumption. By extracting energy from residual flows, a circular economy is created, and the production of biofuels represents a significant contribution is made to the energy transition.

4.2.5 Start-ups and Scale-ups

Groningen Seaports is partner of the MOI (Maritime Offshore Innovation) energy community established in 2019. MOI Workplaces is an initiative of the Economic Board Groningen and aims to help entrepreneurs in Northern Groningen with low-threshold flexible workplaces. For this initiative, Groningen Seaports also works closely with the NOM Flinc (Noordelijke Ontwikkelingsmaatschappij), which specialises in the growth of start-ups. Partly thanks to this cooperation, several start-ups settled in Nijlicht (Eemshaven) in 2019.
This development has been further stimulated since, as the Nijlicht location has been expanded and enlarged with differently scoped start-ups, of which it now houses a total of 14 with various expertise ranging from talent to energy, also including the circular economy and robotization. Wind energy remains one of the leading innovative sectors at the Eemshaven.
Research shows that start-ups, but also scale-ups, do not so much choose specific accommodation and/or location, but are attracted by the community they are offered with a specific purpose. Groningen Seaports offers an innovation-centred community within both the energy and recycling sectors. Moreover, start-ups in the Eemshaven can count on cheap but excellent quality housing. Groningen Seaports facilitates start-ups by stimulating the use of flexible leasehold. In addition, participation offers many advantages in terms of access to expertise and knowledge from the energy- and recycling-related industries at the Eemshaven. The start-ups that establish themselves in the Nijlicht incubator will also be given a place in renowned accelerator programmes.

Project Waddensla is one of such new initiatives. This pilot project was launched in 2021 by North Seaweed and CIV Offshore & Shipping, and it explores the possibilities for local cultivation of seaweed. Seaweed is considered a resource of the future for the food, feed and pharmaceutical industries, and has the additional benefit that it doesn't require land or freshwater for its cultivation. Simultaneously, the pilot examines the smart and shared use of space and infrastructure around offshore wind farms. The aim of the current project is to investigate whether the expected returns in quality and quantity are achievable. If the results are positive, the project can be scaled up.
Another start-up that has been operating from Nijlicht since 2020 is Ocean Grazer. This company is developing a promising technology for underwater energy storage, which consists of a battery that stores electricity at sea in a sustainable, clean and efficient way by making smart use of the water pressure on the seabed. With the Ocean Battery, this start-up has won an important award in the "Best of Innovation, Sustainability, Eco-design & Smart Energy" category at the 2022 Las Vegas CES. The technology that Ocean Grazer develops is very important for a wind energy hub like the Eemshaven as it greatly enhances the potential efficiency of wind energy supply, as it presents a solution for the recurrent mismatch between (peak) demand and supply.
Groningen Seaports takes it as its duty to facilitate such start-ups and scale-ups and aims to play a connecting role between the new companies and the established order. This has a positive impact both on the sectors and on the entire (economic) region.

The same principle applies to the chemical sector in Delfzijl. Some chemical start-ups in Delfzijl have in fact grown into scale-ups. In 2018, a letter of intent was signed by Groningen Seaports and associated partners to set up a Chemport Industry Campus, where start-ups will be further stimulated. This helps Groningen Seaports to be better positioned as a location where start-ups can land and develop further. Sustainable chemical products or processes will be

evaluated and developed on a larger scale within Chemport Industry Campus. Talent development within educational institutions and the business community will also be given a prominent place here. A decision of approvement has been made for this initiative in 2021 and its launch is now being prepared. The CIC website has been launched in April 2022, and Groningen Seaports is currently in the process of physically preparing the assigned location and attracting start-ups to it. The office building has been granted the energetic A-label, in part thanks to its LED-lighting. The focus is on start-ups with a high level of technical readiness (demonstration phase) and scale-ups. CIC has the networks, the knowledge and the permits needed to successfully guide the development of these enterprises and their products to the final market launch phase, and the area is highly attractive for start-ups in sectors like the chemical industry because of its industrial texture and the already established companies.

The signing follows on from the Eemsdelta Industrial Agenda, in which the regional business community, in close collaboration with the province of Groningen, has mapped out a route for greening the chemical and energy sectors. Various initiatives are underway in this area. Knowledge institutions are working closely with the chemical sector, for instance, and pilot projects have been developed where numerous innovative ideas for sustainable products and applications are generated. An example of this is the test environment Zernike Advanced Processing (ZAP) on the Zernike Campus in Groningen, of which the Hanze University of Applied Sciences is the principal partner on behalf of companies and knowledge institutions. ZAP focuses on significant reduction in the use of fossil building blocks and offers a facility for testing sustainable chemical products or processes.

Action: Groningen Seaports strives to be an important link between established industry and new start-ups**,** in order to foster innovation in the energy and recycling sectors

Action: Expand and improve testing facilities for start-ups and scale-ups in MOI and Chemport Industry Campus

4.3 Corporate Responsibility

Corporate responsibility is an important concept for Groningen Seaports. As such, Groningen Seaports adapts its internal functioning and policies to ensure they match with our sustainability ambitions. For example, Groningen Seaports plans to adapt its office building in order to limit energy consumption and has recently been granted the A-label for ten years by SKW Certificering, according to the standard set by the EU's Energy Performance of Buildings Directive. Moreover, Groningen Seaports has made significant progress in its digitalization. Additional measures have been realised or are planned for the next two years.

4.3.1 Business plan 2022-2026

While sustainability used to form a separate component of the previous business plan, Groningen Seaports has demonstrated that it considers sustainability as part of the company's DNA. This means that we now take for granted that sustainability is on the agenda for every activity carried out at Groningen Seaports and that there is no need to treat it as a separate topic any longer.

4.3.2 CO_2 footprint of Groningen Seaports

The climate agreement and its implementation by the industry has been reason for Groningen Seaports to have an internal discussion about additional measures to reduce CO_2-emissions within the organisation. Traditionally, Groningen Seaports' CO_2 footprint consists for a large part of emissions from mobility and personal transport. This includes among others: commuting, car use for physical appointments, and sailing with the *Havenschap 1*. In addition, the impact of purchases is considerable. These purchases notably cover infrastructure maintenance and the construction of new infrastructure. For these purchases, durability and innovation are important criteria. An action agenda to reduce CO_2 was drawn up during three workshops. The action programme is included below.

Set up of the CO_2 footprint program

The starting points for this programme are:

1. The objective in the 2022-2026 business plan is leading, which sets out that Groningen Seaports wants to be an example and make its business operations more sustainable.
2. The year 2016 applies as first measurement.
3. Groningen Seaports uses the standard drawn up for the CO_2 performance ladder by SKAO for establishing the CO_2 footprint.
4. Groningen Seaports uses the Trias Energetica as a strategy in the programme, which means that:
    a. Groningen Seaports *firstly focuses on energy saving.*
    b. Groningen Seaports *generates the necessary energy sustainably where possible.*
    c. Groningen Seaports *will use the remaining fossil energy economically.*

5. The measures that have been included in this programme or that have emerged from it are supplementary to the sustainable procurement programme.

The following three scopes are used to determine the footprint:

- Scope 1, direct emissions: Emissions that have their direct source from the installations owned or controlled by the organisation. For example, the gas consumption for the office building.
- Scope 2, indirect emissions: emissions that arise from generating electricity, heat, steam or cooling in installations that do not belong to the own company, but which are used by the organisation, such as the emissions released when generating electricity in power stations. In addition, the CO_2 performance ladder also includes business kilometres under scope 2.
- Scope 3, other indirect emissions: are emissions that are created as a result of the organisation's activities but that are generated from sources that are not owned by the organisation or managed by the organisation. Examples are emissions resulting from the production of purchased materials (upstream) and the use of the work, project, service or delivery offered/sold by the organisation (downstream).

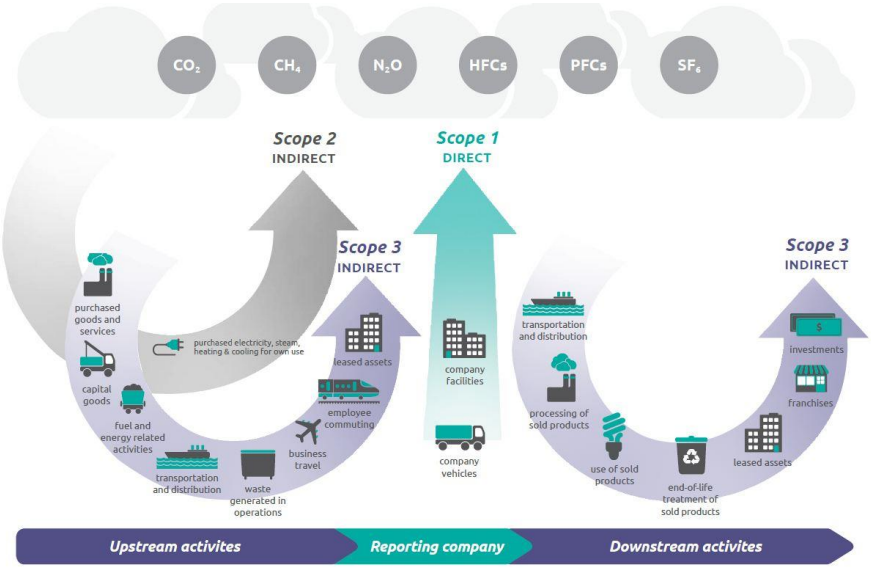


Figure 22: CO_2 footprint as prescribed by the CO_2 performance ladder

Figure 22 above shows various substances that are emitted by different activities. This research is focused on the emission of CO_2 for the corresponding ambition to be a CO_2-neutral organisation. Groningen Seaports mainly uses scope 1 and 2 for its footprint. In addition, Groningen Seaports has some influence on its scope 3 emissions, such as the emissions from lease cars, and those are included in the calculation of the footprint. Parts of the scope 3

emissions are omitted from the footprint however as we lack the necessary data to include them. This mainly concerns dredging and construction emissions.

Results of the CO_2 footprint program

The total CO_2-emissions for 2021 are shown in Figure 23. The quantities in kilometres, m^3 of gas, kilowatt hours etc. were provided internally. Invoices are particularly useful information for this. Using the CO_2 emission factors website as a base for calculations, the various emission factors are linked to their respective quantities. CO_2-emissions from mobility have been considerably lower in 2021 due to the reduction of travelling during the corona-crisis. With a total CO_2-emission of 123.168 kg, the 2021 footprint shows that there are a lot of potential gains to be made if we can further reduce travelling emissions. Flights have been particularly reduced (partly because of the corona-crisis), while the lease-car fleet has also been adapted to be more sustainable (as shown in section 5.3.3). Moreover, a compensation programme has been initiated for both flights and lease cars and the certificate for the latter can be found in Annex 1. The gas consumption from the office is also being reduced as the building now has an A-label for energy and potential new heating systems are investigated.

- Scope 1: This consists of gas consumption and emissions from our own fleet. Total emissions are 81 076 kg CO_2.
- Scope 2: This consists of the use of lease cars and private cars for work-work kilometres, use of public transport for work-work kilometres, and air travel. Total emissions are 56 507 kg CO_2.
- Scope 3: This consists of commuting kilometres for private cars. Total emissions are 18765 kg CO_2.

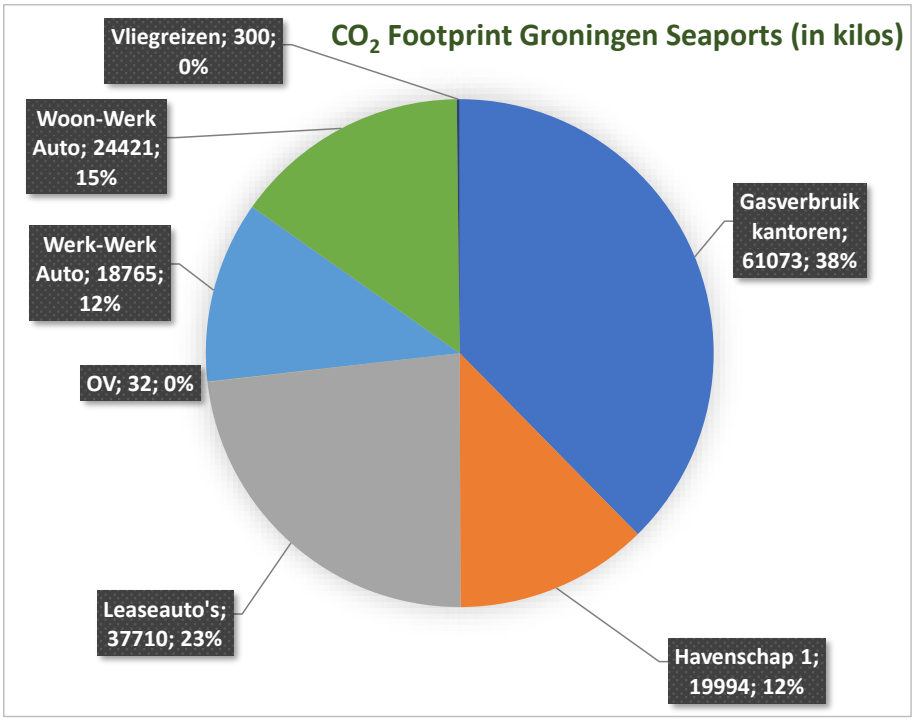


Figure 23: CO2 footprint Groningen Seaports for 2021 (in kilos)

4.3.3 Internal sustainable measures

This section contains a number of concrete measures that Groningen Seaports has taken to increase its domestic sustainability. These measures and developments are in part driven by the results and initiatives of the action programme CO_2 footprint reduction.

Office

Groningen Seaports is progressively replacing all lighting in the principal office with LED lighting, as this is more energy efficient, and LED has a longer life span. Lamps that are defective are being replaced by LED lighting. Moreover, the facility management board is considering the costs and the possibilities to speed up this process. Lighting schedules are also being examined for further possible energy savings.

Groningen Seaports has already drastically reduced the number of waste bins in the offices, this leads to considerably less plastic use (waste bag), but we're investigating the possibilities to reduce this further. One way in which Groningen Seaports is looking to reduce its waste generation is discontinuation of the use of the disposable cups that were introduced during the corona pandemic. The Dutch government plans to phase these out by 2023, but at Groningen Seaports we're looking to already terminate their usage in 2022. In addition, Groningen Seaports investigates ways to better sort its domestic waste and recycle it. For this process we look to cooperate with the provincial waste company as well as other companies in the area, in order to find efficient ways to better separate the streams of different waste. Groningen Seaports considers this as an important improvement opportunity.

With upcoming legislation that requires an energy label C, Groningen Seaports had stated the ambition to develop a plan to reach a C-label by 2023. After a new evaluation in March 2022, Groningen Seaports' office building has been awarded with the A-label for energy consumption, which remains valid until 2032. In addition, Groningen Seaports is investigating the use of sustainable heating such as a hybrid heat pump and thermal heating for the main office building. Another ongoing initiative investigates the (partial) use of the air-conditioning installations for heating. Moreover, Groningen Seaports solely uses green electricity generated in the Netherlands. The total electricity consumption of Groningen Seaports, including shore power consumption (1 396 MWh) for ships, is therefore 100% CO_2-neutral.
Groningen Seaports intends to explore the possibilities of placing solar panels at the Groningen Seaports offices. Their energy production could potentially be used for things charging the electric/hybrid fleet of Groningen Seaports. Since the roof is not suitable for the placement of solar panels, possibilities for the parking space are being surveyed instead.

