



NOBELWIND

Offshore wind energy power plant

Annual work report 2023

NBW_MUMM_2023_Annual work report

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Modification history

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1. Purpose of the document

The present report gives an overview of the main activities and relevant parameters of the Nobelwind offshore windfarm for the period as from 1 January 2023 up to 31 December 2023.

2. Introduction

The Nobelwind offshore wind farm is located on the Bligh Bank, part of the Belgian Continental Shelf within the Belgian Exclusive Economic zone (Figure 1). The distance from the wind farm to the nearest point at shore (Zeebrugge) is approximately 47 km. Other wind farm data can be found in Table 1.

Table 1: Wind Farm data

Quantity	50	#
Power wind turbine	3.3	MW
Wind farm power	165	MW
Offshore HV stations	1	#
Wind farm area	19,8	Km ²
Minimum seabed level depth, approx.	26	m LAT
Maximum seabed level depth, approx.	38	m LAT
Distance to the coast, approx.	47	km

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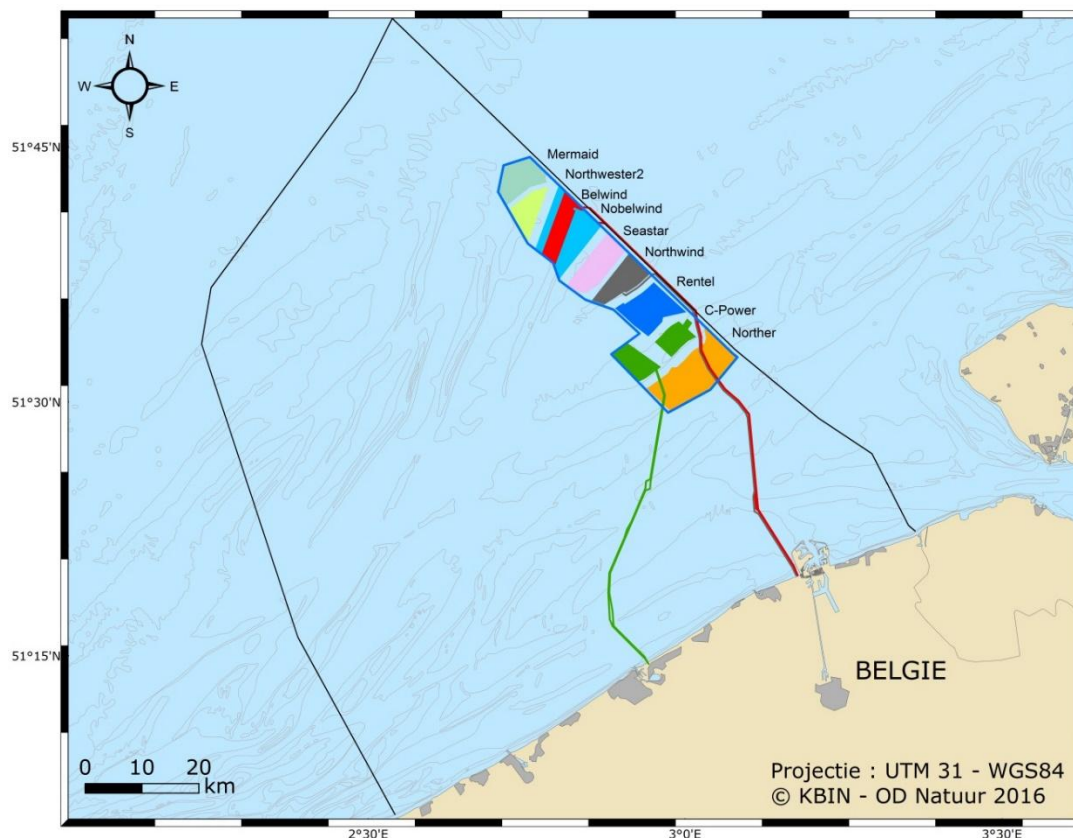


Figure 1: Location offshore wind farm Nobelwind

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3. Project overview

The Bligh Bank offshore wind park zone is the initially Belwind concession zone, which has been split up into two separate concessions namely the Belwind and Nobelwind concession (Figure 2). In line with the Royal Decrees of 20 December 2000 (Domain concession), 12 March 2002 (Sea-cable permit) and 07 September 2003 (Marine environmental permit), the partial split of these initial permits has been applied for by Belwind and Nobelwind. Nobelwind obtained in 2015 the necessary authorization for its realization.

