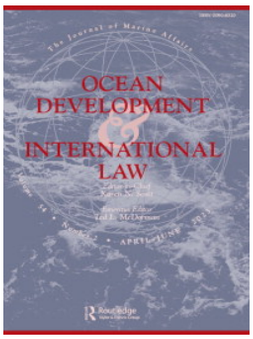

Ocean Development & International Law

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/uodl20

Decommissioning Offshore Windfarms and Grid Infrastructure: To Remove or Not to Remove? - A Belgian Law Perspective

Angelo Goethals & Frank Maes

To cite this article: Angelo Goethals & Frank Maes (15 Oct 2023): Decommissioning Offshore Windfarms and Grid Infrastructure: To Remove or Not to Remove? - A Belgian Law Perspective, Ocean Development & International Law, DOI: 10.1080/00908320.2023.2265297

To link to this article: https://doi.org/10.1080/00908320.2023.2265297

Published online: 15 Oct 2023.

OCEAN DEVELOPMENT & INTERNATIONAL LAW
https://doi.org/10.1080/00908320.2023.2265297

Taylor & Francis
Taylor & Francis Group

Decommissioning Offshore Windfarms and Grid Infrastructure: To Remove or Not to Remove? - A Belgian Law Perspective

Angelo Goethals[a] and Frank Maes[b]

[a]PhD Candidate Energy Law, Department of Public Law, Ghent University, Ghent, Belgium; [b]Professor International Law of the Sea, Department of Public Law, Maritime Institute, Ghent University, Ghent, Belgium

ABSTRACT

This article explores the applicable international and regional rules and standards for the decommissioning and removal of offshore installations. In addition, the Belgian legal approach to the decommissioning of offshore wind installations and grid infrastructure is examined. Although Belgian legislation supports the complete removal of installations, an ecosystem restoration approach to the development of offshore wind farms might suggest options other than complete removal. This article demonstrates that lifetime extension, refurbishment, and repowering of installations are not problematic from an international law perspective. This research shows, however, that decommissioning offshore wind farms and grid infrastructure is ambiguously regulated in Belgium, and, in the longer term, the development of a dedicated regulatory approach is recommended.

ARTICLE HISTORY
Received 17 January 2023
Accepted 21 September 2023

KEYWORDS
Decommissioning; grid infrastructure; offshore; (partial) removal; windfarms

Introduction

The offshore renewable energy sector is developing very rapidly, especially with the deployment of offshore wind farms (OWFs) and (associated) grid infrastructure for the transmission of electricity. The first-generation offshore wind turbines will end their lifetime and will have to be decommissioned or removed before the end of their concession period. The central question of this article is, should the installations be removed completely or partially, according to international and national law? This research question is important as there is a lack of clarity about what will happen to wind turbines and associated infrastructure once they reach the end of their life. This article explores whether this lack of clarity stems from the international obligations or national legislation in Belgium.

This article examines the rights and obligations of the coastal states under international law, principally the 1982 United Nations Convention on the Law of the Sea (UNCLOS),[1] regulations and standards of the International Maritime Organization

CONTACT Angelo Goethals angelo.goethals@ugent.be PhD Candidate, Department of Public Law, Ghent University, Ghent, Belgium

[1] United Nations Convention on the Law of the Sea, adopted 10 December 1982, entered into force 16 November 1994, 1833 *UNTS* 397 (hereafter: UNCLOS).

(IMO), and in regional conventions such as the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).[2] Although the end of the life span of the Belgian OWFs is far from imminent, there is nevertheless a need to engage in legal analysis from a long-term planning perspective, acknowledging the fact that there are also economic, ecological, and technical issues associated with decommissioning decision making. It should be emphasized that this article does not examine in depth the environmental considerations related to the decommissioning, although they may (potentially) play a decisive role in the decommissioning decision. The choice between removal and non-removal (e.g., in favor of lifetime extension, refurbishment, repowering, artificial reefs, etc.) can potentially lead to legal uncertainty when that choice is not predetermined (which is particularly important for project planning and financing). On the one hand, as discussed in the following, international law allows certain parts of offshore installations and structures to remain in place after use, as long as they do not interfere with other uses of the sea or seabed. On the other hand, there is also the idea (although not considered equally desirable by everyone) to extend the lifetime of OWFs, to refurbish or repower them. The question then arises as to what is possible under international and national law.