Contracts and tenders

When contracting (external) personnel, for example for cleaning, the criteria take into account a sustainability component. The company must be sustainable, so that our staff is employed in the greenest possible way.
When searching for suppliers of goods and supplies, such as beverages, the sustainability criteria are increasingly important, with respect to the manufacturing, packaging and transport of these supplies. These are considered and the supplier is consciously selected, and Groningen Seaports asks its (potential) suppliers to clearly indicate what makes them the more sustainable option. Socially responsible expenses standards apply equally to the procurement for the coffee machines in the office, of which the contract is ending soon.

Transparency

Groningen Seaports includes specific sustainability indicators into its annual report. Thus, there is a sustainability report within the annual report of Groningen Seaports, of which the 2020 version is the most recent report that is publicly available.
The annual reports can be found via this link: https://www.groningen-seaports.com/groningen-seaports/jaarverslagen/

Documents and printing

Groningen Seaports strives to send and handle order forms digitally throughout the organisation as much as possible, which leads to less printing of documents within the organisation. Significant progress has been made in this domain and paperwork has been cut back a lot in the last two years. The corona pandemic has in part facilitated this process, as it has lowered the (psychological) barriers towards digital work. Microsoft Teams has been the main online service to facilitate the digitalization. Similarly, internal updates are now transmitted via weekly vlogs. Online mail services also slightly reduce the amount of required postal services, while internal post is usually transported with an electric vehicle.
Alternative ways of talking to each other and holding meetings, for example by implementing online services such as Facetime, Skype and Teams, are encouraged by Groningen Seaports, even though this is not yet part of PIANOo's guidelines/requirements. Courses in the use of Microsoft Office 365 are facilitated by Groningen Seaports, which equally reduces the printing of documents within the organisation.

Employees

Groningen Seaports makes sure that sustainability is and remains high on the agenda of its employees by continuously bringing these kinds of subjects to their attention and by repeatedly discussing them internally, as sustainability is considered to be part of the company's DNA. Examples of such topics that are discussed are the Industrietafel Noord-Nederland and sustainable internships. In addition, the sustainable Port Vision 2030 has been developed together with the employees. The employees of Groningen Seaports have also been trained in the process of the new Environment act (Omgevingswet). Several employees also take part in the World CleanUp Day.

In 2022, the entire technical department is offered 3 courses from *Bouwmeesters* focusing on sustainability in construction. The first of these consists of a basis introduction to sustainability and related concepts. The second training is centred around the acquisition of contractors and the related expectations, requirements and suited contract forms for these. The last course aims to enable employees to implement the Environmental Costs Indicator (ECI) and includes a tutorial for the use of DuboCalc, a tool used to calculate the ECI.

Employees are also encouraged to work from home, as Groningen Seaports' contracts now stipulate employees are expected to work 60% of their time in the office, and 40% from home. Moreover, a home-working compensation has been introduced, and the standard commuting compensation has been replaced with a compensation on demand. These changes reduce the number of workplaces necessary in the office, as well as the required material and supplies. In consequence, the office has been reorganised to include more flexible workplaces. At the same time, material that falls out of use in the principal office will be re-used on the CIC location.

In addition, the Sustainable Development Goals formulated by the UN are being adopted as a structure to communicate on Groningen Seaports' actions for sustainability. An overview of the SDG's is presented at the UN website: THE 17 GOALS | Sustainable Development (un.org)

Mobility

Sustainability was an important criterion for the procurement of lease cars. Groningen Seaports has relatively many green lease cars. The remaining CO_2-emissions from the lease car fleet is compensated annually and the compensation certificates for 2021 are included in Annex 2. Furthermore, the initiative to encourage the use of lease cars by colleagues who do not drive a lease car is encouraged.

Bicycle use among employees is encouraged by a bicycle with tax benefits. There have been relatively many applications for this during the last year: 20 bicycles have been purchased as of January 2021 until now.

Environmental performance indicator:

Overview lease cars Groningen Seaports:

- 1 hydrogen car
- 14 fully electrical cars
- 4 hybrid-Euro 95 cars
- 1 hybrid-diesel car
- 2 Euro 95 car

Action: Groningen Seaports replaces the lighting in the office for LED variants and investigates whether the complete replacement needs to be outsourced

Action: Groningen Seaports continues to implement a conscious but workable office environment with the possibilities that ICT offers, which contributes to sustainability by means of facilities such as remote meetings via Teams

Action: Groningen Seaports investigates its options for a more sustainable heating system

Action: Groningen Seaports wants to promote and facilitate domestic waste reduction and sorting and is committed to draft up a plan towards this ambition

Action: Groningen Seaports offers its technical department a set of courses on sustainability in construction

4.4 Sustainable Shipping

Groningen Seaports internally monitors the actions included in the Clean Shipping Programme every 3 months (see link below). The Green Deal Inland Shipping, Sea Shipping and Ports has ensured that the entire chain of involved parties has jointly formulated goals to realise the transition to sustainable shipping. These goals correspond to the ambitions that Groningen Seaports had previously included in the Clean Shipping Programme. The Green Deal was signed on 11 June 2019.

Programme Clean Shipping Groningen Seaports (in Dutch and English): https://www.groningen-seaports.com/wp-content/uploads/Schone-scheepvaart_brochure-1.pdf

4.4.1 Shore power

The use of quayside electricity (shore power) in the ports is an important development to stimulate cleaner shipping, as it limits the use of on-board generators. Moreover, through the shore power system, ships are provided with green electricity. Government regulations that make shore power usage obligatory are expected at long term, but Groningen Seaports already provides shore power on several locations and currently requires the use of quayside electricity for ships that have the ability to do so. Private quays are currently exempt from this rule, but is in consultation with enterprises that rent these. These discussions will be continued in the coming period, but various companies are already considering private use of quayside electricity at this moment.

In addition, Groningen Seaports is planning to couple the facturations for shore power to consumption in the long term. This not only ensures a more equitable distribution of costs, but also incentivises the reduction of energy consumption on docked ships. The first preparations for this plan will be completed late 2022. So far however, there has been a lack of insight into the use of shore power by ships, partly due to the fact that these connections are used for other applications. Groningen Seaports has therefore tasked engineering bureau Witteveen & Bos with a study on the possibilities to measure shore power usage for individual ships. Their recommendations will include an analysis of the necessary changes to the current shore power infrastructure and will be a basis for Groningen Seaports' new policies. Moreover, these measurements can allow for timely expansion of the network when necessary.

In order to further stimulate the use of shore-based power, Groningen Seaports has placed signs at some of the shore-based power connections, mainly at the floating jetties in Eemshaven and Delfzijl.

At this moment, shore power is mainly in use with inland ships. Groningen Seaports is looking to expand this to seaships, especially in the Eemshaven. The use of different connectors on ships of various origins and capacities makes this a challenging initiative, but standardisation is slowly gaining ground internationally and will provide a better basis for shore power usage on sea ships. Another challenge remains the high consumption of such ships in relation to the aptitude of the current electricity net.

BOZ ports is working on a shore-based power programme to effectively deploy national resources and knowledge. The EU and the Dutch government are planning legislation that ensures that the ship segments RO-RO, containers and ferries will be obliged to use shore-based power in the port from 2030 onwards. The quayside electricity sockets will therefore have to be of greater capacity in the Eemshaven so that larger ships can use them.

Environmental performance indicator:

Internal data shows an increase in use of shore power usage in Delfzijl and the Eemshaven:

Year	Total shore power usage
2017	968 MWh
2018	1 114 MWh
2019	1 113 MWh
2020	1 396 MWh
2021	1 495 MWh

Table 6: Shore power usage (including usages outside ships)

Action: Groningen Seaports investigates ways to better monitor the use of shore power in order to be able to expand and/or upgrade specific locations and/or connections.

Action: Groningen Seaports sets up its infrastructure in order to support shore power facturation based on consumption for a fair cost distribution and to increase the incentive for lower energy consumption on docked ships.

Action: Groningen Seaports investigates the expansion of its shore power infrastructure to sea shipping in the Eemshaven.

Mobile H_2 shore power unit

Within the Green Deal Seagoing, Inland Shipping and Ports, the ports involved are developing a business case for shore-based power. This case looks at major issues such as: how to connect shore-based power to maritime shipping in a cost-efficient way, what about the demand for shore-based power and the type of connections, the logistics and technical feasibility. Groningen Seaports is setting up a business case in the form of a project to develop a mobile generator on hydrogen for a sustainable shore power supply. This generator will be available for maritime activities as well as for other activities in the ports, such as for construction sites and festivals like Delfsail 2024. Unfortunately, it looks like the price of hydrogen as a carburant is too high at this moment to bring about a positive business case, but further developments might restore interest and in either case it is being developed further in cooperation with the ports of Harlingen and Den Helder. Other partners are Bredenoord, Eekels TBI and Nedstack. Groningen Seaports continues to cooperate with technical tests for this technology in order to research its feasibility and elaborates on the business case for a mobile shore power generator and keeps an eye on developments in the sector that can facilitate its implementation.

In spite of the high costs at this moment, there are various reasons for Groningen Seaports to choose a mobile shore power unit in addition to fixed shore power connections, a few of these reasons are listed below:

- The uncertainty of which ship is at which location means that the heavy cables are never installed at the right places on the quay. By taking a mobile generator to the ship, the investment in cables and e-facilities (hardware) can be omitted.
- There are ships that use either 50 or 60 Hz shore power connections; a generator will be able to supply both.
- The mobile shore power is available on demand. If the installation has been in place for a longer period of time and shows a regular pattern of use, it can always be decided to install a mains connection. Mobile shore power unit(s) can then be used at other locations.

4.4.2 Ship fuels

At the moment, an important goal for Groningen Seaports is to further stimulate and expand the use of LNG. Unfortunately, the demand for LNG is not yet high enough for entrepreneurs to realise a permanent installation ashore, i.e., a bunkering station (IBI). Current developments in this field seem to be positive however and there is now a slight increase in demand for LNG. On the long term, all signs point to LNG becoming a success and Groningen Seaports supports this in its package of measures. The ultimate goal for Groningen Seaports is of course the complete replacement of fossil shipping fuels with renewable fuels, and in this frame, LNG functions as a transition-fuel with lower levels of pollution. Groningen Seaports can play an important role in the development of LNG-fuelled shipping by facilitating the supply of ships with LNG within the ports.
However, it remains difficult to facilitate large-scale usage of LNG for the time being. The number of LNG bunkering operations is limited by a permit. In addition, the LNG bunker location is limited to only one place in the port. Currently, exception permissions have to be obtained for large(er) bunkering operations. In order to permit larger-scale LNG bunkering, the current permit must be amended and private initiatives at other locations in the ports must be considered. Harmonisation will have to take place here, so that LNG bunkering can be scaled up in a uniform manner to several locations in the ports. This process has recently been started and is still on-going. For the time being, LNG bunkering mainly takes place by means of trucks. For any larger LNG bunkering operations, LNG bunkering vessels are used. A recent development has however been initiated by Gasunie, which is working on the construction of an LNG terminal in the Eemshaven. This terminal also represents a long-term option for green hydrogen.
Recently, Groningen Seaports has collaborated intensively with AG Ems on the LNG retrofit of the ship *Münsterland* at the Delfzijl shipyard. Groningen Seaports made it possible for the ship to bunker properly in the Eemshaven. The ship commutes between Eemshaven and Borkum several times a day. This project is a spearhead for Groningen Seaports, since the Wadden Sea has been designated a Natura 2000 area and a UNESCO World Heritage site. The conversion of the ship started in the middle of 2020 and has now been completed. The ship's exploitation has resumed in April 2022. Using LNG allows for very significant emission reductions for NO_x and SO_x (about 90%), Particular Matter, and CO_2.
By taking these various measures, Groningen Seaports is trying to stimulate the use of LNG, despite the obstacles mentioned earlier.

In the WEVA-project, Nobian, NPRC, and other partners are developing a hydrogen-powered inland navigation vessel. For this initiative, Groningen Seaports is involved in organising the necessary facilities to receive the hydrogen on board. The ship named *Antonie* will span 135

meters, weigh 3700 tonnes, and under construction at Lenten Scheepvaart BV. The construction of this ship was launched in 2021 and its exploitation is expected to start in 2023. It will transport salt from the Nobian plants in Delfzijl towards Rotterdam.

Groningen Seaports is closely following the developments of marine fuels and clean energy carriers. Where this leads to concrete projects Groningen Seaports will actively facilitate the realisation of necessary infrastructure for environmentally friendly fuels and energy carriers. An example of such green fuels is the development of ammonia as a new shipping fuel in the port of Singapore. Another such development on a slightly shorter term is the use of methanol as a transitional shipping fuel, which also has the benefit of lower costs. In 2020, Groningen Seaports has drafted its Carburant Vision to present alternative carburants with their advantages and inconveniences, while investigating Groningen Seaports' role in their development. In addition, Groningen Seaports is partner in the G*reen Shipping Programma Waddenzee* with the aim to accelerate the innovations in the area of CO_2-neutral and fossil-free shipping for the Wadden Sea fleet and to develop the corresponding port facilities and infrastructure.

Action: Groningen Seaports stimulates the use of LNG in various ways**,** including by obtaining new and enlarging current permits where necessary so that LNG can be bunkered on a larger scale at more locations in the ports.

Action: Groningen Seaports facilitates the use of hydrogen as a shipping fuel and encourages the development of other new clean fuels

4.4.3 Ship emissions

Groningen Seaports continues the discussion with shipowners and the shipbuilding industry with the aim of promoting cleaner shipping. By adjusting and expanding the current discount systems, for sea-going vessels the ESI (Environmental Shipping Index) and for inland vessels the Green Award, Groningen Seaports wants to create an incentive for cleaner shipping to visit the port. At present, shipowners have to keep separate records for each port. There are various discount systems in operation in the national seaports (% discount for LNG ships differs in the ESI, CSI, Green Award, etc.). Shipowners therefore have to keep different records, depending on which discount system applies in the port. Groningen Seaports wants to harmonise the discount system in cooperation with other seaports on a national level. Through this measure, this will be integrally facilitated and made more efficient. Because of the reduced administrative burden and the reduction of harbour dues for clean energy carriers, it is then more attractive for shipowners to switch to cleaner forms of shipping. These developments are being discussed with the shippers and other ports. Groningen Seaports however has limited influence on this process and its progress. Groningen Seaports does however intend to investigate whether shipping emissions in the port can be monitored to provide better insight. Groningen Seaports will use existing sources and innovations to this effect. Linking data systems/ICT can play a substantial role in the accessibility of this information.

Action: Together with the national sector organisation for seaports, Groningen Seaports wants to ensure that the discount systems in the national seaports are adapted, standardised and expanded in the coming two years.