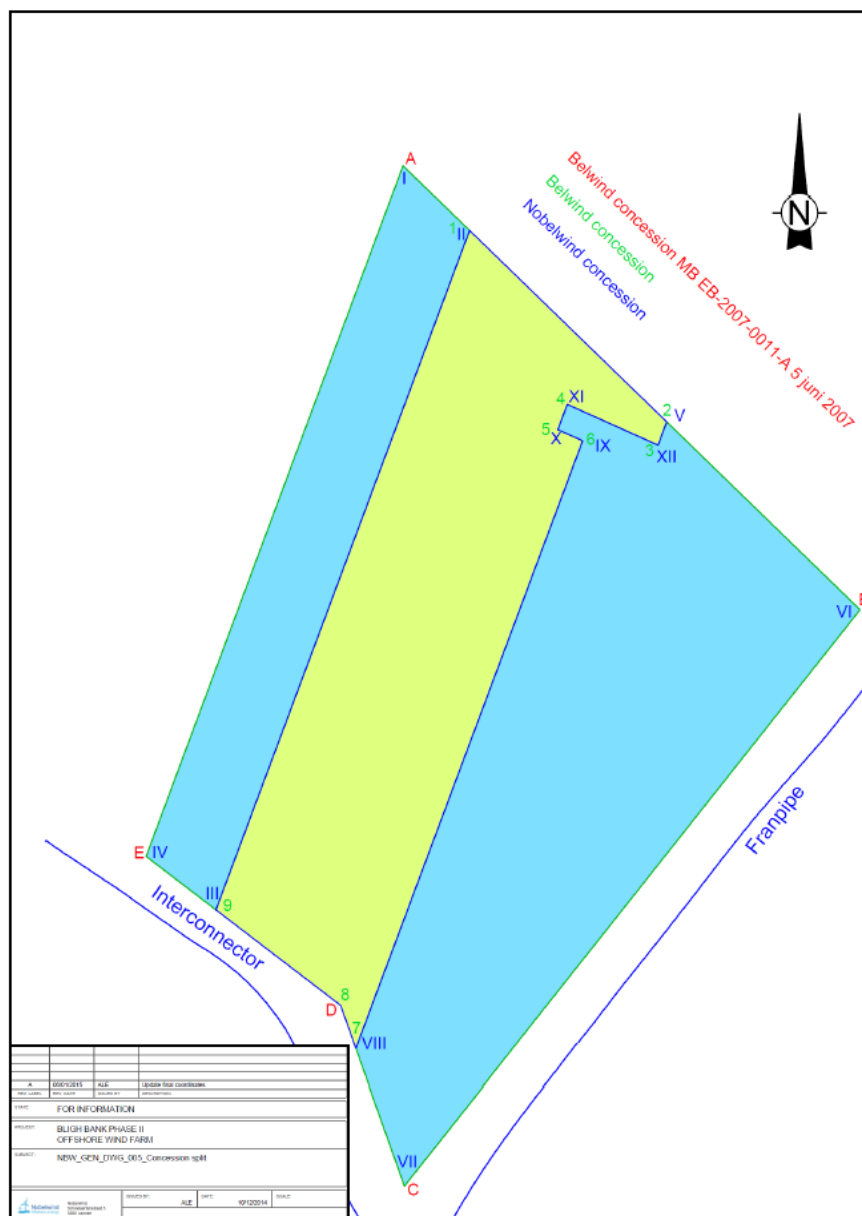


Figure 2: Domain concessions Belwind and Nobelwind

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Nobelwind consists of 50 WTG's, type Vestas V112 3.3 MW, total of 165 MW and one Offshore High Voltage Station (OHVS) (Figure 3). Via a local grid (33kV) the wind turbines are connected to this OHVS. Further, a 220kV interconnector cable connects this OHVS with the Northwind OHVS. Energy is transported to land via the existing 220kV export cable, installed during the construction of the Northwind project, but the cable owner is now Cableco CVBA. Construction of the Nobelwind project started in 2016. The first energy has been produced since January 2017 and Nobelwind in full production as of May 2017.