In Belgium, the current OWFs have an installed production capacity of 2 262 MW.[3] By designating a new energy zone in the 2020–2026 Belgian Marine Spatial Plan (MSP), the federal government aims to double the installed offshore wind capacity to 4.5 GW in 2030.[4] In October 2021, the federal government announced a policy goal to triple rather than double the installed capacity up to 5.8 GW by using larger wind turbines with more installed capacity.[5] Whether tripling capacity is feasible will depend primarily on the tendering that will take place in the near future, for which the regulatory framework is currently being developed.

The average life cycle of OWFs is estimated at 20–25 years.[6] When the concessions are approaching the end of their term, the decision on how the installations are to be decommissioned should be clear. The question is whether the installations and infrastructure used for the deployment of offshore wind energy must be removed, partially or completely, after the end of use.[7] To date, only a few wind farms have been decommissioned in the North Sea: for example, Yttre Stengrund and Uitgrunden I in Sweden, Lely in the Netherlands, Vindeby in Denmark, and Blyth in the United Kingdom.[8] As a consequence, there is little experience with the decommissioning of

[2] Convention for the Protection of the Marine Environment of the North-East Atlantic, adopted 22 September 1992, entered into force 25 March 1998 (hereafter OSPAR).

[3] Belgian Offshore Platform (BOP), "First Offshore Wind Energy Zone in the Belgian North Sea Fully and on Time Completed," 3 January 2021 at: https://www.belgianoffshoreplatform.be/en/news/first-offshore-wind-energy-zone-in-the-belgian-north-sea-fully-and-on-time-completed (accessed 3 January 2023).

[4] Ibid; Frank Maes, "Het nieuw Belgisch marien ruimtelijk plan voor de periode 2020–2026" (2020) 4 *Tijdschrift voor Milieurecht (TMR)* 416, 417–418.

[5] Tobe Steel, "Regering mikt op verdrievoudiging windenergie op zee" 15 October 2021, *De Tijd* at: https://www.tijd.be/ondernemen/milieu-energie/regering-mikt-op-verdrievoudiging-windenergie-op-zee/10339099.html (accessed 3 January 2023).

[6] Tosin Adedipe and Mahmood Shafiee, "An Economic Assessment Framework for Decommissioning" (2021) 26 *International Journal of Life Cycle Assessment* 344, 348–349.

[7] Eva Topham, Elena Gonzalez, David McMillan et al., "Challenges of Decommissioning Offshore Wind Farms: Overview of the European Experience" (2019) 1222 *Journal of Physics: Conference Series* 1, 6–7.

[8] X., "First Offshore Wind Farm Decommissioning Complete" 4 February 2016 *The Maritime Executive* at: https://maritime-executive.com/article/first-offshore-wind-farm-decommissioning-complete (accessed 3 January 2023); X.,

OWFs to date. This is unsurprising given that the construction of OWFs started relatively recently, and the concessions usually expire after 25 to 30 years. In addition, the OWFs (including their turbines, substructures etc.) are generally designed to last 25 to 30 years. This means that there are few previous examples from which we can derive best or poor practice, technically, economically, and legally.

In Belgium, the term of the domain concession is 20 years, extendable to 30 years, beginning from the notification of all licenses or permits (such as environmental permits) that have been granted.[9] It is expected that the decommissioning of the current OWFs in the Belgian part of the North Sea (BPNS) will take place between 2034 and 2047. Anticipating this evolution, it is important to investigate the legal framework for decommissioning OWFs and grid infrastructure. Existing legal literature principally concerns the decommissioning of offshore installations for liquid or gaseous hydrocarbons, whereas legal research on the decommissioning of OWFs and (associated) grid infrastructure (with a focus on the Belgian situation) is currently very limited.[10] This article seeks to make a contribution to that literature.