Environmental performance indicator:

Groningen Seaports also ensures that green shipping is encouraged within its ports, and as such there is a 5% discount on port dues for an ESI score higher than 20. Currently, incoming ships have to make an application for this discount, based on their certificate. Since 2020, Groningen Seaports is taking away the administrative barriers by taking over this duty from the ships. A list of ships with ESI certificates and Green awards (for sea ships and inland ships respectively) has been created at Groningen Seaports and is updated monthly. Ships registered on this list automatically benefit from the discount on port dues. Currently the list counts 224 sea ships with an ESI score over 20, and 126 inland vessels with a Green award. Naturally not all of these ships enter the harbours on a yearly basis however. 25 ships with a Green award and 75 ships with a sufficient ESI score visited Groningen Seaports in 2020. In 2021 these numbers have increased to 42 and 84 respectively. Groningen seaports will update its discount in line with the "Green deal binnenvaart, zeevaart en havens".

Action: Groningen Seaports maintains a register with ships that have an ESI score of over 20 or a Green award and grants these a discount on port dues in order to encourage green shipping.

4.4.4 Ship waste

For some time now, Groningen Seaports has been working on drastically reducing the administrative burden for the collection of ship-generated waste. Groningen Seaports is working on a new waste plan (HAP) that makes the collection of ship-generated waste easier for skippers, collectors and for the port itself. Expectations are that the deployment of this system will be finalised by the second half of 2022. The efficiency of waste collection will be increased, and the administrative pressure will be reduced. This will lower the threshold for delivering ship-generated waste, lead to increased quantities of collected waste, and therefore cleaner seas as a result of less waste pollution. As much waste as possible is reused, which is made possible by extensive sorting of the offered waste materials.
Groningen Seaports' aim is to resume the usage of the sloop built from waste materials from spring 2020 onwards. The plan is to do this together with companies in the waste industry, civil servants that deal with this subject, and students. The intention is to organise educational sailing trips together with these parties, to make the circular use of (waste) materials in shipping visible.

Action: A new port waste plan is under development. In this plan, we strive to collect waste in the most circular way possible.

Environmental performance indicator:

The table below shows collected maritime waste and the corresponding number of ships from 2016 in the ports of Delfzijl and Eemshaven. The amount of collected ship-generated waste

fluctuates due to the supply of different types of goods and raw materials. In addition, various ships visit the ports on an irregular basis.

Year	Collected maritime waste	Number of ships
2016	17 201 m^3	4 223
2017	85 841 m^3	987
2018	29 423 m^3	2 229
2019	21 588 m^3	910
2020	12 260 m^3	4 433
2021	8 719 m^3	2 021

Table 7: Maritime waste collection at Groningen Seaports

4.4.5 Innovation in shipping and ports

Groningen Seaports is currently looking at a number of innovations in the field of cleaner and more efficient shipping. These are briefly listed below.

- Groningen Seaports has drafted a study on improving the arrival and departure times of ships.
  About 30% ships are too early/ 30% too late, so these times are irregular. Groningen Seaports could start using PortXchange, an application used in the Rotterdam port to better plan arrival and departure times. Ultimately, adapting the system would lead to less idle and waiting time and therefore a reduction in CO_2 emissions from ships. Currently however, consultation with the PortXchange creators show that the business case isn't positive enough as the system requires a large investment. Groningen Seaports will however consider its implementation whenever this seems to become more feasible.
- An investigation into autonomous sailing and remote control of ships, as well as a related application for quay occupancy and sensors in the harbour quay. Because of a lack of personal however, this investigation is currently on hold.
- Groningen Seaports has been investigating the use of drones in order to improve the safety of its ports and industrial areas. As a result of this investigation, two employees have received extra formations for the use of drones, and one more is currently in training. Groningen Seaports seeks to remove or limit the current restrictions on drone use in the area. Drones have already been deployed for autonomous monitoring of certain areas however.

4.5 Utilities

Groningen Seaports has a driving and leading function in the installation of infrastructure such as pipelines and tube zones. Pipelines are the safest and most sustainable transport modality for liquified and gaseous substances. Meanwhile, this modality can also stimulate and promote circularity, energy saving and the use of sustainable energy sources. The role of Groningen Seaports in various utilities in the management areas is great and Groningen Seaports brings the opportunities of this transport modality further to the attention of other parties. Groningen Seaports connects parties both literally and figuratively by supplying and facilitating pipe systems and networks.

4.5.1 Hydrogen infrastructure

Between 2009 and 2016, the foundation Buizenzone Eemsdelta has been actively investigating the possibilities for a pipeline zone between the Eemshaven and the Chemical Park Delfzijl. This foundation has now been replaced with NorthGrid, of which Groningen Seaports is equally an active participant. Considering the current energy transition and other developments in this area, this foundation has the objective to provide the necessary facilities to develop underground pipeline connections. As a result, discussions have been held with the province of Groningen and the municipalities and companies involved (such as Gasunie). There seems to be potential for this project in the near future. In the presence of a large-scale pipe zone, the industry would be able to take investment decisions that have not been taken to date due to the lack of such infrastructure. This has a positive effect on the further (sustainable) development of the industry The foundation is now at a pre-development stage where a number of scenarios, with regard to the planning feasibility and the number of pipes, are being investigated.

Previously, research has been carried out into all of Nobian's utilities and how they could possibly be managed and expanded outside the Chemical Park Delfzijl so that other companies can make use of them. Ultimately, the management remains in the hands of Nobian, but there are also other (possible) plans and activities in relation to the use and expansion of utilities.

Groningen Seaports has facilitated many activities in the recent period to encourage the use of hydrogen. Groningen Seaports intends to expand this further in the future. The current hydrogen pipeline at the Chemical Park Delfzijl runs to a filling station that serves to refuel Qbuzz hydrogen buses (PitPoint) and was put into operation in February 2018. This filling station is also open to regular cars, and one of Groningen Seaports' lease cars is fuelled here. The hydrogen it supplies is produced by Nobian, which obtains it as a by-product from its chlorine production. Therefore, this is double green hydrogen, as chlorine is produced by Nobian using green electricity.

In the short term, the current hydrogen infrastructure will be expanded into the industrial areas. Groningen Seaports is preparing this expansion in order to connect more companies at the Chemiepark Delfzijl and the Oosterhorn industrial area to a hydrogen facility. The realisation of this expansion will take place in various phases, although the planning depends on a number of external factors and on the parties that will benefit from the infrastructure. Currently, the involved companies are in the process of making an investment plan. The first connection that Groningen Seaports wants to construct is between the initiative of Nobian (electrolyser) and BioMCN, with a possibility for future expansion for new connections.

BioMCN has recently announced its intention to use hydrogen as a production resource for e-methanol on a larger scale.
The expansion of the network will take place step by step. This deployment depends in large part on customer demand and the place in the network, where the important question is whether companies will switch to all-electric or hydrogen. Nevertheless, the implementation of the network will be oversized, meaning that it will be fully equipped and ready for the future. In the longer term, a complete area-wide hydrogen pipeline network can be developed. Several companies have already signed up as potential customers because of their interest in the hydrogen backbone, and Groningen Seaports wants to facilitate potential contracts in relation to hydrogen utilisation.

Action: Groningen Seaports seeks to attract companies at the end of the hydrogen chain to its management area in order to create a sufficient demand basis for the expansion of hydrogen infrastructure in the region.

Action: Groningen Seaports wants to build a hydrogen pipeline network in the near future, tailored to customer demand, expand it in the long term to supply companies on the industrial estate with hydrogen, and connect it to the national hydrogen grid.

Action: Groningen Seaports actively participates in NorthGrid with the objective to provide the necessary facilities to develop underground cable and pipeline connections for hydrogen, heat, industrial water, power and CO_2

Plastic hydrogen pipelines

While steel is the common material for pipelines, Groningen Seaports has developed a more sustainable plastic hydrogen pipeline. The pipeline to the filling station in Delfzijl for example is a plastic system operated at low pressure. However, since there is also a need for a high-pressure hydrogen pipeline system in the area, Groningen Seaports has now also developed a high-pressure plastic hydrogen pipeline. The use of plastic piping is cheaper, easier, quicker and more sustainable than other types of piping. A local raw material, Twaron (strong fibres) produced and supplied by Teijin Aramid in Delfzijl and Emmen, is used in part in the production of the plastic high-pressure hydrogen pipes.

Electrolysers

Together with Gasunie, Nobian is preparing the construction of a special electrolyser (20 MW) in Delfzijl. These are installations specifically built for the production of hydrogen. Electrolysers and the associated technology still have to be scaled up, so this development can be seen as a large-scale pilot/experiment; capacity expansion of electrolysers will follow later. The production of hydrogen by the electrolyser at Nobian can be distributed across the industrial area via the synthetic hydrogen backbone. Nobian and Gasunie have not yet taken a final investment decision concerning the electrolyser. Groningen Seaports depends on this decision before the network is constructed. This decision has however been delayed, in part as an indirect consequence of the corona-crisis.
HyCC B.V. is a joint venture of the European electrochemical company Nobian and Macquarie's Green Investment Group. Together with Gasunie, HyCC will develop the Netherlands' first 20-megawatt water electrolysis facility to convert renewable electricity into 3,000 tons of green hydrogen per year in the Chemical Park Delfzijl. BioMCN will then combine

the produced hydrogen with CO_2 from other processes to produce renewable methanol, which can be used as fuel for transport or feedstock in various industrial sectors. The project helps reduce CO_2 emissions by up to 27,000 tons per year.

Hydrogen hub

HyEnergy TransStore is a company that aims to realise a hydrogen hub in Delfzijl. Its technology allows to transport the hydrogen available in Delfzijl via cartridges (containers) and to use it for other applications such as shipping on hydrogen (containers on board and sailing on hydrogen) and shore power on hydrogen. The fuel stations on land at Pesse and in Groningen could be supplied with this system. An inland ship powered on hydrogen is currently under construction and will start its transport activities between Rotterdam and Delfzijl next year. This ship will equally be supplied with hydrogen from HyEnergy TransStore. For these applications, hydrogen is not used as a raw material for industry, but as a fuel for all kinds of mobility applications. Transporting it via cartridges instead of pipelines makes the employability of hydrogen more mobile.

4.5.2 Residual heat

A development that Groningen Seaports would like to stimulate in the field of residual heat is the idea of constructing an industrial heat network in Eemshaven. A concrete connection was planned for a residual heat pipeline from RWE to Holland Malt. This hasn't been carried through however, as Holland Malt is now supplied with sustainable thermal heat. Expected natural gas savings from this development are 20 million m^3 per year. Groningen Seaports is however still looking to provide residual heat on the network for several customers. The focus is now primarily on RWE as a supplier. Moreover, Groningen Seaports wants to synergise these developments with the development of its hydrogen ecosystem, by employing the residual heat from hydrogen electrolysers as an important supply source. Feasibility research for this design is currently carried out at the Hydrohub Megawatt Test Centre Groningen.

Similarly, Groningen Seaports has investigated the use of the Google datacentre's residual heat. Unfortunately, the cooling water's temperature is too low to be employed for heating, and in consequence no specific concrete application has been found for Google's residual heat so far. Applications are still being sought for however, and with the newly obtained insight Groningen Seaports will consider the potential of residual heat as a criterion for new company establishments.

A subsidy has been granted from the Waddenfonds for the construction of a pipeline for biomass between the Zeesluizen business park and the Chemical Park Delfzijl. This pipeline is expected to contribute to a reduction in CO_2 emissions and thus to the transition to sustainable energy management and chemistry in the industrial area, but it needs warming in order to ensure a constant liquid flow. The design connects the warm residual water that is currently released from the electrolysis at Nobian to Contitank, a company which accommodates the storage of bio-oil products in particular, for example used cooking oils. At present, these products are transported from Contitank to customers by lorry but transporting them through the pipeline would be more sustainable. With this system, the products can be transported in liquid form to Contitank's customers. After processing by the customers, their residual products can be transported back to Contitank. Groningen Seaports analysed the temperature requirements to transport various products so that they do not solidify. While the technical feasibility and cost-effectiveness have been proven for this project, an investment decision is yet to be made.

In 2018, Groningen Seaports expanded the steam pipeline network as a result of the third waste incineration line at EEW. Groningen Seaports is currently looking at extending the steam pipeline network for the new developments in the Delfzijl industrial area, partly due to the planned arrival of SkyNRG's bio-kerosene plant and the establishment of Avantium in the chemical park. The steam supply in the Delfzijl industrial area has now become a network because the 1-to-1 connection with EEW has been extended further and further. The Eneco Bio Golden Raand power plant, for example, is linked to EEW's connection to the Chemical Park Delfzijl. These developments reduce the amount of primary energy that needs to be used for the production of steam and energy. In practice, Nobian is therefore making less use of gas-fired turbines to generate steam and power and supply it to the Chemical Park Delfzijl. Moreover, Groningen Seaports has been conducting a study into the initiatives concerning the development of a steam pipe network on the south side of the Oosterhornkanaal. The steam pipeline network is now being extended into the Oosterhorn Zuid area, where it will supply steam along the basis utilities. For this substantial expansion, Groningen Seaports is in discussion with potential partners for the supply of CO_2-neutral steam. At the moment, the Groningen Seaports steam provision is primarily originating from green production, and the intention is to preserve that condition.
In summary, there are now two suppliers of steam: EEW (from waste) and Eneco (from biomass). There are also various buyers of steam in the industrial areas, and new clients are being added. Furthermore, there are discussions about the development of new suppliers of steam and electricity or expansions at EEW and/or Eneco.

Action: Groningen Seaports is investigating the possibilities of a residual heat pipeline network in both the Eemshaven and Delfzijl and will stimulate these developments. Groningen Seaports has the intention to construct the pipelines in cooperation with other partners.

Action: Groningen Seaports is studying the expansion of its steam grid and the sustainable options therefor.

Action: Groningen Seaports intends to build a pipeline for CO_2 between EEW and BioMCN for the capture of CO_2 and the application of its use in industrial processes.

4.5.3 Industrial water

The demand for industrial water is increasing due to the expansion of the industry. Over the past years, Groningen Seaports has made a concerted effort on the developments around industrial water in the area, affecting both the physical supply and the policy around it.

In practical terms, Groningen Seaports is developing a plan to replace the use of drinking water in the industry together with Northwater and other involved parties. It has been made clear what the water demand will be for the industry in the future. The adaptation plans are now at the feasibility stage, as their technical and financial requirements are being investigated and the first preparations are being effectuated. The scale and scope of the project have enlarged over the last two years however.
Currently, much drinking water is still used in industry as process water. The water company is the supplier of drinking water to the industry, but this is not sustainable as the quality of

this water is too high. The water company works together with NorthWater for the supply of industrial water. A joint study is being carried out to replace drinking water with industrial water.
An industrial water pipeline from the sewage treatment plant in Garmerwolde to Eemshaven to supply industrial water to Google as cooling water was completed in 2021. This pipeline is the replacement for the condensate pipeline that was planned between the former AkzoNobel (Delfzijl) and the Eemshaven. A newly designed extension of this pipeline towards the Delfzijl Chemical Park is expected to be ready for use by 2023. The water purification capacity at the Garmerwolde sewage treatment plant has been increased in order to support the supply of this area. In addition, NorthWater is planning to expand its existing water purification capacity in Delfzijl.
A project for the construction of an industrial water pipeline to PMC was recently initiated. This will be an extension of the existing network and will result in a larger network and is currently in the engineering phase. Construction is planned for 2023.
In combination to these physical measures and in collaboration with the water company, Groningen Seaports has changed its policy towards water supply. New companies that settle in Groningen Seaports' management area are now given the task to break down their water demands into domestic and industrial demands. Domestic demands include office use (such as water used for drinking and washing), while industrial demands consist of water used for production processes. Basic water supply will now be granted only for domestic use, while companies are encouraged to connect to the industrial water utilities for their industrial use.