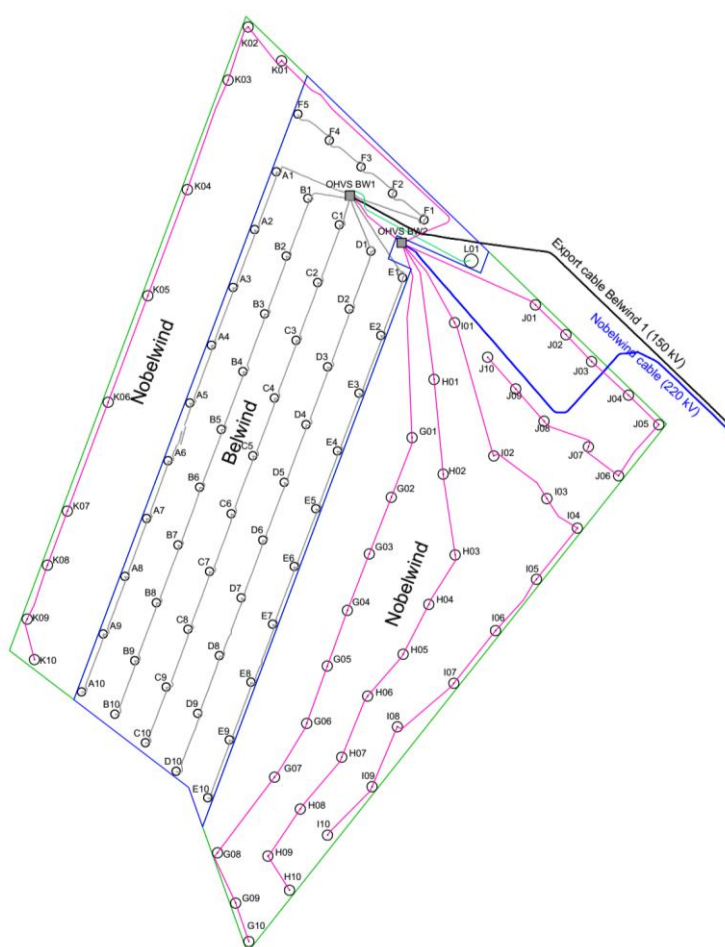


Figure 3: Locations of the Nobelwind and Belwind wind turbines and the grid connection

