



DUTCH
SAFETY BOARD

Compromise on room to manoeuvre

Managing the safety of shipping in an
increasingly crowded North Sea



CONSIDERATION

The Dutch North Sea

When you stand on the beach looking out over the seemingly endless North Sea, you may find yourself thinking: ‘How calm and peaceful it is, and how spacious!’ Depending on where you are, some ships and wind turbines may be visible, or closer to shore some fishing boats. But out of sight, beyond the horizon, the North Sea is getting ever more crowded. Out there, there’s in fact a great deal of shipping, including to and from Dutch ports, there are fishing vessels, and 160 platforms for oil and gas extraction, as well as Defence training areas, Natura 2000 areas, and areas for sand and shell extraction. Moreover, there are currently about 700 wind turbines, as well as 7,000 kilometres of pipelines and 4,000 kilometres of cable buried under the seabed. So the North Sea has a wide variety of different uses and users. And virtually all these activities involve shipping. The interests of those different users regularly come into conflict. Extracting oil and gas isn’t possible in military training areas, for example, while sand and shell extraction is not permitted in Natura 2000 areas. Fishing is prohibited where there are cables buried under the seabed, and vessels aren’t permitted to sail through wind farms. So in the North Sea, finding room to manoeuvre is quite a problem.

Tension between renewable energy generation and the safety of shipping

In the coming decades, the North Sea is set to become even ‘fuller’. As part of the energy transition, there are plans to greatly expand the number of offshore wind turbines. The Climate Agreement states that by 2030 Dutch CO₂ emissions must be at least 55% lower than in 1990, and that the Netherlands must be climate-neutral by 2050. To achieve that target, the country is committing heavily to offshore wind energy, i.e. wind farms out at sea. The shallow depth and favourable wind climate of the North Sea make it well suited for this. A number of wind farms are already operational in the Dutch sector, supplying a significant portion of the country’s renewable energy. The Netherlands’ current energy policy includes plans for expanding wind farm capacity in the North Sea from about 5 gigawatts to about 21 gigawatts by 2030. That equates to more than 1,700 offshore wind turbines. At the same time, the North Sea is one of the world’s busiest shipping areas, and it serves as an important gateway to Europe. The expected proliferation of fixed objects will further restrict the room available for shipping and increase operational complexity. The Julietta D incident in 2022 – when a ship went adrift and allided with two structures of a wind farm under construction – shows the tension between fixed objects out at sea (including wind turbines) and shipping.

Insufficient understanding of the risks

It emerges from the present investigation that there is only a limited understanding of the risks to maritime safety that result from the installation of fixed objects in the North Sea. Management of those risks is consequently insufficient and potentially unsafe situations remain unexposed. Although shipping safety is in fact considered during the decision-making process, the risk analyses used for that purpose contain

multiple gaps. It is also unclear what level of risk is considered acceptable when decisions are made. The Dutch Safety Board believes that understanding safety risks is the basis for effective risk management. Deciding on the installation of fixed objects in the North Sea demands an understanding of the risks that they will pose to shipping (among other aspects). The use of data and models based on the situation *without* wind farms does not allow one to arrive at an up-to-date understanding of the risks. When a situation changes – as it has for shipping with the advent of large-scale wind farms – the models do not, after all, automatically evolve in line with it. Effective risk insight requires new or improved models that also take account of known developments. The understanding of the risks thus gained can then be assessed against the safety goal so as to determine whether additional efforts are necessary. That is only possible, however, if there is a safety goal that is both realistic and can be tested too. To determine whether the safety goal can be achieved by implementing control measures, it is also essential to understand the effectiveness of those measures. This can be tested by means of modelling or by utilising scenarios. Understanding the effectiveness of the measures allows one to determine which of them are appropriate. On that basis, policymakers can make informed decisions and re-evaluate previous decisions. If one has a better understanding, one can also seek more specific input from other user groups in the decision-making process.