Action: Groningen Seaports encourages companies within its management area to use industrial water for their production processes.

4.5.4 Syngas

Syngas is a name for a mixture of all kinds of gases. It is a mixture of gases that is released during all kinds of gasification processes, such as the gasification of coal or biomass. This mixed gas consists of many different components, for example CO and H_2. Within the management areas of Groningen Seaports there are several companies that use a gasification process and thus release syngas. An idea has arisen to connect these different producers, thus creating a collection network of syngas. This can then be transported to customers who can use it as an alternative to natural gas (for combustion in their boilers). A few years ago, the focus was on collecting and splitting the syngas to extract the hydrogen component. Partly because the demand for hydrogen has become quite relevant recently. This is a potential solution to balance the supply and demand of hydrogen, but alternatives to hydrogen production are also being developed. Nevertheless, syngas remains an interesting energy carrier, so there is potential to develop it further for wider applications. Groningen Seaports continues to investigate the syngas business case with the hope of possibly rolling it out in the future. Groningen Seaports is taking stock of the possibilities together with a company called Torrgas (a company that also wants to use biomass).

4.5.5 Electricity

Groningen Seaports is conducting a feasibility study into a direct current electricity network. This is particularly important because the expectation is that the efficiency of a direct current network within the industrial area Oosterhorn (initially the focus is on this area) is higher than that of an alternating electricity network, in reason of the high share of wind and solar energy

production in the area (which produce direct current, as well as some companies (like Google) that primarily use direct current. At the moment, the direct current produced at wind turbines and solar panels is converted into alternating current for transport on the public electricity network, after which it is converted back into direct current at its destination, a process at which a significant percentage loss occurs. If this electricity would be transported directly from its source to its end users with a direct current network, energy savings of around 8 – 12% could be achieved. The project, which was initiated by Groningen Seaports, is currently in the study phase and Groningen Seaports is looking for cooperation with partners in the energy chain, as the required investments are considerable.

Action: Groningen Seaports conducts a further study into the feasibility of a direct current network within the Oosterhorn industrial area and wants to gather support for this project with companies in the energy chain.

4.6 Safety, spatial planning and settlement

4.6.1 Safety

External safety

Discussions have been held with the partners involved to improve safety in the Oosterhorn industrial area. This has resulted in the Oosterhorn Safety Programme. This programme is currently running and will continuously monitor safety and improve it where necessary by organising new activities and measures. The programme includes knowledge meetings and incident evaluations (interdisciplinary). An example of a knowledge session is to draw attention to possible risks and safety aspects of the new use of hydrogen as an energy carrier on the industrial estate (which will be used more and more often). This is then discussed by the parties involved so that knowledge and expertise can be shared, ultimately increasing safety. The aim of the programme is therefore twofold. Firstly, the programme aims to prevent, limit and combat the number of safety incidents. Secondly, the programme aims to strengthen mutual cooperation and connection.

Activities undertaken by this platform:

- **Educate, train and exercise:** intensifying cooperation between companies and authorities in order to act more effectively and efficiently.
- **Evaluate between multiple disciplines:** by sharing knowledge and making joint analyses, governments and businesses can together draw conclusions, make recommendations and take steps forward.
- **Explore safety services:** investigating the characteristics and feasibility of an Oosterhorn-wide Safety Service, for example in terms of materials for in-house emergency response or joint training.
- **Communication about programmes:** creating connections between the different stakeholders.
- **Integral Fire department coverage:** the realisation of a joint fire service on the Oosterhorn industrial estate in the form of a public-private partnership.
- **Incident communication:** improving the uniformity and quality of communications in the Oosterhorn industrial area.

By continuously undertaking and further developing these activities, safety in the Oosterhorn area is guaranteed. More information about the Oosterhorn Safety Programme is available at: https://www.veiligheidoosterhorn.nl/

Nautical safety

RWS, Groningen Seaports and the Wadden Sea Association have agreed to come together where necessary to tackle potential problems with regards to nautical safety for the future. This cooperation between the above stakeholders will be continued, in order to address safety issues where necessary.
Groningen Seaports has implemented AIS (Automatic Identification system) for all inland navigation and has linked the AIS system to its own radar systems. AIS base stations have also been established to increase the safety of shipping. Moreover, Groningen Seaports has

improved the communication system between port and ship (VHF) in order to increase safety. This system has been made more versatile and can now target specific vessels in its communication. Groningen Seaports also further expanded and fine-tuned the system that calculates and monitors tides and draught (Pro-tide). It is now operational for ships sailing on the Eems and in the Wadden area. Collaboration with Germany is intended. This system is made to prevent seabed disturbance and to counteract undesirable passing and crossing of ships at certain locations under ecological pressure. Finally, Groningen Seaports has replaced its existing light lines with LED systems for better visibility and greater reliability.

Action: Groningen Seaports is co-developing a system that can calculate the lateral forces exerted on ships by wind and water, based in part on weather expectations, in order to improve nautical safety

4.6.2 Spatial plans

"Structuurvisie"

In 2017, a structural *vision* was adopted for the Eemsdelta region; parts of this concept have already been discussed in chapter 5.A. This instrument was developed to bundle the 15 large projects of the past period and the coming period. The environmental space for these projects has been determined. The cumulation of noise, odour, nature, light and external safety resulting from these projects are important aspects in the spatial development strategy. Since there are 15 different projects, the need for a spatial development strategy was high, in view of the large potential impact and/or burden of the combined developments on the environment. This structural concept is still leading and formed the basis for the zoning plans. This is explained in more detail below.

Zoning plans

The Oosterhorn zoning plan had already been adopted in 2017, but was not yet irrevocable due to proceedings before the state council (Raad van State). In June 2019, the zoning plan was annulled on the basis of the earlier PAS ruling. The procedure therefore had to be restarted. By now, a revised zoning plan has been developed by the local authorities for Oosterhorn and is expected to be made available for inspection after the summer. Similarly, the progress of the development of the Eemshaven zoning plan, which was almost finished, has been seriously delayed as a result of the PAS judgment.
Groningen Seaports has good contacts with the province of Groningen and the municipalities concerned. The revised zoning plans will be leading policy documents for the development of both port areas starting next year at the latest. The new zoning plans have also been adapted for the energy transition.

"Omgevingswet"

The expected implementation of the new Environment Act in 2023 is based on participation and informing the environment during the development of plans and initiatives. For Groningen Seaports, this is in fact already standard practice, but the Environment Act will require the participation to take place at earlier stages in the development of new projects. At the moment, Groningen Seaports publishes newsletters which are accessible to the public. Groningen Seaports has involved the neighbourhood in its (future) developments for quite

some time already, particularly by setting up various ways of communicating and participating in projects. Groningen Seaports does this not so much to prepare for the new Environmental Act, but simply because we believe that the environment should be treated with care. Nevertheless, in practice the new Environment Act will include some changes in this process which can cause some policy related obstacles, hindrances and other initial troubles. Through good communication with the local authorities and the surroundings, Groningen Seaports tries to minimise any negative effects. In addition, in preparation of the new law, an internal course has been offered to the employees of Groningen Seaports. An external course has also been offered via the Economy & Ecology in Balance platform.

4.6.3 Synergy in settlement plans

In order to make the establishment policy (see link below) more compatible in practice with the policy document of the same name that was issued in 2016, a plan of action was drawn up internally within Groningen Seaports to improve this. Within the sales team, points for improvement were inventoried regarding acquisition policy, land policy and establishment policy. These improvements have been combined and actions have been set out to better integrate the policy in the sales process. This allows Groningen Seaports to make more conscious location choices, especially when establishing new companies. This can lead to a better synergy between the company and the environment and between companies, with the additional effect that circularity and the exchange of products and raw materials become more feasible. Groningen Seaports can play a major role in this when it comes to making the region more sustainable. In this way, a better distribution of the less current sites can take place, so that Groningen Seaports will not be stuck with unsellable sites in a few years' time.
Groningen Seaports has developed a questionnaire for this purpose, and this is now being further implemented. The questionnaire is also available in an English version for international customers. It should lead to the translation of the customer's business case into the choice of location. Groningen Seaports looks at all possible locations that could be suitable from the perspective of the business case. This is a shortlist to get to the heart of the actual customer demand. Subjects that are involved in customer location such as; logistics, synergy, external safety, sales, suppliers, etc. are thoroughly explained on the basis of advantages and disadvantages in relation to the location. Positive features of the location are identified, for example, nearby suitable infrastructure. But obstacles to the site are also inventoried, such as poor soil quality or the risks associated with the presence of wind turbines on the plot. This also applies the other way around; Groningen Seaports would like to map out at the start whether companies might have a certain risk contour. This can probably influence the choice of location and can also be a possible restriction for land allocation of nearby plots in the area. This is becoming more and more relevant, also because of the placing of many new wind turbines which can lead to external restrictions in terms of location and choice of site. The analysis results in 2 or 3 possible suitable locations that are weighed against each other based on facts and customer preference, which ultimately leads to a location choice. The further implementation of Groningen Seaports' establishment policy in the sales process must lead to a location report so that a conscious, well-considered choice of location can be made.

For Groningen Seaports, it is important that, unlike in the past, several options are kept wide open at the start of the process in order to avoid obstacles at the end. So that it is possible to steer initially, instead of correcting afterwards. To ensure this, there have been improvements in internal cooperation and consultation on location choices. This facilitates the granting of

permits at an earlier stage. Location choices, with regards to possible objections, are also discussed more integrally with business managers in a sales meeting.
Establishment policy Groningen Seaports: https://www.groningen-seaports.com/wp-content/uploads/Delfzijl_Eemshaven_Business_Location_Policy-1.pdf

Action: The further implementation of Groningen Seaports' establishment policy in the sales process must lead to a location report so that a conscious, well-considered choice of location can be made.

Action: Intensify the internal collaboration between business development and Sales, especially at the start of the location process. Focus on the location requirements of the client and how these fit in with the area.

4.7 Nature

The ports of Delfzijl and Eemshaven and their industrial areas are adjacent to the Eems-Dollard estuary, which is part of the Wadden area. Since flora and fauna have no legal boundaries, they also use and inhabit the estuary. The Wadden Sea has rightfully been included in the UNESCO World Heritage List; it is also a Natura-2000 designated area with an improvement objective for the estuary habitat. Partly because of the location of the port, nature monitoring and management is a priority for Groningen Seaports. Because of other developments in the management areas of Groningen Seaports, there are animal and plant species that find their habitat under pressure, while other species are thriving. Groningen Seaports tries to anticipate these developments so that as many native species as possible can be preserved. The goal is to create space for desirable species that have an added value in the area.

4.7.1 Nature areas in ports

Projects for compensating nature

Groningen Seaports always tries to take mitigation or compensation measures if flora or fauna is potentially affected by the realisation of a project, for instance when a company is established. An example is the demolition of an old farm. If it turns out that bats are present there, bat boxes will be placed elsewhere as compensation. Similarly, the recent sighting of a beaver at the Eemshaven has not gone unnoticed and Groningen Seaports is currently investigating its habitat and will take the necessary precautions if the beaver turns out to have established itself in the area. The measures required to prevent damage to nature have been defined in an internal code of conduct (Gedragscode Natuurvriendelijk Werken). In 2020, this code has been approved by the Minister of Agriculture, Nature and Food (LN&V) and is available for consultation in the link below. The code is valid for Groningen Seaports and for any companies located within its management area.
Gedragscode Natuurvriendelijk Werken: Gedragscode-GSP_def.pdf (groningen-seaports.com)
Groningen Seaports has a long-standing policy to allocate extra financial resources to the realisation of mitigating nature measures during the construction projects in Eemshaven. For instance, an ecological zone was established in the area. Eemshaven Zuidoost now consists of

nature-friendly banks and public greenery. Butterfly and bee mixtures have also been planted. New bat habitats have also been successfully established.

Projects for additional nature

The "Ecological Plus" was launched as part of E&E in Balance and the Eems-Dollard 2050 Programme and serves to stimulate companies within the Groningen Seaports management areas to contribute to the unique environment. It mainly consists of a number of guidelines, of which the most important are that Groningen Seaports will provide the regional federation of environmental NGOs with timely information about new initiatives, and that they will coordinate the environmental, ecological and sustainability wishes of the establishing companies, the environmental NGOs, and local government. Groningen Seaports' own role in the Ecological Plus is mainly to stimulate companies and to consult important stakeholders in the region. For Groningen Seaports, it is important that a good relationship is established between our clients and their environment. Concretely this initiative means that for new or expanding companies, there is an investigation on the legal requirements towards its environments, its sustainability ambitions, and how its impact on the environment can be mitigated or negated. Additional agreements can been made to make a voluntary ecological investment in the region, in the form of a contribution to an ecological project in accordance with the ED 2050 programme, in combination with each economic investment. One of the aims is to improve and strengthen the ecological value of the area.

Through participation in the E&E in Balance platform, the partners are better able to link their interests to those of other parties, public and private. In the case of the Ecological Plus, companies make agreements about caring for the physical living environment with governments and nature and environmental organisations. Moreover, such agreements reduce the regulatory and administrative burden while the extra nature investments improve the environment and the (business) climate.

For the past two years, Groningen Seaports has been in discussion with the NMFG about the Ecological Plus, as described in the Structural Vision Eemsmond Delfzijl. Groningen Seaports cooperates with NMFG to professionalise the Ecological Plus, the discussion is still going on. Groningen Seaports has also effectuated an investigation on the Grote Polder area in Delfzijl, which concluded that the area is included in the programme.