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4. Production

4.1. Performance of the wind farm

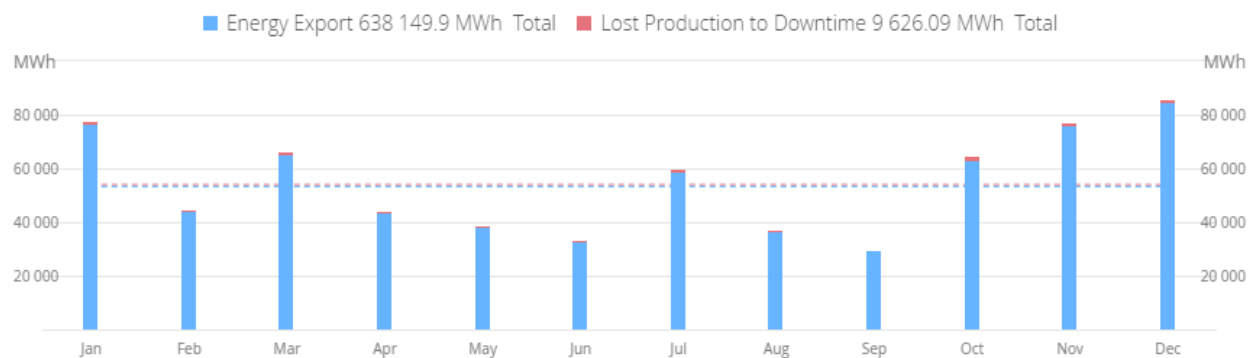


Figure 4: Monthly production V112 2023

4.2. Wind rose

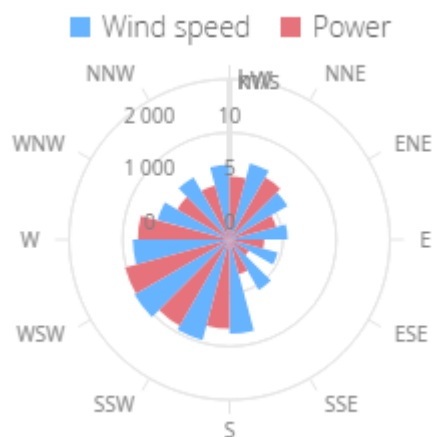


Figure 5: Wind rose 2023

The displayed wind rose is a graphical representation of the wind speed and direction measured all over the wind park. The wind speed is calculated as an average for all turbines. For all wind speed categories, the wind direction WSW prevails.

4.3. Planned Maintenance

Vestas, the service contractor for the Nobelwind **WTG’s**, performed the following planned maintenance and inspections in 2023:

- Vestas completed the 6-yearly service (May till May) on time and started the 7-yearly service as of June 2023.The counter end of December is on 12/50, which is below the planned target.

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So far, the delay in the service is not worrying and will continue Q1 2024 although no service works were initially planned that period so creating lots of catch-up possibilities.

- Yearly Statutory inspections: 50/50 WTG's completed;
- HV inspections: all WTGs have been inspected;
- GPC inspections were performed on all WTGs along the HV inspections.

On the **electrical installation**, the following tasks have been performed for 2023 as part of the routine maintenance:

- Yearly mandatory statutory inspections of high voltage installation: this inspection was carried out by supplier according to legal criteria and no major observations were made;
- Yearly mandatory statutory inspections of all lifting equipment by supplier: all secondary equipment, cables, chains, slings, hooks and the cranes mechanisms are inspected to see if any aging or damage has occurred to the equipment. An exception has been successfully obtained since 2020 to go from a 3-monthly inspection to a yearly inspection as all lifting equipment is rarely used;
- Yearly maintenance of all equipment by Parkwind: the maintenance focuses on visual inspection, cleaning and functional testing of low voltage systems and components;
- Yearly inspection and maintenance of the fire detection system by supplier: this maintenance campaign focuses on testing of the fire detection equipment and fire control cabinet functions;
- Yearly inspection and maintenance of the firefighting by supplier: this maintenance campaign focuses on the firefighting equipment, e.g. pressure on the firefighting gas and portable fire bottles and test of the release valves and activation push buttons;
- Yearly inspection of First Aid kits;
- 3-monthly maintenances to all SCADA systems and IT infrastructure by Parkwind and supplier: during the SCADA and IT maintenance all equipment is tested and some performance and connectivity tests are performed;
- Yearly maintenance of HVAC installation by supplier: check of filters, functional tests of all valves & sensors, inspection of coolers and cleaning of the heat exchange condensers is performed;
- Yearly inspection of diesel fuel system by Parkwind: general inspection of the diesel generator, pumps and valves are focused during this yearly maintenance. Also, the diesel tank and its leak detection is checked;
- Generator maintenance and load test have been done on a 6-monthly basis to ensure the correct working;
- Yearly inspection of life saving equipment (life jackets and immersion suits) by supplier;
- Yearly inspection life raft by supplier;
- Regularly high and medium voltage equipment checks by Parkwind
- Small preventive maintenance has been done (e.g.: changing defect light bulbs, ...);
- Preventive paint repairs have been performed to avoid excessive corrosion;

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- Onshore: Yearly HVAC maintenance has been performed by supplier.