In the discussion that follows, relevant concepts such as "decommissioning," "removal," "different offshore grid setups," and "repowering" are discussed in some detail. In the next part, the international legal framework and the Belgian domestic legal framework regarding decommissioning of OWFs and associated infrastructure are analyzed in order to determine the legal framework for decommissioning. In the final part, this

"Swedish Offshore Wind Farm Is No More" 4 October 2018, *offshoreWIND* at: https://www.offshorewind.biz/2018/10/04/swedish-offshore-wind-farm-is-no-more/ (accessed 3 January 2023); X., "Lely Wind Farm Fully Decommissioned" 7 December 2016, *offshoreWIND* at: https://www.offshorewind.biz/2016/12/07/lely-wind-farm-fully-decommissioned-video/ (accessed 3 January 2023); X., "World's First Offshore Wind Farm Being Decommissioned" 19 March 2017, *The Maritime Executive* at: https://maritime-executive.com/article/worlds-first-offshore-wind-farm-being-decommissioned (accessed 3 January 2023); Jason Deign, "UK's Blyth Retirement Offers an Early View of Offshore Wind Decommissioning" 25 March 2019, *Greentechmedia* at: https://www.greentechmedia.com/articles/read/blyth-offshore-wind-decommissioning (accessed 3 January 2023); Topham, Gonzalez, McMillan et al., note 7, 2–4.

[9] The domain concessions for the future wind farms will be subject to a longer term, namely, 40 years (see the discussion that follows); Cedric Degreef and Wouter Geldhof, "Offshore Energy and the Belgian Legal Framework: All at Sea?" (2015) 1 *Tijdschrift voor het recht van netwerkindustrieën (TRNI)* 56, 61; Royal Decree of 20 December 2000 on the terms and conditions and the procedure for constructing and operating energy production installations using wind, water, or waves in the sea areas over which Belgium has jurisdiction, *Belgian Official Gazette* 30 December 2000, Art 13.

[10] Samir Mankabady, "Decommissioning of Offshore Installations" (1997) 28 *Journal of Maritime Law & Commerce* 603, 603–613; John Woodliffe, "Decommissioning of Offshore Oil and Gas Installations in European Waters: The End of a Decade of indecision?" (1999) 14 *International Journal of Marine and Coastal Law* 101, 101–123; Dinand Drankier and Martha M. Roggenkamp, "The Regulation of Decommissioning in the Netherlands: From Removal to Re-Use" in Martha M. Roggenkamp and Catherine Banet (eds), *European Energy Law Report XIII* (Intersentia, 2020), 289; Greg Gordon and John Paterson, "Decommissioning of Offshore Installations upon the UK Continental Shelf" in Martha M. Roggenkamp and Catherine Banet (eds), ibid, 307; Dag Erlend Henriksen, "Decommissioning Practice in Norway," in Martha M. Roggenkamp and Catherine Banet (eds), ibid, 351; Clara Greve Brett, "Regulation of Infrastructure Decommissioning in the Danish Offshore Oil and Gas Sector" in Martha M. Roggenkamp and Catherine Banet (eds), ibid, 329; B. A. Hamzah, "International Rules on Decommissioning of Offshore Installations: Some Observations" (2003) 27(4) *Marine Policy* 339, 339–348; Erika J. Techera and John Chandler, "Offshore Installations, Decommissioning and Artificial Reefs: Do Current Legal Frameworks Best Serve the Marine Environment?" (2015) 59 *Marine Policy* 53, 53–60; Foroogh Torabi and Seyed Mohammad Tababaye Nejad, "Legal Regime of Residual Liability in Decommissioning: The Importance of Role of States" (2021) 133 *Marine Policy* 1, 1–8; Colin Mackie and Anne P. M. Velenturf, "Trouble on the Horizon: Securing the Decommissioning of Offshore Renewable Energy Installations in UK Waters" (2021) 157 *Energy Policy* 1, 1–12; Edward Brown, "The Significance of a Possible EC EEZ for the Law Relating to Artificial Islands, Installations, and Structures, and to Cables and Pipelines, in the Exclusive Economic Zone" (1992) 23 *Ocean Development and International Law* 115, 115–144; Rosalyn Higgins, "Abandonment of Energy Sites and Structures: Relevant International Law" (1993) 11 (1) *Journal of Energy & Natural Resources Law* 6, 6–16; Zhiguo Gao, "Current Issues of International Law on Offshore Abandonment, with Special Reference to the United Kingdom" (1997) 28 (1) *Ocean Development & International Law* 59, 59–78.