Ems-Dollart 2050 programme

Over the past century, large areas around the Ems-Dollart have been drained to form polders, which has resulted in little or no natural transition zones between land and water in the coastal zone. Such transition zones are essential for the characteristic estuarine nature and for the sedimentation of fine sediment. Moreover, the shipping channels have been broadened and deepened over the course of time. The high tide from the North Sea can therefore enter at a great speed, bringing along large volumes of fine sediment. The low tide is not strong enough to transport all this material back into the North Sea. This results in fine sediment accumulation in the Ems estuary, while there is less opportunity for sedimentation. This is due to regular dredging and depositing; the fine sediment particles are constantly in motion and cannot settle. The combination of all these developments has resulted in increased turbidity levels of the waters of the Ems-Dollart. In turn, these high turbidity levels affect the base of the food chain: algae and benthic species. Production of algae is hindered due to the low level of light permeating turbid water. Seabed life has deteriorated because of the increasing level of seabed fine sediment. Sea grass fields and mollusc beds have almost

entirely disappeared. And so the (excessive) turbidity has a negative impact on the ecological carrying capacity and biodiversity of the Ems-Dollart.
Within the ED2050 programme Groningen Seaports cooperate to the different strategies to lower the turbidity by removal and benifial use of sediments. Examples of projects are VLOED, Pilot Raising Agricultural Lands, clay ripening pilot, production of reefsblocks, study for the use of fine sediments in cerametics, or soil improvement in agriculture.
Groningen Seaports also participates in the strategy "Smarter dredging and distribution of sand and fine sediment" to reduce turbidity of the Ems-Dollart.
A total overview of the programme is available by the link Programmaplan-Eems-Dollard-2050-English-Version.pdf (eemsdollard2050.nl).

Temporary nature

Groningen Seaports strives to designate as many fallow grounds as possible, for which currently nothing is happening and for which there is no agricultural use, as temporary nature. In these fallow grounds, Groningen Seaports is working on using flower mixtures, provided that this does not conflict with the flora that is already present, in order to enhance the habitats of insects, such as bees and butterflies. In other places, a conscious choice has been made to restore the flora naturally after excavation work. While ecosystems on such fallow grounds are kept in condition with care, the character of this environment is inherently temporary, and currently the release of more terrains to new companies is gaining momentum. This development is paired with increases in the transfer of persons and goods and in economic activity. Nevertheless, the new establishments include companies that have invaluable technology for a more sustainable future, such as for instance the newly attracted Avantium which manufactures bioplastics. Furthermore, Groningen Seaports plays an active facilitating role in diverse projects within the ED 2050 programme.
The fallow grounds in Delfzijl near Borgsweer are very suitable areas for ground-breeding birds and have proven popular among these in past years. Groningen Seaports strives to maintain this situation for as long as there are no signed contracts for these locations and their preparation for new customers haven't started. More information on the status of ground-breeding birds in the area can be found in subchapter 5.7.3.

Action: Groningen Seaports participates in the Ems-Dollart 2050 programme to restore ecological value of the estuary.

4.7.2 Nature monitoring

In order to map the status of nature in the management areas of Groningen Seaports, Groningen Seaports has a complete flora and fauna inventory carried out every 3 to 4 years. A new inventory has been ordered in 2021 and is currently being carried out. The last inventory took place in 2017 and is available as a GIS map via the link below:
https://gspnv.maps.arcgis.com/appps/webappviewer/index.html?id=4a5b409ac58444a690d29132175d4277

As part of the permit for the helicopter take-off and landing site in Eemshaven (realised in 2019), a voluntary agreement was made by Groningen Seaports with the nature and environmental organisations that a five-year monitoring programme would take place around the high-water refuge sites. Since 2017, Altenburg & Wymenga Ecological Research is

monitoring the effects of the newly realised heliport and helicopter movements around the high-water flight sites.
SOVON surveys and monitors the numbers of breeding pairs and the breeding success of various bird species in Delfzijl and Eemshaven in order to record bird victims of wind turbines. The results of these surveys are to be integrated in Groningen Seaports' PortAtlas system which will be coupled with an inspection app for flora and fauna. In addition, Avifauna studies bird migration in and around the area. Ecological bureau Waardenburg (BUWA) is conducting research into the damage that the wind turbines cause to birds in the management areas. Part of this research is the testing of a bird radar. This radar charts swarms of birds that arrive in the direction of Eemshaven. The aim is to reduce the number of bird victims by predicting bird migration and, as in the event of a high density of bird migrations it allows for a timely standby of wind turbines in the vicinity, so that the birds are not disturbed by rotating wind turbines.

Action: Conduct a full flora and fauna inventory within Groningen Seaports management areas every 4 years

Action: Our entire area is currently surveyed by ecologists (using the app), while data they release is included in PortAtlas. This way, in new ecologist or other experts could also make use of this in the future, and it is directly available for the internal organisation.

Environmental performance indicator:
Eighteen bird species with a Natura-2000 listing have shown a declining trend over the last 30 years, mainly fish-eating birds and birds that feed on shellfish and worms, but also migratory birds. In contrast, the common tern and the arctic tern have been doing relatively well again in recent years, thanks to new and safer breeding grounds. With the new "*Kluteneiland*" (Avocet Island), the number of avocets appears to be increasing again. This island has been finalised in 2018 and its bird population has steadily grown since. The number of avocets on the island "*Stern*" has also massively increased.

4.7.3 Nature management
The inventoried legally protected natural values of the terrains within the management areas of Groningen Seaports are included in PortAtlas, making the data accessible online both internally and externally. Groningen Seaports has previously stated its intention to develop a nature management plan, which is now in its early development stages. Groningen Seaports is also developing an app based on PortAtlas to make the data more accessible internally.
Groningen Seaports is one of the three members of the foundation Natuurcompensatie Eemshaven. The foundation owns the Ruidhorn (a nature reserve north of Uithuizen) and a part of the North Groningen salt marshes. In 2019 a new management plan was discussed in the foundation, which has been submitted to Natuurmonumenten. Natuurmonumenten publishes administrative reports about the area every six years.

Hunting policy
Until recently, there were many hunters in Groningen Seaports' management areas. These hunters are commissioned by Groningen Seaports to manage fauna that does not belong in these areas, or that is present in excessive quantities (as the duty of care applies to all

species). This is necessary to preserve indigenous species and give them a safe environment. Groningen Seaports is in consultation with the FBE (Fauna Management Unit) of the Province of Groningen about future hunting policy. Groningen Seaports wants this management to be adjusted, in part because of changes in the environment (such as the increased issuance of areas, or the growing number of installed wind turbines in the temporary nature areas). In line with these changes, the number of hunters has been reduced. While in recent years, 12 to 14 hunters have been active in the area, Groningen Seaports has made a more restrictive selection of these based on expertise and necessity, thereby reducing this number to 5. Moreover, hunting has been restricted to only consist of management of unwanted and excessive species such as geese, foxes and deer. Hunting the five official game species is not authorised within the management areas anymore, because of their decreasing numbers.

Action: Further develop the internal nature management plan

Protecting animals

Ground breeding and migratory birds

In 2018 the breeding island "*Stern*" has been constructed by RWS to the east of the Eemshaven. Groningen Seaports has financially contributed to the realisation of this breeding island. This island of 2400 m^2 consists of sand and clay soil with a top layer of gravel and shells. This layout makes it suitable and attractive for protected birds such as the common tern or the rarer Arctic tern to breed. After the first breeding season, the island already proved to be a success. The island was also constructed to relocate the Arctic Tern from Eemshaven to the island, due to their aggressive behaviour during the breeding season on business sites in Eemshaven. This led to a lot of nuisances, as these birds would attack bystanders and company employees. The population of Arctic terns has in large part been relocated, resulting in fewer birds in Eemshaven and a decrease in the nuisance. But despite the efforts, there still is a number of terns breeding on the roofs of companies in Eemshaven. Some of these companies are still trying to chase the birds away by using fake raptors (sort of kites), but for now we expect these birds to continue breeding in the port. Moreover, the presence of breeding birds can cause nuisance, delay, and economic setbacks. Groningen Seaports aims to better anticipate the breeding season and increase mowing in areas with active economic development in order to minimise disturbances for breeding species by encouraging them to breed elsewhere, which is also facilitated by the establishment of other breeding locations such as the island "*Stern*". From the most recent reports by Manche & Loonen (2021) it is clear however that breeding is much more successful on the specifically designated island than in the harbour. However, the SOVON monitoring reported the intrusion of a fox on the island that significantly impeded breeding successes, especially for Arctic terns and concludes that the placement of an electric fence has is crucial for the success of the colony.

BUWA is conducting a study on the effects of black paint on wind turbine blades in decreasing the number of fatalities among migratory birds. This has proven to be a successful measure in Norway, with a 70% decrease in lethal collisions, and its potential for indigenous species is currently under investigation in the Netherlands. In 2021, seven RWE windmills in the Eemshaven have been equipped with a black blade as part of this investigation that will last until 2024. Groningen Seaports facilitates this initiative and allows the birdwatchers to access the area.

Action: Groningen Seaports intends to make internal and third parties aware of when the breeding season is and what its consequences are for spatial developments. Through different management, we will try to prevent our important development sites from being used as nesting sites in the future

Environmental performance indicator:

In 2019, ten species of breeding birds were identified on "*Stern*", including three Red List species. The most recent available data shows that by 2020, the number of species has increased to fifteen, of which four red list species. As such, the diversity of bird species on the island has significantly increased. The 2021 breeding season has however been less successful than previous years, because of the predation of young birds and disturbance of the breeding birds by a fox. The general trend over the last years is still positive however. Most of the other species also have very significant positive numbers, while the number of species has also increased. As to the latter note, a remarkable success is the arrival of Spoonbills on the island. The relative popularity of the island as a breeding ground has equally increased, as its share of the total breeding pairs has increased for several species. Breeding success for Common Terns was measured at 1,26 in 2020, twice as high as the average rate of the rest of the Dutch Wadden Sea area. The 2021 breeding success numbers are lower because of the intrusion of a fox, but the total amount of breeding pairs still increased. In total the island counted 4241 breeding pairs of various species in 2021, compared to a mere 372 in the first year of its existence (2018), which represents a 1140% increase.

Species	2019	2020	2021
Spoonbill	0	0	9
Nile Goose	1	1	2
Greylag Goose	0	1	6
Shelduck	0	2	3
Crow duck	0	2	0
Wild Duck	0	1	2
Oystercatcher	8	8	11
Avocet	2	13	1
Redshank	**0**	**1**	**1**
Piedmont Plover	**7**	**8**	**8**
Common Gull	113	1096	2609
Black-headed Gull	1	5	11
Herring Gull	1	1	0
Black-backed Gull	0	1	1
Common Tern	**812**	**895**	**1424**
Arctic Tern	**216**	**132**	**152**
White Wagtail	1	1	1

Table 8: A comparison between the number of breeding pairs on breeding island "Stern" in 2019, 2020 and 2021 (Species from the Red List of Threatened Breeding Birds are printed in bold).

Bats and badgers

Bat roosts have been placed in Eemshaven Zuidoost. These have proven to be successfully used by bats. The current status of the bats in the roosts is monitored by Ecological Bureau

Bakker Assen. Some populations seem to have increased recently and several rare species of bats have been observed in the Eemshaven.
In Weiwerd a new badger sett has been spotted. This sett was located in a transport zone for wind turbines (for the construction of a wind farm), but another location has now been found for the construction cranes to pass. As a result, the castle has remained intact.

Raptors and owls

In order to promote natural control, including that of brown rats, Groningen Seaports has opted to install raptor poles (sitting areas). There are few trees in Eemshaven, but the buzzard mainly catches mice and rats from a fixed spot. Therefore, 25 raptor poles have been placed at strategic locations. From these poles, birds of prey like the Buzzard can hunt small mammals. Similarly, Groningen Seaports has experimented with the placement of an artificial Buzzard nest. Recent measures show that Buzzard and Falcon populations are on the increase. The increased issuance of terrain in the Eemshaven is however restricting the habitat and fixed territories. Several species of raptors, owls in particular, have been decreasing in numbers over the last years. In order to counteract the reduction in the number of birds of prey, is researching its options within the limits of an industrial area. For instance, during the last two years, Groningen Seaports has been placing nest boxes for raptor species. These were placed on strategic locations. These nesting boxes are especially suitable for the different types of Falcons such as the Kestrel, but also for the Barn Owl. These species are present in the areas and the placing of these nesting boxes can most likely lead to the conservation of these species in the management areas of Groningen Seaports. Currently, about 40% of these nesting boxes are in use by Kestrels.

Action: Groningen Seaports monitors permanent resting and residence sites of protected species and applies mitigating measures where necessary.

Controlling species

Stone-marten, rats, foxes, and wild cats

There has been a significant increase in foxes, stone-martens and especially brown rats in and around the Eemshaven. These cause a considerable degradation of ground-breeding bird populations such as Oystercatchers, Lapwings and Arctic Terns. Many of the newborn birds fall victim to predation, while breeding birds are disturbed. Moreover, they can damage infrastructure and material. However, the Stone-marten is a protected species and may not be hunted down. Both nationally and in the province of Groningen, the management of stone-martens is being evaluated, in a long-term process. The province of Groningen is taking action by looking at possibilities to work with an exemption. At this moment, there is an exemption for private parties in the event of significant disturbance. On the long-term, Groningen Seaports is waiting for an exemption to be able to capture stone-martens.
This is already possible for foxes, which are being captured with traps (especially in dykes) and moved to other locations, especially because of the disturbance they cause for breeding birds.
Brown rats represent an increasing problem, because of Dutch legislation it is not allowed to use chemical means to control the Brown Rat, while the population of this species and the accompanying nuisance are increasing all over the country. Therefore, Groningen Seaports hired a professional company, which fights the animal for two years. The method of control

is with trap cages and traps. Only on the basis of the monitoring plan and the number of catches (minimum number of catches with cages and traps), this certified company may proceed to chemical control. Brown rat populations have however been increasing in the area, and Groningen Seaports is searching for ways to control their numbers, because they represent a serious threat to infrastructure and even public health. In 2021, Groningen Seaports has tested the Eko1000 system, which is a very effective trap that catches and eliminates rats and mice in an ecological way. Unfortunately, the test had to be suspended when it turned out that a large number of other animals (mainly weasels) were caught alongside the targeted rats. Groningen Seaports also looks at the source of the rat population increase. Especially grain waste at Holland Malt, but also other waste sources have been attracting the rats to the Eemshaven. Groningen Seaports wants to reduce these waste flows in order to lessen the attractiveness of the area for rats and other nuisance causing species. Natural predation by raptors is equally starting to contribute towards the solution of this problem.
Feral cats have also caused some nuisance in the management area over the past years, but this problem has now been solved, with most of these cats being taken to the asylum.

Geese

Geese can equally cause major nuisance, especially species such as the Greylag goose and the Nile goose. In addition, the Nile goose is an exotic species and is superseding indigenous species in the Netherlands. During the past two years, Groningen Seaports has increased hunting on geese in its management area, on the basis of the new hunting policy. This has allowed to significantly decrease the population of geese in the area and consequently bring down the nuisance for tenants and companies. Groningen Seaports can now focus on controlling these populations.

Action: Ensure the inaccessibility of waste flows from companies in the Eemshaven, in order to reduce the amount of undesired animal species

Action: In cooperation with the province of Groningen, lobby for the possible amendment and/or relaxation of laws and regulations, with the aim of creating opportunities to better manage stone-martens

Species	Protect/Control	Remarks
Ground-breeding birds Arctic Tern Common Tern Lapwing Oystercatcher	Protect Control	Construction of breeding islands and creation of temporary nature terrain. Moving concerned species from locations in development before the breeding season
Raptors Buzzard Peregrine Falcon Kestrel Barn Owl Hawk	Protect/encourage	General improvements of the habitat within the possibilities of an industrial area. Placing raptor poles from which raptors can hunt. Placement of nesting boxes for smaller raptor species.