Safety demands a proactive focus

It is important to realise that decisions that are taken now on the installation of fixed objects in the North Sea have implications for the risks in 2030-2050. In other words, the future of shipping safety in the North Sea is being determined right now. Thousands of fixed objects are expected to be installed there in the future (after 2030). There are plans for converting the electricity generated by wind turbines into hydrogen or ammonia. This will require new platforms to be constructed, and it will also need to be possible to transport the hydrogen on board tankers or via pipelines. All this means that the North Sea is gradually being transformed into an offshore industrial zone, with ships constantly finding fixed objects or other vessels alongside them. Shipping traffic in traffic separation schemes will also increase in intensity, with vessels sailing closer together. In contrast to air traffic in the skies over the Netherlands, there is no traffic management system for shipping in the greater part of the North Sea. Moreover, further upscaling is also taking place within the shipping industry and vessels are being equipped with new power sources. This brings with it new incident scenarios and safety risks. The Dutch Safety Board therefore considers it necessary for the approach to shipping safety to evolve along with the increasing complexity that results from the scaling up of wind energy and shipping.

North Sea risk management needs to be viewed differently

It is highly likely that – with an improved understanding of the risks – the installation of fixed objects in the North Sea will in some cases prove incompatible with the goal of shipping safety. In such cases, the zoning plans will need to be revised, especially because the consequences of shipping accidents may potentially become more serious for the Netherlands. After all, more and more activities are taking place on and in the North Sea. The activities and systems involved provide us with energy, goods, data, communication, and food, among other things. The North Sea is thus developing into a lifeline for the Netherlands. A shipping accident involving, for example, damage to the

seabed, obstruction of shipping lanes, or spillage of hazardous substances can have serious consequences. The spatial layout of the North Sea therefore requires a system of risk management that goes beyond the direct risks to shipping safety and that – allowing for uncertainty – also takes other safety aspects into account. That can serve as a basis for an integrated assessment of the various interests, thus determining which location is most appropriate for a given activity with regards to safety.

Pioneering role for the Netherlands and other North Sea countries within the IMO

Besides the Netherlands, the United Kingdom and other EU countries such as Belgium, Germany, and Denmark are also investing heavily in North Sea wind energy with a view to meeting their emission targets. Up till now, fixed objects have always been fitted in around pre-existing features such as shipping lanes, traffic separation schemes, anchorages, and other areas with defined activities. With a view to future developments, it is necessary to consider the entire North Sea when determining how different activities can safely coexist. Although the Netherlands can determine independently where fixed objects will be located, the shipping routes across the North Sea are defined internationally and the unobstructed passage of vessels must be respected. The Netherlands cannot therefore determine independently where vessels can or must sail in the North Sea. The Dutch Safety Board therefore calls on the Dutch Minister of Infrastructure and Water Management to join with the other North Sea countries to arrive at a view, enjoying mutual support, on how shipping can continue to travel safely across the North Sea in the light of the changing circumstances. Making the North Sea safe means looking at it in a different way. This may include re-routeing traffic separation schemes and anchorages and regulating the routes taken by shipping. Consider carefully which locations are most suitable for which activities, and do not be reluctant to relocate existing activities if necessary. The Dutch government can play a pioneering role in this regard.

SUMMARY

On 31 January 2022, the Maltese bulk carrier Julietta D encountered problems during a storm in the North Sea. At the time, the vessel was in the anchorage area off the port of IJmuiden. The Julietta D's anchor was unable to hold her in place and the vessel went adrift. While drifting, she collided with another anchored vessel and then struck the pedestal of a future wind turbine and subsequently the foundation of a transformer station that was yet to be installed. The Julietta D incident is one in a series of incidents in the North Sea involving ships and fixed objects. That series of incidents was a reason for the Dutch Safety Board to launch an investigation into risk management for shipping in the North Sea. The Dutch Safety Board has investigated the manner in which shipping safety is taken into account in the decision-making process for the installation of fixed objects in the North Sea. It also looked at how risk management for North Sea shipping is organised as regards the installation of fixed objects and what lessons can be learned from the findings. The circumstances of the incident with the Julietta D were not investigated by the Dutch Safety Board but by the Maltese maritime accident investigation authority, the Marine Safety Investigation Unit (MSIU).