On the **foundations**, the following tasks have been performed in 2023 as part of the routine maintenance:

- Inspection, maintenance and recertification of the fall arrest systems: the complete fall arrest system is inspected and recertified by qualified technicians. If any system is non-compliant it gets replaced as soon as possible;
- Cathodic protection: the cathodic protection needs to prevent/limit the corrosion on the primary and secondary submerged steel. The protection level is continuously monitored through the ICCP SCADA system. The status of the system determines whether offshore interventions are required to control, repair or check the system;
- Survey of inter-array cables: this multibeam survey takes a snapshot of the sea bottom condition and the results are used to determine the depth of burial of the cable assets;
- ROV inspection of outer submerged foundation to evaluate the marine growth and presence of ropes, fishing nets, rocks or other debris;
- Smart foundation monitoring: the WTG's K05, G08 and G10 are equipped with several sensors in order to monitor mainly acceleration, inclination and loads..
- MP-TP bolted connection: the bolted connection needs to be checked to assure the bolts are tightened to the correct tension, the flange is air-tight, and the bolts are not corroding;
- Frequency monitoring: this monitoring is performed on 20% of the foundations. During half an hour the natural frequencies are measured by accelerometers. These results are analyzed and compared against design frequencies and excitation frequencies caused by blades. This is to monitor that natural frequencies are in a safe zone where there is no chance of resonance.
- Nobelwind has stepped into a cable repair framework managed by Parkwind, called Safe Link project. The Safe Link project will ensure that in case of a cable failure, the repair works will be executed within reasonable time to minimize the loss of electricity production, reduce idle time of WTG's and reenergize the cable as soon as possible. To be able to cope with a quick repair, following actions are defined and active:
 - Carry out preparedness services = be prepared to mobilize personnel and marine spread + equipment within agreed response time and prepared to carry out the repair works.
 - Carry out repair works on the Nobelwind export cable and Inter Array Cables.
 - Carry out the spare parts management.

The Safe Link project framework agreement started in September '21 and extends until April '27.

5. Environmental Research

The MUMM coordinated all the foreseen standard environmental monitoring activities in the field. In collaboration with scientific organizations, some dedicated programs were also started-up and further executed by the MUMM whereby Nobelwind cooperates where relevant (e.g. fish track sampling).

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6. Permit conditions

In compliance with the authorization for the construction and a license for the operation of a wind farm on the Bligh Bank in the Belgian sea areas article, we give an overview of the environmental permit conditions as mentioned in Schedule 1 of the authorization for the construction and a license for the operation of a wind farm (see Table 2).

Table 2: Permit conditions overview

Condition Number	Condition Summary	Current Status
2	Each planned modification must be reported to the Board and will be included in the annual work report.	No modifications to be reported in 2023.
4	The holder undertakes to find and recover all floating or sunken objects used for its activities which, for any reason, have ended up in the sea during the construction, operation or dismantling stages.	All dropped objects related to Nobelwind offshore activities are recorded in the online reporting tool, the SOS system, and reported on a quarter basis.
14	During construction, all foundations and structures already finished must have a temporary warning light (at the highest point) for shipping and aviation traffic.	No new foundations installed in 2023.
15	The holder must set up the necessary safety systems to assure the signalling of the wind farm and structures at all times.	Since 14 July 2017 all navigation and aviation signalisation are fully operational and monitored.
16	All WTG's must be numbered individually at the base of the mast and at the top of the nacelle.	The foundation and the WTGs have been numbered in accordance with the requirements of this condition.
17	All WTGs and transformers must be provided with collection receptacles to prevent liquids from being released in the environment.	The design of the WTG is such that in case of leakage in the nacelle, all fluids are collected in the central part of the nacelle. From here, collection receptacles are installed under the oil pumps and hydraulic systems as standard.
20	During the operation stage, the availability must be facilitated of a specially equipped intervention vessel (or combination of vessels) for assignments concerning the prevention of shipping traffic accidents and cleaning up sea pollution around and in the wind farm	An agreement was signed with Federal authority responsible for the marine environment.
21	Once or twice a year, the holder must take part in simulated nautical accidents, emergency towing exercises and pollution combating exercises.	On a regular base Nobelwind MVOW execute internal emergency exercises
24	Before laying protective mattresses or other artificial erosion protection on the seabed, the holder must verify and certify that all components chosen can be used without any danger of leaching into the marine environment. The composition of the erosion protection must be presented to the Board for approval. The use of monoliths and slag is hereby prohibited.	No new construction material to be approved in 2023.