article reflects on the scope and substantive requirements of a future regime to manage OWF and grid decommissioning.

Key OWF Concepts

In absence of a codified legal definition for the notion "decommissioning," the concept has been defined in the literature as "encompassing the entire process dealing with the removal or re-use of an asset, the disposal of the removed asset or parts thereof and the restoration of the energy site."[11] Removal of structures can be a consequence of the decommissioning, but is not a necessary requirement. The 1989 IMO Guidelines,[12] for example, prescribe that at the end of life offshore installations may be entirely removed, partially removed, or remain in place.[13] Pursuant to the 1989 IMO Guidelines, a coastal state must normally ensure that an installation or structure on its continental shelf or in its exclusive economic zone (EEZ) is removed once the primary purpose or a subsequent new use is no longer applicable or when any other justification for leaving the structure or installation to remain on the seabed no longer exists.[14] It must be noted that parts of the installations and infrastructure can serve as artificial reefs or might remain in place through the processes of lifetime extension, refurbishment, repowering, and so on.[15]

In order to assess what can and must be removed or what can remain in situ, it is important to understand the various relevant components of OWFs, as well as the associated infrastructure that is necessary to transmit the electricity to the national high-voltage grid. An OWF consists of multiple wind turbines. Each individual wind turbine comprises a foundation and a turbine.[16] In a radial setup (i.e., park-to-shore setup), the different turbines are connected by interarray cables to each other.[17] These cables are connected to an offshore substation, which transforms the electricity to a higher voltage. The offshore substation, which also has a substructure, is connected to the onshore landfall point by means of a long transmission cable (export cable).

[11] Drankier and Roggenkamp, note 10, 289–290;Hamzah, note 10, 339-341; Raphael J. Heffron, "Energy Law for Decommissioning in the Energy Sector in the 21st Century" (2018) 11(3) *Journal of World Energy Law & Business* 189, 193.

[12] IMO Assembly Resolution A.672(16) of 19 October 1989, Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone.

[13] Ibid, [1.1]. See also Drankier and Roggenkamp, note 10, 293.

[14] IMO Assembly Resolution A.672(16), of 19 October 1989, Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, [1.2].

[15] It must be noted that research regarding decommissioning in relation to renewables-to-reefs and its interplay with marine biodiversity is still in full development. The same goes for research with regard to the reuse of offshore installations. For more information: Katie Smyth, Nikki Christie, Daryl Burdon et al., "Renewables-to-Reefs?—Decommissioning Options for the Offshore Wind Power Industry" (2015) 90(1–2) *Marine Pollution Bulletin* 247, 248; Ashley M. Fowler, Peter I. Macreadie and David J. Booth, "Renewables-to-Reefs: Participatory Multicriteria Decision Analysis Is Required to Optimize Wind Farm Decommissioning" (2015) 98(1–2) *Marine Pollution Bulletin* 368, 368–369; Silvana N. R. Birchenough and Steven Degraer, "Science in Support of Ecologically Sound Decommissioning for Offshore Man-Made Structures: Taking Stock of Current Knowledge and Considering Future Challenges" (2020) 77(3) *ICES Journal of Marine Science* 1075, 1077; Irene S. Fortune and David M. Paterson, "Ecological Best Practice in Decommissioning: A Review of Scientific Research" (2020) 77(3) *ICES Journal of Marine Science* 1079, 1088–1089.