Bats	Protect	Placing bat roosts on various locations
Badgers	Protect	Realise compensating badger setts. Preserving existing badger setts.
Stone-martens	Control	Start of a procedure to facilitate management policy for stone-martens
Brown Rats	Control	Managing Brown Rats with traps and cages. Increasing raptor populations. Potentially using chemical means in cooperation with a certified corporation.

Table 9: Groningen Seaports tasks and responsibilities with regards to the various fauna species in the area

Protecting bees, insects and plants

In addition to the fallow grounds, where flower mixtures are used, Groningen Seaports now also uses flower mixtures in the cable and pipeline strips. This contributes to an improved environment with flowers, insects and bees.

Reed orchids have been exempted from their protected status since 2017. Nevertheless, Groningen Seaports is trying to manage them in terms of populations and thus maintain the species well. More is done than strictly necessary in this area and Groningen Seaports' current policy has proven to be successful in recent years. For example, with the recent establishment of a company on the Heveskes terrain, a group of orchids have been unearthed and moved to a different location.

Controlling plants

Groningen Seaports' management is executed ecologically, which includes mowing after the growing and flowering seasons of most plants, to ensure that the diversity of insects increases.

With respect to flora, Groningen Seaports has had a relatively large amount of trouble with hogweed, mainly in Delfzijl. In the past, this plant was controlled with chemicals. As this is contrary to our ecological ambitions, Groningen Seaports is testing the best way to manage this species. In a cycle of 3 years, hogweed is mowed 4 times a year (previously only 1 time a year) to exhaust the plants. This seems to be going in the right direction. Grazing with pigs and sheep or using of electric pest control equipment to control the plants has unfortunately proven too labour intensive. In good cooperation, and by exchanging experiences with the Port of Rotterdam, Groningen Seaports is actively looking at more innovative alternatives for control.

Species	Protect/Control	Remarks
Bees	Protect	Potentially placing extra beehives. Using additional flower mixtures.
Insects	Protect	Using additional flower mixtures.
Reed orchids	Protect	Giving enough space to the development of reed orchids, as well as protecting currently present plants. Moving plants to different locations instead of removing them in the event of new constructions.
Hogweed	Control	Locally mowing four times yearly.
Other flowers and plants	Protect/Control	Manage actively to ensure that weeds do not gain the upper hand where this is appropriate

Table 10: Groningen Seaports tasks and responsibilities with regards to the various flora species in the area

4.8 Soil and Sediments

5.8.1 Soil and archaeology

Soil and archaeology are two fields of importance for Groningen Seaports. Soil pollution needs to be limited as much as possible and both the quality of soil and its archaeological value have impact on the activities that can take place upon it. Moreover, sometimes ground removal or import have to be effectuated to enable new constructions. This process has been improved and simplified over the last years, in cooperation with the province of Groningen and local municipalities.

Archaeology

The "Behoudsplan Archeologie", which Groningen Seaports has had drawn up by A=M Adviespraktijk, has been implemented in the zoning plan for some time now. This conservation plan is maintained and consulted in case of any developments on plots of land. "Conservation-in-situ" remains the most sustainable form to apply to new activities when it comes to possible archaeology in the soil.

Soil contamination

The national project Aanpak Spoed was initiated in 2010. It focuses on soil investigation and remediation of locations with unacceptable risks for humans, the environment and the spread of soil pollution. These are called emergency locations and encompass all contamination sites in the Netherlands which were created before 1987. The province of Groningen is still working on the removal of these risks by cleaning up these locations. In fact, remediation of these sites

may take months to years. The remaining locations with pollution without unacceptable risks for people and the environment will also be remediated, which is required when changes take place at these sites, such as building works or road construction. Remediations must have started on all locations by 2020. The number of urgent locations is a suitable indicator for monitoring progress. Two urgent locations have been identified in Delfzijl. One of these locations was remediated in 2018, the other is currently being remediated, but its spreading risk has been reduced over the last two years, and the location is now officially controlled (as shown on the map below).

Environmental performance indicator:

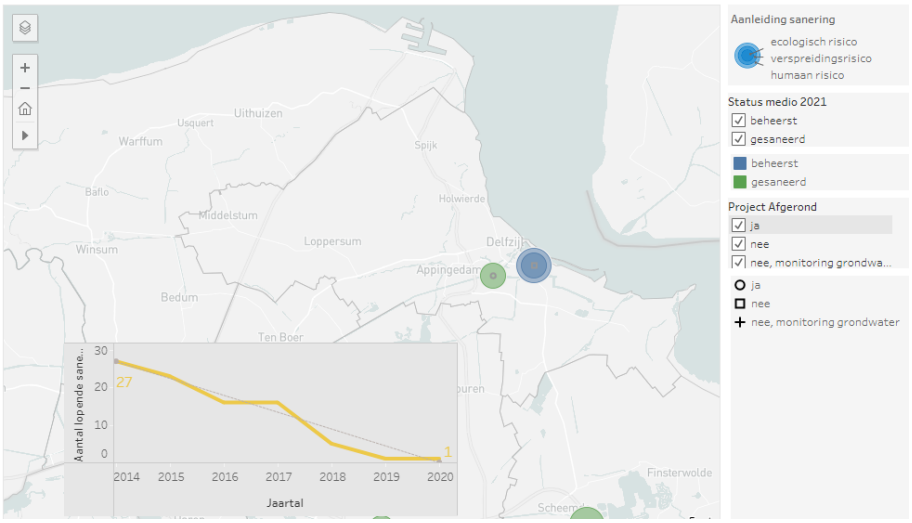


Figure 24: Emergency locations for soil contamination Delfzijl (April, 2021)

This map shows the location of the emergency sites in Delfzijl and the state of affairs in April 2021. The map distinguishes between soil clean-ups which have been completed, controlled and partly cleaned up (the status). An emergency location is controlled if it has not yet been remediated, but further spread or risks have been addressed. The size of the site increases based on the severity of the risk of further contamination of the remediation operation. The colours of the sites indicate whether remediation has been completed, controlled or ongoing. Based on the map and the table, it can be stated that the remediation of these locations is on schedule.

Soil management

In 2010, Groningen Seaports, together with the municipalities of Delfzijl and Eemsmond and the province of Groningen, drew up and administratively adopted the “Soil Management Memorandum for Eemshaven and the industrial areas in Delfzijl”. The purpose of this memorandum was to optimise and stimulate the reuse of soil and dredged material, including dredged material with high salt concentrations, within the management area of Groningen Seaports at the time (excluding Zuidoost and Fivelpoort) by means of an area-specific policy within the framework of the Soil Quality Decree. In 2013, the province of Groningen and the Groningen municipalities have drawn up a “regional Soil Management Memorandum Province of Groningen”. The areas of Groningen Seaports were deliberately left out of this document at the time.

Recently, the local authorities have updated their own soil management. The province and the municipalities have asked Groningen Seaports whether it would also like to be included in this provincial memorandum, effectively ending the current *status aparte* of Groningen Seaports. The intention to fully adopt the updated nota Bodembeheer only when the new Omgevingswet takes effect (expected 2023). Groningen Seaports has agreed to comply with the new management and to subordinate its areas to it. The advantages of the current Groningen Seaports soil management remain valid, but policy is now the same as in the rest

of the province. Concretely, this means that soil regulations from the entire province of Groningen are now applicable on Groningen Seaports sites and that soil from elsewhere in the province may be used on Groningen Seaports terrains (which was much more complicated previously). This has a number of economic and administrative advantages, but also induces a risk of higher concentrations of contaminated substances. As Groningen Seaports wants to preserve the quality of its soils, its internal policy regulates the application of soil originating from outside its management areas and its required qualities and continence. In order to decide whether soil from external sources should be accepted, Groningen Seaports has drafted a decision matrix. This will prevent our sites from being filled with materials that are legally permissible but environmentally undesirable. This matrix is an integral part of Groningen Seaports' policy since 2020 and is available for consultation in Annex 1 (in Dutch). The initial aim was to finalise the new provincial memorandum around the summer of 2019. However, just before completion, the newly irrupted Nitrogen Crisis demanded a complete review of the expectation map. This recalibration has now been completed. A new decision matrix for the application of soils has been drawn up by Groningen Seaports and is included the second appendix to this document. This decision matrix clearly indicates when Groningen Seaports may use soil, depending on its origin and class, among other factors.

Action: Groningen Seaports ensures that imported ground and mud don't have a negative impact on the soil quality of the management area

4.8.2 Dredging

It is necessary to know the environmental quality of extracted sludge when dredging and spreading it. According to legal requirements, all the silt in the ports is sampled once every two years in a seabed survey, in order to determine the environmental its quality. The seabed investigation is carried out in accordance with the protocols of the besluit Bodemkwaliteit (decree on soil quality). The entire harbour is divided up into sampling sections and six points are sampled per section. Concretely, this means extracting material from the bottom up to the dredging depth maintained in the harbour, after which it is examined in the lab. The results from the lab are tested against defined standards. A new standard for the amount of PFAS has recently been added. The standards determine whether the material can be spread outside the port. That has always been the case so far, because the sludge in the Delfzijl and Eemshaven harbours consists mainly of clean material. Up until now, all compartments have always been approved for spreading in salty seawater. In fact, no extra pollution of the seabed takes place in the ports and we expect the quality of the silt to remain similar in the future.
When salty dredged material is brought on land, other standards apply. In projects where sludge is to be used on land, selective consideration is given to the compartments from which sludge can be removed for use on land. Groningen Seaports guarantees the continuation of this water bottom research because of the requirements of the Soil Quality Decree and to guarantee the quality of the sludge.
Improving the quality of the saline sludge is not easy to steer, as Groningen Seaports has little to no influence on it because the sludge in the harbours mostly originates from outside the harbour (mainly from the Eems-Dollard and the Wadden Sea).
The new dredging contract for Delfzijl which started in 2018, Groningen Seaports stipulated with the contractor (Baggerbedrijf de Boer) that the ships used would be made cleaner, mainly in terms of emissions. This has been achieved; the dredger ("Airset", operational since

2001) deployed in Delfzijl was equipped with clean engines, including a corresponding certificate, when the new dredging contract commenced.
The LNG-powered dredger "Ecodelta" has been carrying out (semi-)annual dredging and maintenance work in Eemshaven in 2019 and 2020, for a total of three sequences. Unfortunately, its functioning had to be suspended, mainly because of the high maintenance costs. The ship "Hein", also owned by van der Kamp, is now commissioned with the dredging duties. Dredger "Hein" was recently equipped with a catalytic convertor on the main engines and as a result, the NO_x emission has been reduced by 75%. This ship also has the necessary certificates and complies to Groningen Seaports' sustainability wishes.
Groningen Seaports recently carried out a study that investigated the possibility of lowering a sand barrier in the mouth of the port of Delfzijl. This has been shown to have positive effects on the accretion of sediment. It reduces the amount of material that settles in the ports, which in turn reduces the need for dredging. In accordance with these results, the plan has been implemented and the results are being monitored.
The survey vessel Havenschap 1 is being used for the survey of the navigable depth of the port. To reduce emissions and to gain a more detailed information a pilot with drones to survey the port is being executed. The implementation of the use of drones will be part of the pilot in the coming period.

Action: Groningen Seaports monitors the quality of the dredged sludge in Delfzijl and Eemshaven during recurrent water bottom investigations.

Environmental performance indicator:
The quantities of dredged mud in the ports of Delfzijl and Eemshaven since 2016 are displayed in the following table. The quantities are rather stable in the Eemshaven and have slightly been reduced in Delfzijl.

Year	Delfzijl	Eemshaven
2016	1 435 200 m^3	1 710 000 m^3
2017	1 678 600 m^3	1 444 700 m^3
2018	1 544 100 m^3	1 540 800 m^3
2019	1 414 100 m^3	1 632 600 m^3
2020	1 357 300 m^3	1 598 600 m^3
2021	1 305 600 m^3	1 635 200 m^3

Table 11: Amounts of dredged material per year in Delfzijl and in the Eemshaven

5. Environmental responsibilities and resources

This chapter describes how Groningen Seaports is organised in terms of structure, who the important stakeholders are for Groningen Seaports and which staff member or department is responsible for the environmental measures to be taken. Furthermore, it is explained how Groningen Seaports strives to increase awareness, in relation to the environment and sustainability, among Groningen Seaports' personnel. The information in this chapter shows that Groningen Seaports has an adequate and appropriate management organisation. It also shows that Groningen Seaports' personnel are suitable to meet the objectives stated in the "Environmental policy statement" (see chapter 3).

5.1 Structure of organization and the position of identified staff

Since 14 June 2013, Groningen Seaports is a semi-governmental public company. This put Groningen Seaports at a greater distance from governments, so that Groningen Seaports can operate more efficiently and decisively and can also cooperate with others. In addition, the Joint Venture Port Authority Groningen Seaports is for the time being the only shareholder. Figure 25 below is a schematic representation of the organisational structure of Groningen Seaports.

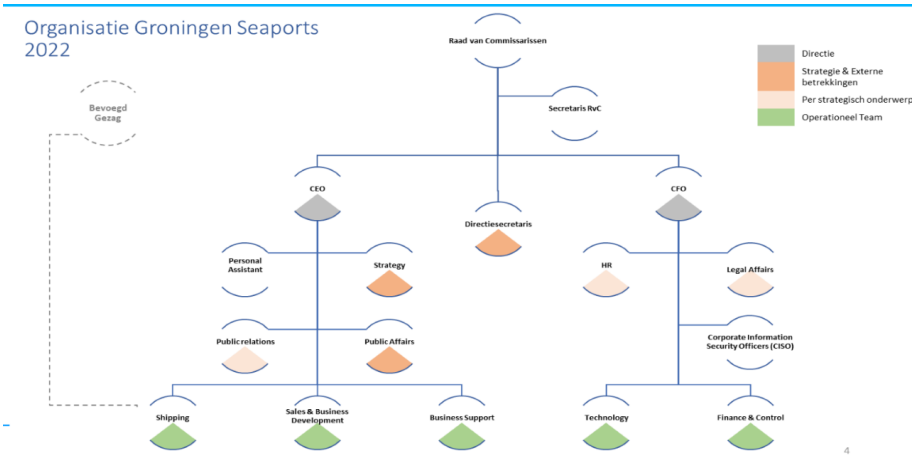


Figure 25: Organogram organisational structure Groningen Seaports

6.2 Stakeholders

A shift can be seen in which ports start cooperating with each other instead of competing. Groningen Seaports aims for close cooperation with other ports in the region. It is important for a port to be part of an efficient transport chain. Collaboration with various Dutch seaports and inland ports is being tightened. There is cooperation in the Northern Port Alliance with the aim of stimulating sustainable development in the ports. Germany is also an important

partner of Groningen Seaports, including a partnership between Niedersachsen Ports and Hafen Emden is improving port activities for both sides.
Besides alliances with ports, Groningen Seaports is interested in developing broader partnerships. Our cooperation initiatives with the NOM (Investment and Development Company for the Northern Netherlands), SBE (Cooperating Companies Eems Delta), Chemport Europe, and Energy Academy Europe are good examples of this.
Other important stakeholders of Groningen Seaports are governments, educational institutions, interest groups, local residents and commercial companies in the Northern Netherlands. A robust network is being created in various fields such as nature, space and energy. Some examples of these stakeholders are: Waterbedrijf Groningen, Stichting Natuur- en Milieufederatie Groningen, Staatsbosbeheer, Stichting het Groninger Landschap, Stichting WAD, Vereniging tot behoud van Natuurmonumenten in Nederland, De Landelijke Vereniging tot Behoud van de Waddenzee, Province of Groningen, Ministry of Economic Affairs and Climate Change, Ministry of Agriculture, Nature and Food Quality, Ministry of Infrastructure and Water Management, Ministry of Education, Culture and Science, Ministry of the Interior and Kingdom Relations, Directorate-General for Public Works and Water Management, IL&T Inspectorate, Gemeente Eemsdelta, Gemeente Het Hogeland, Waterschap Hunze and Aa's, Waterschap Noorderzijlvest, Omgevingsdienst Groningen, and the individual companies in Groningen Seaports' management areas.
Because of the cooperation with these parties, various projects have been created in the Eems Delta area in which Groningen Seaports initiates, facilitates or stimulates. Some examples are: Eems-Dollard 2050, Marconi and Ecology and Economy in Balance.