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Condition Number	Condition Summary	Current Status
29.1	The construction materials and rip-rap must be made of natural materials and must not contain any waste materials or a secondary raw material... the use of slag is prohibited.	No new construction material to be approved in 2023.
31.2	Pile driving activity between 1 January and 30 April will be subject to additional, special monitoring in the amount of EUR 50,000 at most, which is not included in the estimated budget and is completely at the expense of the holder	No piling activities have been performed in 2023.
33.1	The lighting of the turbines for the benefit of shipping and aviation traffic must comply with the conditions set by the competent authorities.	Lights are installed according to the Navigational Aids Plan and have been fully operational in the O&M reporting period. Since Nobelwind is built around Belwind, the Navigational Aids Plan of Belwind has been changed into a Navigational Aids Plan of the Bligh Bank, considering the whole zone of Belwind and Nobelwind as one zone.
33.2	Foghorns, which come into operation automatically in the event of a meteorological visibility of less than 2 sea miles, must be placed on the corner turbines.	Fog horns are installed according to the Navigational Aids plan and have been fully operational in the O&M reporting period.
34	The holder must maintain the farm on a regular basis.	All installations are maintained on a regular basis.
35.4	The covering of the cables must be assured at all times. If the annual monitoring shows that the cable is exposed, the necessary work must be done in the shortest possible time, three months at most, so that the cable can be placed at its original depth.	Annual cable burial depth surveys are executed during the operational phase. Based on the result of the cable risk analysis (Cable Risk Management), a reburial campaign will be set up.
48	A logbook must be kept in which the following is specified for each turbine: ➤ Date, time and all relevant data of incidents that occur which have an impact of the environment, stating the measures taken; and ➤ The recording of hazardous waste materials, the date of removal of the relevant batch of waste, the quantity and the name of the carrier and the recognised waste processor must also be recorded.	We confirm that logbooks have been kept for all turbines since start-up of the first WTG and this has continued during operation.

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7. Health, Safety, Security and environment

7.1. Unwanted events over the reporting period

No unwanted events (with LTI) happened during the reporting period.

7.2. Proactive safety initiatives

Similar to previous years, to ensure that our O&M employees continue their good HSSE progress of recent years and to establish and maintain a real HSSE culture, the company continues to establish a KPI for all O&M Teams. In 2023 the HSSE department defined a KPI on Personal Protective Equipment (PPE) self-checks. To raise awareness and train the personnel on these pre-use checks, considering the specifics and points of attentions linked to every type of PPE, on a monthly basis a different type of PPE was selected. Employees were required to use a pre-defined checklist drafted by the HSSE Department, to check the applicable PPE in their possession, resulting in a self-check of all possessed PPE by the end of 2023. The KPI had to be reported on a monthly basis to ensure follow-up.

In continuation, to provide our employees and Contractors with a better understanding of our HSSE procedures and requirements, additional online inductions were developed, and existing inductions were revised in our Online learning platform, linked to the online “SoS” reporting system.

The reporting scope of this Online SoS system was expanded in 2022, making a clear distinction in follow up and reporting of on the one hand HSSE related events and Quality related events. In 2023, to ensure capturing of all events within the relevant module, periodic meetings took place between the Quality and the HSSE Department to run through all reported cases and if relevant, allow linking between HSSE and Quality cases.