Responsibility and influence of the Dutch government in the North Sea

It is the national government of the Netherlands that determines the spatial layout for the Dutch Exclusive Economic Zone (EEZ) of the North Sea. The aim is to enable different activities – such as sand extraction, nature conservation, and energy generation by means of wind farms – to be carried out simultaneously. The national government can influence international shipping within the EEZ only to a limited extent. It has been established internationally that shipping has freedom of navigation. If the Netherlands wishes to regulate shipping on a particular route by establishing a traffic separation scheme, for example, this must be approved by the International Maritime Organization (IMO). Within the national government, responsibility for maritime safety is centrally assigned to the Ministry of Infrastructure and Water Management, which aims to maintain shipping safety in the North Sea at the same level, or to improve it. The department responsible for shipping safety within the Ministry is involved in decision-making on the layout of the North Sea and thus assigns shipping safety a place within that process. The shipping industry is also involved.

Because of the construction of wind farms in the North Sea – as part of national government's energy policy – the number of fixed objects in the EEZ has increased significantly in recent years. Given current plans, that number will increase even further in the coming years. The majority of current and planned wind farms are adjacent to shipping routes and traffic separation schemes. If no measures are put in place, the safety risks for vessels in the North Sea will increase.

Offshore Wind Energy

A number of shipping safety measures have been taken in recent years in relation to wind farms in the North Sea. Since the construction of the first wind farm, a fixed distance – a ‘buffer strip’ – has been maintained between wind farms and shipping lanes. This is intended to ensure that a vessel can undertake the largest possible manoeuvre, a 360° turn, without coming into contact with any wind turbines. With the aim of optimising the use of space, the width of the buffer strip has been reduced to a distance based on a dimensionally normative vessel.

In the course of 2017, staff from the Directorate-Generaal for Rijkswaterstaat, the Ministry of Infrastructure and Water Management, the Dutch Coast Guard, and the MARIN research institute expressed a need for greater clarity regarding the risks to shipping and the necessary control measures. To gain a better understanding of the risks and the effectiveness of the control measures, the ministries concerned commissioned MARIN to carry out a study of the combined effect of all the wind farms on shipping safety. The study showed that the installation of wind turbines led to a deterioration in shipping safety, despite the measures implemented to avert this. Based on MARIN’s study, the Ministry of Economic Affairs and Climate Policy and the Ministry of Infrastructure and Water Management decided on a package of seven measures. These included setting up a traffic management system, installing additional sensors in and around the wind farms, deploying additional emergency towing vessels, and setting up the Offshore Wind Energy Shipping Safety Monitoring and Research Programme (MOSWOZ). The management measures and the buffer strip came about independently of decisions on the installation of wind farms.

Shipping safety in regular decision-making

Positioning fixed objects in the North Sea requires multiple decisions and is subject to a decision-making procedure. The Dutch Safety Board investigated how shipping safety was taken into account in three different recent decisions, namely on the designation of new wind energy areas, on the installation of a wind farm (a site decision), and on the installation of a platform (an environmental permit decision). For each of these decisions, an Environmental Impact Review (mer) was carried out to identify the effects of positioning, including the impact on shipping safety. For the designation of new wind energy areas, shipping safety and the required measures were assessed by the North Sea Shipping Advisory Group (SAN), which consists of representatives of the Dutch shipping industry and relevant government departments. For the site decision and the environmental permit, the analysis of shipping safety consisted mainly of calculating the theoretical frequency of ramming and drifting collisions. That was not sufficient to determine how much the risk would increase and what the effect of the measures would be. During preparation of the site decision, some of the staff involved raised questions about these knowledge gaps. These gaps were acknowledged in the decisions taken but they had no consequences for the actual decision-making.