[16] Ceciel Nieuwenhout, *Regulating Offshore Electricity Infrastructure in the North Sea* (University of Groningen 2020), 12–13.

[17] Hannah Katharina Mûller, *A Legal Framework for a Transnational Offshore Grid in the North Sea* (Intersentia, 2016), 15.

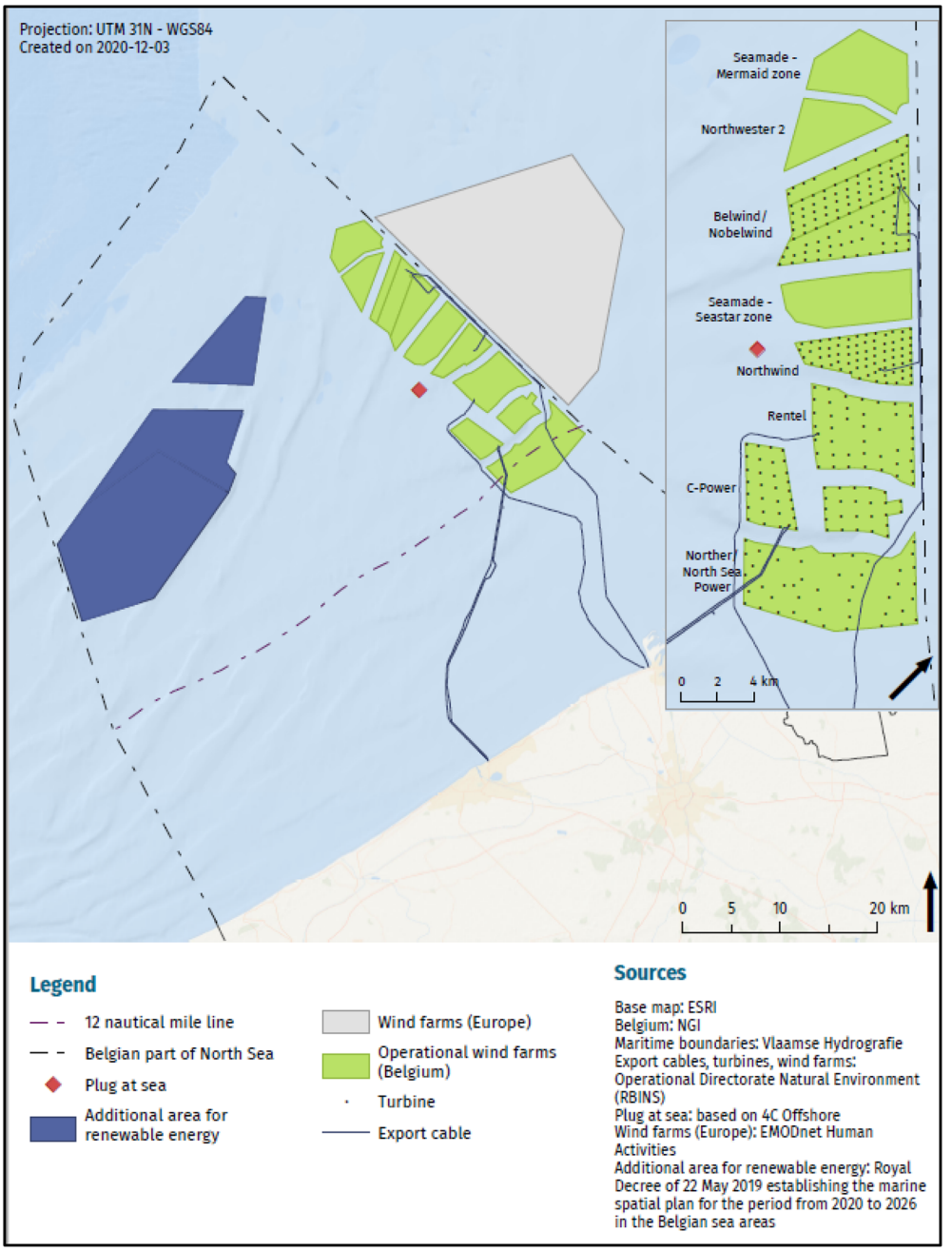

Figure 1. Belgian concession areas for renewable energy. The offshore windfarm on the right is fully operational; the additional windfarm area (in blue), also called the Princess Elisabeth Zone, is not yet operational. (Source: https://kustportaal.be/sites/kustportaal.be/files/public/fxd_maps/13_offshorewind-parken_en.pdf. (accessed 9 October 2023).)