The Online “SoS” system was also further developed, including some additional functionalities. For example, the section Transfer planning was upgraded with an overview and a Simops detection that indicates potential Simops for the creator and the approver, additional access restrictions were added to SoS to notify personnel on restrictions that are in place on the location they plan to visit.

In line with the HSSE Year Action Plan 2023, the new EcoOnline Tool, allowing the management of chemicals on site, was introduced. The tool was populated with all chemicals in use, including the location and quantity. In continuation, in 2024 employee training sessions shall be organized on its usage.

Finally, in 2023, in cooperation with our External Service for Prevention, a risk assessment on psychosocial aspects was organized to assess the level of wellbeing amongst all Parkwind employees. The results of this assessment were discussed on several levels within the organization, allowing measures to be implemented. Overall, the psychosocial wellbeing within the company was valued very positively by our employees.

7.2.1. Emergency exercises

Overview emergency exercises 2023

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OSS	12/12/2023: Parkwind; Safety exercise release of SF6 and victim
Onshore	02/11/2023: Parkwind; Desktop Drill: Environmental incident Oil spill
Outside of concession	05/10/2023 & 06/10/2023: POLEX exercise: Otary and Parkwind
Vessel	02/06/2023: Vestas Offshore Wind First Aid Practices
	28/06/2023: Vestas Offshore Wind Sked exercise
	11/10/2023: Vestas Offshore Wind rescue with sked through a hatch
	27/07/2023: Vestas Offshore Wind Sked Assembly Practices

It has been agreed that, to ensure a higher level of safety, environmental protection and security, the knowledge and participation gained from exercises conducted within the larger area of offshore wind, shall be shared amongst the several Windfarm owners via the HSSE BOP. In total two pollution exercises were carried out successfully one was done with the participation from Parkwind, as well as two rescue and security exercise that were performed on Belwind, focusing on the recovery of refugees from an offshore wind asset (both in cooperative and non-cooperative scenarios).

7.2.2. Emergency actions (TIER2)

In 2023 one Tier 2 situation was reported.

7.2.3. Intrusions

In 2023, 2 third party / Tier-classified intrusions were reported in the Nobelwind concession.

As most of the intrusions were related to activities of neighbouring windfarms and only included small crossings of the safety zone (Proximity Agreement), these intrusions were managed between Nobelwind Marine Coordinator and the Marine Coordinators of the applicable neighbouring wind parks. Thus, these intrusions were not reported towards the Authorities, using the MRCC intrusion template.

All intrusions are logged in the SOS system and are during the periodic Supervisory Committee meetings communicated to the Authorities. In case of intrusions by civilians (e.g. fishing boats) the MRCC template is used to report towards the Authorities; considered a TIER situation.

7.3. Vessel & accessibility

For maintenance on the turbines the Esvagt Mercator is used as hotel/mother ship. Small crew transfer crafts, FRC's, are being used for transfer of personal, tools and equipment on the wind turbines, as well as for maintenance on the OHVS and the foundations, for delivery of parts and equipment to the wind farm and for carrying out surveys and measurement campaigns.

For the maintenance of the OHVS and the foundations secondary steel Parkwind uses CTV's starting from shore per the vessel pooling agreement.

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When required specific Work Vessels can be added to the logistics mix for specific tasks such as surveys, ROV works, Cable or scour repair actions or Major component exchange.

7.4. O&M office Parkwind

O&M team offices are located in the harbor of Ostend: Esplanadestraat 10B, 8400 Oostende

8. Conclusion and outlook

One major HSSE incident was recorded and well followed-up on and all tasks as mentioned under the operational permits are well managed.

We foresee a further rolling out of the HSSE master plan in 2023 supported by the Parkwind HSSE team.

Nobelwind, managed by the Parkwind organization, will keep striving for innovation in terms of maintenance procedures, preventive actions, O&M inspection tools, etc. as it has been doing in the past. Next to the standard maintenance, we are confident that any concern can be tackled adequately and preferably in a proactive matter.