6.3 Environmental responsibilities of key personnel

The table below shows which personnel and which department within Groningen Seaports have this responsibility for each function for which Groningen Seaports is responsible.

Environmental functions	Job title
Port operations (dredging)	Manager Dredging & Surveying
Port operations (navigation)	Harbour master
Port operations (shipping)	Harbour master
Port operations (terminals)	Harbour master
Site management	Business managers
Strategic planning	Team strategy
Supplies acquisition	Sales and Sales Support
Licensing/Permits	Harbourmaster Sales and sales support Asset management
Quality management	Project administrator

On site contractor management	Project administrator
Emergency planning	Harbour master
Waste management	Harbour master Project Asset Management
Environmental document management	Sales and Sales Support
Environmental datamanagement	Sales and Sales Support
Soil pollution assessment	Sales and Sales Support
Air quality monitoring*	Provincie Groningen en gemeenten
Energy and carbon footprint monitoring	Business Development
Water quality monitoring*	Rijkswaterstaat and Water boards Noorderzijlvest/Hunze en Aa's
Noise management*	Province of Groningen and municipalities

Table 12: Environmental responsibilities of key personnel

* Groningen Seaports itself is not responsible for the monitoring of these functions. However, Groningen Seaports uses the monitoring information from the local authorities (Groningen province and municipalities), as well as from the Department of Waterways and Public Works and the Water Boards, in the processing of the results of Groningen Seaports' sustainability measures (see also chapter 5.A).

5.4 Evidence of efforts to promote awareness

Groningen Seaports considers it of great importance that its employees are aware of the environmental policy pursued and the possible environmental effects resulting from its activities. The actions stemming from the environmental policy are included in the business plan which formulates the five main themes of Groningen Seaports for the next five years (2022-2026), as well as the main objectives for the coming years. This gives substance to the mission of Groningen Seaports and the Port Vision 2030. The themes are: managing of growth, improving the establishment attractivity, making the organization robust and futureproof. With the choice of these themes, Groningen Seaports connects to the Shareholder Strategy that was adopted in 2016.

Documents

As Groningen Seaports has included the targets in the business plan, the organisation is aware of them, the necessary budgets have been reserved for the execution of the projects, and the responsibilities are defined. The accessibility of the business plan has also been increased by making it available to all employees in various ways, including via the site below. The measures, goals and ambitions per theme that have been formulated by Groningen Seaports in the business plan 2022-2026 can be read on: Bedrijfsplan 2022-2026 - Groningen Seaports Strategie (groningen-seaports.com)

In addition, the environmental measures, actions and developments that Groningen Seaports proposes in this PERS are also linked to the business plan.
In addition to the business plan, the Port Vision 2030, drawn up jointly by Groningen Seaports, is also publicly accessible via this website: http://havenvisie2030.groningen-seaports.com/.

Groningen Seaports is convinced that the economy based on renewable raw materials is the sustainable future, with market value for the ports. The vision must be able to respond flexibly to changing economic circumstances, trend shifts and social issues. The Port Vision 2030 is therefore a strategic document for further planning.
Since Groningen Seaports is fully committed to green economic development in the future, both in the Business Plan and in the Port Vision 2030, these documents are discussed here. In fact, these are leading documents within the organisation of Groningen Seaports and therefore also create an increased awareness among the personnel concerning the environmental policy of Groningen Seaports.

Staff

For Groningen Seaports, the Port Vision 2030 states that the economic growth is green, which means that for the long-term companies and businesses are mainly focused on sustainability and sustainable activities, it is therefore important that from the Sales & business development department such parties are attracted. In further substantiating this sustainable ambition, the companies are assisted by the Business development team, where new sustainability projects are initiated on the basis of knowledge and innovation. Talking about this with customers also means that Groningen Seaports itself sets an example. This is done by the Project Asset Management unit, which maintains the infrastructure and sites in a sustainable manner by using the necessary raw materials sparingly, thus also giving nature in the ports the opportunity to develop further. In the handling of shipping, safety comes first. From an environmental point of view, safety is important because damage to the environment can be considerable if mistakes are made when navigating ships.

Other activities to promote awareness

Below are a number of activities and measures that show that Groningen Seaports employees are made aware of environmental developments, the need and status of the environment and sustainability in business operations (these have partly already been discussed in more detail in chapter 5.3, Corporate Social Responsibility).

- A training course on the Environment Act was organised for management and staff.
- The EcoPorts certificate and the associated measures are important points in the staff meetings. EcoPorts is also regularly referred to with external stakeholders.
- Presentations and work experience assignments focusing on sustainability are organised every six months.
- Workshops have been organised concerning the CO_2 footprint reduction action programme. Groningen Seaports is actively working on this.
- With external support, an internal Energy Transition Strategy Team has been set up to steer this transition in the right direction.
- Groningen Seaports stimulates the use of online services for meetings, among other things, and organises courses for this purpose (Microsoft Office 365).

- Staff are asked for their input when it comes to sustainable initiatives. For example, for the business plan or the joint development of the Port Vision.
- Sustainability indicators have been included in the annual reports since 2018.

5.5 Resources for environmental actions

The activities and measures proposed by Groningen Seaports in chapter 5 are also included in the targets of the business plan, including the financial planning. For more information see: Bedrijfsplan 2022-2026 - Groningen Seaports Strategies (groningen-seaports.com)

6. Environmental review on legal requirements

This chapter highlights various measures described in chapter 5 in more detail to demonstrate that Groningen Seaports is actually implementing the actions and measures, in accordance with corresponding laws and regulations. It also emphasises the environmental performance of the ports, based on chapter 5.A and the environmental performance indicators. Furthermore, it presents an overview of the actions included in the PERS 2023-2025, their priority, the responsible department or co-worker, corresponding chapter, and current status of the actions. The previous actions table from the PERS 2021-2023 is also included and the status of each action has been updated. For 2023-2025 a new structure has been developed for the action table which clarifies the link between Groningen Seaports' actions and the Sustainable Development Goals from the United Nations.

6.1 Review of port environmental performance

Chapter 5 mentions concrete actions for each environment aspect, with the aim of starting and/or completing these actions in the next two years. It is important that these actions contribute to the development of the environment or region in the perspective of sustainable economic or ecological progress.

In order to compare the current state of affairs with the past, environmental performance indicators have been added to several key points in chapter 5. They show the developments based on the most recent figures, in contrast to other years (usually from 2016). They uncover a trend of progression concerning ecological and economic developments involving Groningen Seaports, as outlined in the next paragraphs.

The text mentions concrete measures relevant for any economic or ecological development. These contribute to the environmental performance of the ports and nearby industrial areas. The choice was made to describe the environmental performance indicators per aspect so to give a clear picture what has been achieved by the actions and measures. Examples of these environmental performance indicators are the measurements of collected maritime waste, the developments in relation to solar and wind parks, and the monitoring of nitrogen oxide emissions and particular matter emissions in the Eemsdelta region.

The figures for the number of ships with an ESI and Green Award certificate show that the number of green ships has increased over the years (cumulative). The collected maritime waste is subject to considerable fluctuations, because ships visit the ports irregularly and with different cargo. The additional measures of Groningen Seaports' HAP will contribute to more efficient collection in the future. The figures of the dredged sludge show that these quantities remain almost constant, so this situation is stable.

To further demonstrate that the actions in the previous PERS (2021-2023) were implemented or started; Table 14 contains a table with the actions of this period. These actions indicate whether implementation of the action has not yet started, has been started but not yet completed or has been completed. In addition, actions may be discontinued, or they can be performed continuously. The following table lists the actions for the next two years, which are partly based on the previous actions. The current status of these actions is also shown in the table. In addition, the priority of the action taken or to be taken is indicated. This prioritisation was drawn up on the basis of the review of the environmental performance indicators, and the organisation has also determined what the important spearheads are for the coming period. Furthermore, internal and external stakeholders were informed about the

measures and actions of Groningen Seaports and asked to provide input. This input has been processed in the final prioritisation of actions to be taken for the period 2023 -2025.

Table 14 displays the 2021-2023 PERS actions and their progression. The new table of actions for the current PERS (2023-2025) has been structured according to the Sustainable Development Goal each action principally contributes to. Most actions contribute to several SDG's at once, but for better readability they are classed under a single one. This new format is presented on the next pages, followed by table 14.

Main SDG	Actions for 2023 - 2025	Chapter	Responsible	Priority	Status
	Groningen Seaports is supporting the educational development of young professionals. We are building a Seaports Academy and have around 8% interns and trainees in our workforce on a regular basis. In addition, there is a constructive collaboration with schools and universities.	*	HRM	▶	Action is carried out continuously
	Groningen Seaports has devoted extra attention to undesirable behaviour, and both an internal and external confidence person are available to its employees for consultation, advice and reporting discrimination	*	HRM	▶	Action is carried out continuously
	Groningen Seaports encourages companies within its management area to use industrial water for their production processes.	5.5.3	Business Development	▶	Action is carried out continuously
	Groningen Seaports develops its utilities to support alternative energy sources (such as steam for instance) that contribute to the reduction of emissions	5.A.5	Business Development	▶	Action is currently in the process of implementation
	Groningen Seaports will finalise the development of the solar park Valgenweg	5.1.2	Business manager energy- & dataport	▲	Implementation of this action is yet to be started
	Groningen Seaports investigates the expansion of its shore power infrastructure to sea shipping in the Eemshaven.	5.4.1	Business Development	▼	Action is currently in the process of implementation
	Groningen Seaports stimulates the use of LNG in various ways, including by obtaining new and enlarging current permits where necessary so that LNG can be bunkered on a larger scale at more locations in the ports.	5.4.2	Nautical service centre	▲	Action is currently in the process of implementation
	Groningen Seaports facilitates the use of hydrogen as a shipping fuel and encourages the development of other new clean fuels	5.4.2	Nautical service centre	▼	Action is currently in the process of implementation

	Groningen Seaports is actively lobbying in favour of a 10GW production increase of wind farms in the North Sea in order to ensure renewable energy supply for green hydrogen production in the Eemshaven and wants to contribute to such developments with its harbour facilities. Groningen Seaports also dedicates its infrastructure at the Eemshaven to connect the supplementary offshore production to the national power grid.	5.1.3	Advisor Public Affairs	▲	Action is currently in the process of implementation
	Groningen Seaports develops a risk-based assessment framework for scaling up renewable energy in the industrial area.	5.1.1	Business Development	▲	Action is currently in the process of implementation
	Groningen Seaports takes part in the consortium HyNorth in order to promote and realize the Northern Netherlands Hydrogen Investment plan. Within this consortium, Groningen Seaports actively promotes the development of a hydrogen value chain, from production to end-consumer, in the Northern Netherlands	5.1.5	Team Strategy	▶	Action is currently in the process of implementation
8 DECENT WORK AND ECONOMIC GROWTH	Groningen Seaports is co-developing a system that can calculate the lateral forces exerted on ships by wind and water, based in part on weather expectations, in order to improve nautical safety	5.6.1	Nautical service centre	▲	Action is currently in the process of implementation
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Prepare the area for the investments of the companies by rolling out the business case for Oosterhorn-zuid, Valgen, Heveskes. These companies will contribute to the circular economy and to a biobased chemical sector.	5.1.4	Business managers	▲	Action is currently in the process of implementation
	Groningen Seaports seeks to attract companies at the end of the hydrogen chain to its management area in order to create a sufficient demand basis for the expansion of hydrogen infrastructure in the region.	5.5.1	Business Development	▼	Implementation of this action is yet to be started
	Groningen Seaports wants to build a hydrogen pipeline network in the near future, tailored to customer demand, expand it in the long term to supply companies on the industrial estate with hydrogen, and connect it to the national hydrogen grid.	5.5.1	Business Development	▼	Implementation of this action is yet to be started
	Groningen Seaports is investigating the possibilities of a residual heat pipeline network in both the Eemshaven and Delfzijl and will stimulate these developments. Groningen Seaports has the intention to construct the pipelines in cooperation with other partners.	5.5.2	Business Development	▶	Action is currently in the process of implementation
	Groningen Seaports is studying the expansion of its steam grid and the sustainable options therefor.	5.5.2	Business Development	▶	Action is currently in the process of implementation
	Groningen Seaports intends to build a pipeline for CO2 between EEW and BioMCN for the capture of CO2 and the application of its use in industrial processes.	5.5.2	Business Development	▶	Action is currently in the process of implementation

	Groningen Seaports conducts a further study into the feasibility of a direct current network within the Oosterhorn industrial area and wants to gather support for this project with companies in the energy chain.	5.5.5	Business Development	▶	Implementation of this action is yet to be started
	Groningen Seaports strives to be an important link between established industry and new start-ups, in order to foster innovation in the energy and recycling sectors	5.2.5	Sales & Business development	▶	Action is carried out continuously
	Expand and improve testing facilities for start-ups and scale-ups in MOI and Chemport Industry Campus	5.2.5	Sales & Business development	▲	Action is currently in the process of implementation
	Groningen Seaports actively participates in NorthGrid with the objective to provide the necessary facilities to develop underground cable and pipeline connections for hydrogen, heat, industrial water, power and CO2	5.5.1	Strategy Team	▶	Action is currently in the process of implementation
11 SUSTAINABLE CITIES AND COMMUNITIES	Groningen Seaports offers its technical department a set of courses on sustainability in construction	5.3.3	Teammanager technology	▲	Action is currently in the process of implementation
	Intensify the internal collaboration between Business development and Sales, especially at the start of the location process. Focus on the location requirements of the client and how these fit in with the area.	5.6.3	Sales & Business development	▲	Action is currently in the process of implementation
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	In addition to the support of current initiatives, implement the circular economy within the Groningen Seaports management areas as much as possible by including missing links in the relevant chain	5.2.3	Business manager circular economy	▶	Action is currently in the process of implementation
	Further facilitate start-ups that offer solutions to plastic waste and monitor their results.	5.2.3	Business manager circular economy	▶	Action is carried out continuously
	A new port waste plan is under development. In this plan, we strive to collect waste in the most circular way possible.	5.4.4	Nautical service centre	▲	Action is currently in the process of implementation
	Groningen Seaports wants to promote and facilitate domestic waste reduction and sorting and is committed to draft up a plan towards this ambition.	5.3.3	Facility services	▲	Implementation of this action is yet to be started
	Ensure the inaccessibility of waste flows from companies in the Eemshaven, in order to reduce the amount of undesired animal species	5.7.3	Asset Manager	▼	Implementation of this action is yet to be started
	Groningen Seaports sets up its infrastructure in order to support shore power facturation based on consumption for a fair cost distribution and to increase the incentive for lower energy consumption on docked ships.	5.4.1	Project engineer energy technologies	▶	Action is currently in the process of implementation