Shipping safety risk management

The Dutch Safety Board finds that there was limited understanding of shipping safety risks when decisions were made on the positioning of fixed objects in the North Sea. The studies of shipping safety that were carried out failed to provide the necessary understanding of the risks. The quantitative and qualitative analyses were too general to provide a reliable assessment of the risks for a specific wind farm. The manoeuvring problems of heavy and/or wind-sensitive vessels demonstrated in simulations by the Dutch Safety Board have so far not been taken into account either.

The effectiveness of various (planned) control measures to ensure shipping safety is also uncertain. The Dutch Safety Board analysed the effectiveness of three of these measures, namely the buffer strip, (passive) traffic management, and the deployment of emergency towing assistance. It became apparent from the simulations that were carried out that in certain circumstances the buffer strip between the shipping lane and wind farms is not wide enough for heavy and/or wind-sensitive vessels to perform a 360° turn without ending up in the adjacent wind farm. This means that the buffer strip fails to provide the intended safety margin. Analysis of the chosen passive form of traffic management, Vessel Traffic Monitoring, shows that it fails to address the most common occurrences, namely ship-to-ship collisions. Moreover, Vessel Traffic Monitoring can be confusing because it deviates from the international guidelines for traffic management. The effectiveness of an Emergency Response Towing Vessel (ERTV) at an incident depends on its approach time, the possibility of establishing a tow connection, the ERTVs technical reliability, and its 'bollard pull' (i.e. pulling force). For current ERTVs, assisting some wind-sensitive vessels is already challenging upwards from wind force 6 because of the bollard pull required.

The Ministry of Infrastructure and Water Management currently still has the aim of maintaining shipping safety in the North Sea at the same level, or improving it. The Dutch Safety Board considers that aim to be unrealistic, given that the current measures cannot eliminate or compensate for the increase in risk due to the installation of fixed objects. The limited understanding of the level of risk and the lack of a realistic safety objective mean that shipping safety cannot at present be weighed up properly as part of the decision-making process.

Both the aim and the method of risk calculation have been carried forward from the past, and have not been (further) developed for shipping safety around fixed objects such as wind farms. To an extent, this has been recognised and efforts have been made to catch up in certain respects by means of additional research and control measures. Despite these efforts, the Dutch Safety Board concludes that shipping safety in relation to fixed objects is not yet properly managed. In order to manage shipping safety in the North Sea, both now and in the future, a different, integrated approach to risk management is needed, focusing on the ever-changing situation in the North Sea and taking account of new developments in shipping and other activities there.

RECOMMENDATIONS

The management of shipping safety risks in relation to the positioning of fixed objects in the North Sea needs to be improved. A different approach to risk management is necessary, taking account of developments in shipping and other activities in the North Sea. The Dutch Safety Board therefore issues the following recommendations:

To the Minister of Infrastructure and Water Management:

1. Improve management of the risks to shipping safety that result from the positioning of fixed objects. Ensure at least:
 - a. a proper understanding of the risks to shipping safety, making use of modelling and scenario thinking, and incorporating the manoeuvring behaviour of heavy and wind-sensitive vessels and developments in shipping;
 - b. a proper understanding of the effects of (possible) management measures;
 - c. a safety goal that is realistic and can be tested too;
 - d. application to new and existing wind farms and those that are under construction;
 - e. comprehensive assessment of the use that is made of the North Sea, taking into account the safety level (i.e. the residual risk) to shipping; and
 - f. periodic evaluation of the approach adopted.

An internationally shared view on how shipping can navigate safely around fixed objects is crucial in this regard.

To the Minister of Infrastructure and Water Management:

2. In consultations with other North Sea countries, press for the international frameworks to be modified based on the understanding gained of shipping safety risks. In doing so, make use of the option for submitting specific proposals to the International Maritime Organization.



Bezoekadres
Lange Voorhout 9
2514 EA Den Haag
T 070 333 7000
F 070 333 7077

Postadres
Postbus 95404
2509 CK Den Haag

onderzoeksraad.nl