	Groningen Seaports maintains a register with ships that have an ESI score of over 20 or a Green award and grants these a discount on port dues in order to encourage green shipping.	5.4.3	Nautical service centre	▶	Action is carried out continuously
	Groningen Seaports ensures that imported ground and mud don't have a negative impact on the soil quality of the management area	5.8.1	Sales and sales support	▶	Action is carried out continuously
13 CLIMATE ACTION 	In cooperation with the companies involved, Groningen Seaports is investigating the possibilities of capturing, storing and utilizing CO2 on a larger scale.	5.1.1	Team Strategy	▼	Action is currently in the process of implementation
	Groningen Seaports replaces the lighting in the office for LED variants and investigates whether the complete replacement needs to be outsourced.	5.3.3	Facility services	▲	Action is currently in the process of implementation
	Groningen Seaports continues to implement a conscious but workable office environment with the possibilities that ICT offers, which contributes to sustainability by means of facilities such as remote meetings via Teams.	5.3.3	HRM, Facility services, Coordinator Sustainability	▶	Action is carried out continuously
	Together with the national sector organisation for seaports, Groningen Seaports wants to ensure that the discount systems in the national seaports are adapted, standardised and expanded in the coming two years.	5.4.3	Nautical service centre, Coordinator Sustainability	▼	Implementation of this action is yet to be started
	Groningen Seaports investigates its options for a more sustainable heating system	5.3.3	Asset Manager real estate	▲	Action is currently in the process of implementation
14 LIFE BELOW WATER 	Groningen Seaports participates in the Ems-Dollart 2050 programme to restore the ecological value of the estuary	5.7.1	Business Development	▶	Action is currently in the process of implementation
	Groningen Seaports monitors the quality of the dredged sludge in Delfzijl and Eemshaven during recurrent water bottom investigations.	5.8.2	Manager dredging and surveying	▶	Action is carried out continuously
15 LIFE ON LAND 	Conduct a full flora and fauna inventory within Groningen Seaports management areas every 4 years	5.7.2	Asset Manager	▶	Action is carried out continuously
	Our entire area is currently surveyed by ecologists (using the app), while data they release is included in PortAtlas. This way, in new ecologist or other experts could also make use of this in the future, and it is directly available for the internal organisation.	5.7.2	Asset Manager	▲	Action is currently in the process of implementation
	Further develop the internal nature management plan	5.7.3	Asset Manager	▲	Action is currently in the process of implementation
	Groningen Seaports intends to make internal and third parties aware of when the breeding season is and what its consequences are for spatial developments. Through different management, we will try to prevent our important development sites from being used as nesting sites in the future	5.7.3	Asset Manager	▲	Implementation of this action is yet to be started
	In cooperation with the province of Groningen, lobby for the possible amendment and/or relaxation of laws and regulations, with the aim of creating opportunities to better manage stone-martens	5.7.3	Asset Manager	▼	Action is currently in the process of implementation
	Groningen Seaports monitors permanent resting and residence sites of protected species and applies mitigatin measures where necessary.	5.7.3	Asset Manager	▶	Action is carried out continuously

17 PARTNERSHIPS FOR THE GOALS	Promote and enhance the cooperation within circular economy chains	5.2.3	Business manager circular economy	▼	Action is currently in the process of implementation

7. Environmental best practices

Groningen Seaports
Delfzijl and Eemshaven, province of Groningen, The Netherlands

Contact person: Jeroen Dijkstra
Position: Sustainability Coordinator
E-Mail: j.dijkstra@groningen-seaports.com

Environmental issue:

- Soil & ground import
- Prevention of ecosystem degradation
- Soil quality/pollution
- Sustainable cities and communities (SDG 11)

Relevance to the 5 Es framework of the ESPO Green Guide:

- Engage
- Exemplify
- Enable
- Enforce
- Encourage

Title best practice: Soil management Groningen Seaports

Description:
Whether it is for construction, for terrain preparation, or for other activities, Groningen Seaports regularly has to import quantities of landfill materials, such as sand, mud and other types of ground. Previously, the Groningen Seaports management areas used to have a special status within the province of Groningen which regulated the quality of its soils and the allowances of imports. For compliance with the upcoming Omgevingswet however, the province has updated its soil management regulations, and it was agreed to extend the provincial regulations to the Groningen Seaports areas. However, in practice this often means that soil of lesser quality from other parts of the provinces is now allowed to be applied and used in the Groningen Seaports management area, which could have negative effects on soil quality and biodiversity. In order to avoid such negative effects, Groningen Seaports has drafted a decision matrix that regulates the imports according to the quality of the soil. Moreover, two ground flux coordinators have been appointed. This way, Groningen Seaports can maintain its quality standards while also complying to provincial regulation, and reducing the administrative burden. Moreover, tailored decisions can now be made for each project. Visual inspection of ground is also a requirement included into the new policy. The communication around this new strategy has been organized around the seminar "*Grip op Grond in Grunn"* in the Eemshaven.

Benefits:

- The ecosystems within the Groningen Seaports areas can be preserved from negative impacts of soil and sand imports.
- The quality of the soils and materials used at Groningen Seaports remains guaranteed.
- The matrix allows for better monitoring of the used materials
- The two areas have now been added to the provincial soil quality map

Illustrations (also found in Annex 1):

Groningen Seaports
Delfzijl and Eemshaven, province of Groningen, The Netherlands

Contact person: Heleen van Wijk
Position: Business Manager Circular Economy
E-mail: h.vanwijk@groningen-seaports.com

Environmental aspects:

- Water quality
- Climate change
- Circular Economy
- Waste
- Life under water (SDG 14)

Relevance to the 5 Es framework of the ESPO Green Guide:

- Engage
- Exemplify
- Enable
- Encourage

Title best practice: Noria (CanalCleaner)

Description:
In cooperation with Rijkswaterstaat, Noria maps out the locations where plastic can be captured, removes the plastic from the water with its energy-efficient and fish-friendly systems and then processes the plastic into new products. The start-up has been welcomed in the Eemshaven during the Start-up Residence Noord-Nederland 2021 event and has consequently been invited to test run its CanalCleaner in Groningen Seaports' port areas. Their solution looks at the influence of natural conditions such as water flow and wind on the behaviour of plastic. By selecting the location where the plastic naturally drifts, they work together with nature and can tackle the waste problem in a sustainable and affordable way. By positioning the CanalCleaner correctly and using its long float arms, Noria ensures that the plastic waste is led to the screw by wind and current. The screw turns periodically to remove the plastic collected in front of it. When rotating, the screw scoops the plastic waste out of the water and transports it to the core of the machine, where it is stored. By working together with nature and removing the plastic close to the source, it can prevent harmful substances from entering the environment. This is partly during the process the decomposition process from macro- to micro-plastics has not yet taken place.

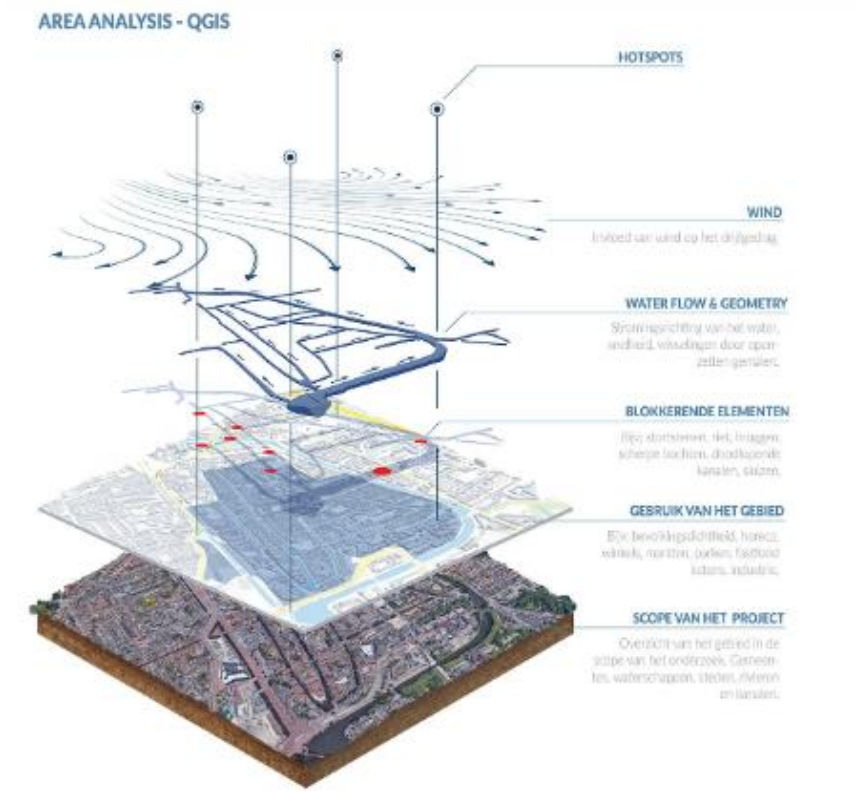
Benefits:

- The CanalCleaner is energy-efficient and doesn't emit greenhouse gases as it works with a solar panel
- Plastics are removed from water bodies to reduce pollution and increase water quality
- The process ensures minimal left-overs of micro-plastics
- The CanalCleaner works in a very natural and nature-friendly fashion
- The CanalCleaner is much more cost-efficient than traditional methods

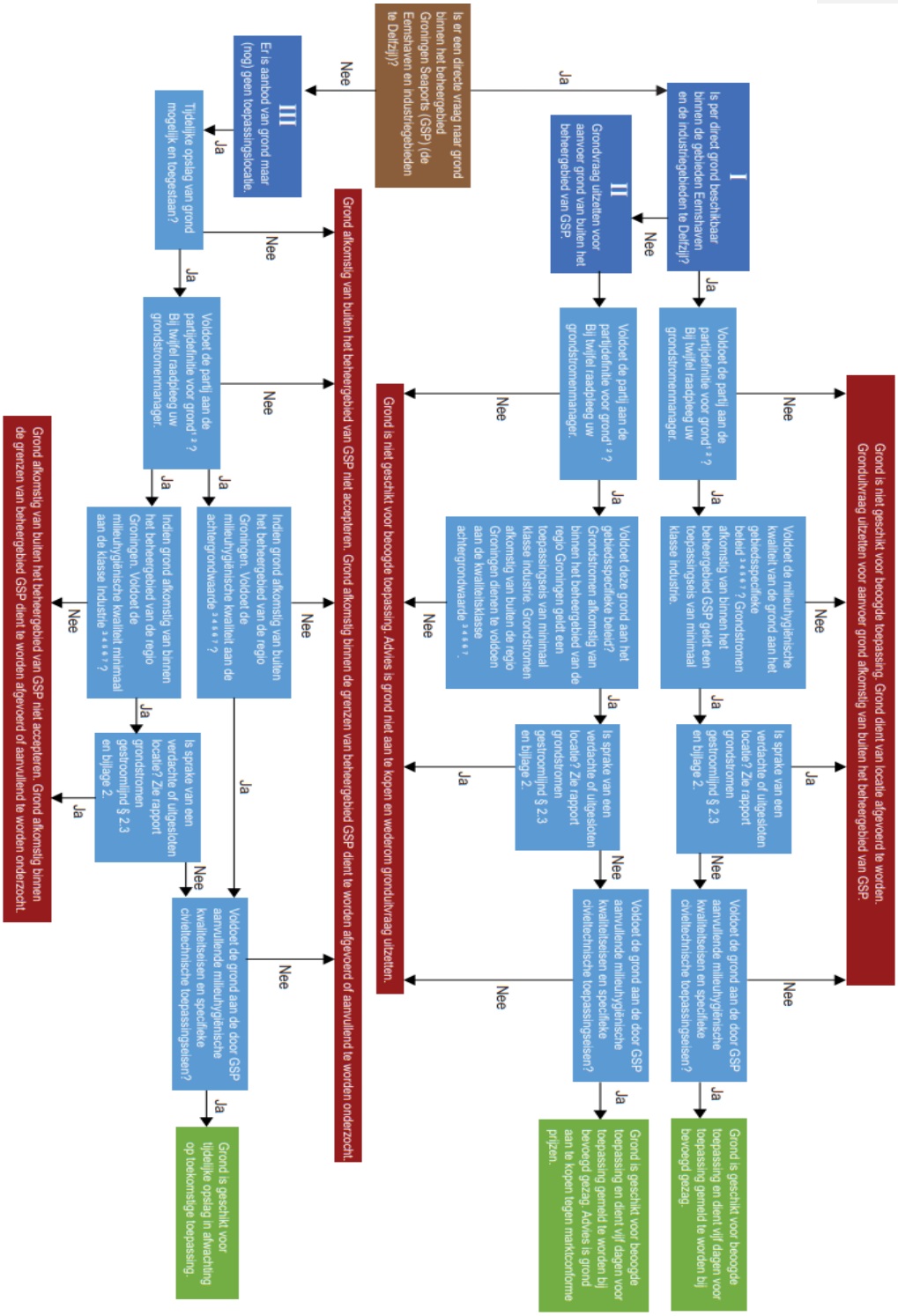
Links:

- https://www.winnovatie.nl/inzending/noria-sustainable-innovators-de-canalcleaner
- https://www.noria.earth/

Illustrations:



Annex 1 – Soil management policy Groningen



Annex 2 – Lease car CO_2 compensation

07C13027

CERTIFICAAT

Groningen Seaports

heeft 37,71 ton CO_2 equivalenten gecompenseerd via Multi Tank Card BV in 2021

Met:

VCS Renewable Energy credits

Compensatie vindt plaats door de speciaal geselecteerde duurzame energieprojecten van Climate Neutral Group. Met deze projecten wordt elders CO_2-uitstoot teruggebracht.

Wij selecteren onze projecten altijd op de bijdrage die zij leveren aan de ontwikkeling van de lokale bevolking en regio. Ontwikkelingen zoals: werkgelegenheid, kennisoverdracht, gezondheidsverbetering, stimulering van de eigen economie en lokale milieuverbeteringen.

René Toet
Managing Director
Utrecht 2/6/2022

Climate Neutral Group
Part of Anthesis