At the point of landfall there is an onshore converter station, which converts the electricity to the right frequency for onshore transmission.[18] A more coordinated

[18] Nieuwenhout, note 16, 12–13.

approach is the clustering of OWFs via offshore hubs, whereby multiple OWFs are connected to an offshore platform that collects the electricity from the OWFs and transmits it to the onshore grid. In the BPNS there is a combination of radial connection (this applies to Rentel, Seastar, Mermaid, and Northwester 2) and clustering (Norther, Nobelwind, Northwind, Belwind, and C-Power are connected to the modular offshore grid).[19] The planned Triton project between Denmark and Belgium will fulfill a hybrid function, whereby two "energy islands"[20] will be connected to each other, thereby connecting the Belgian and Danish OWFs.[21] In addition, Belgium and the United Kingdom plan to build a new multipurpose or hybrid interconnector, called Nautilus, which will be connected to the windfarms of the Princess Elisabeth Zone (PEZ).[22] Belgium is also planning to build an "energy island" in the PEZ, to which the new windfarms will be connected and which will accommodate multiple purposes, such as interconnection.[23] This energy island will be named Princess Elisabeth Island,[24] but is legally speaking not an island. It is a manmade installation or structure. Windfarms and grid infrastructures are also called manmade structures (MMS) in the literature.[25] As demonstrated in the discussion that follows, some of these components will need to be removed at the end of life and others will not.

The perceived high cost of decommissioning offshore installations may prompt OWF operators to consider alternatives to decommissioning.[26] The end-of-life strategy of an OWF does not necessarily only include the removal (in whole or in part) of the OWF. The literature identifies three intermediary stages, namely, lifetime extension, refurbishment, and repowering, before decommissioning.[27] To date, little attention has been given to these concepts in practice. The first intermediary stage is lifetime extension, which implies operating the OWF for a longer period than it was originally designed for. This requires enough structural strength of the turbines in order to guarantee a safe exploitation and may also mean replacing worn parts, which can lead to increased costs in terms of operation (downtime) and maintenance.[28] The second intermediary

[19] Source: https://www.nsenergybusiness.com/projects/elia-modular-offshore-grid-project-north-sea (accessed 3 January 2023); Müller, note 17, 16; Angelo Goethals, Jeroen Mentens, Pieter Mathys et al., "Energy (Including Cables and Pipes)" in Steven Dauwe, Thomas Verleye, Hans Pirlet et al. (eds), *Knowledge Guide Coast and Sea 2022—Compendium for Coast and Sea* (Flanders Marine Institute (VLIZ), 2022), 94; see https://doi.org/10.48470/25 (accessed 6 August 2023).

[20] From a legal point of view, it is debatable whether these "energy islands" can be qualified as (artificial) islands at all (see the discussion that follows).

[21] Marjan Temmerman, "België en Denemarken bouwen samen aan onderzeese energiekabel tegen 2030: maak kennis met Triton" 23 November 2021, *VRT NIEUWS* at: https://vrtnws.be/p.0YYD7oNAQ (accessed 3 January 2023), Müller, note 17, 17–18.

[22] Source: https://www.nationalgrid.com/national-grid-ventures/interconnectors-connecting-cleaner-future/nautilus-interconnector (accessed 3 January 2023).

[23] Source: https://www.tinnevanderstraeten.be/noordzeestroom_voor_elk_belgisch_gezin (accessed 3 January 2023).

[24] Source: https://www.elia.be/en/infrastructure-and-projects/infrastructure-projects/princess-elisabeth-island (accessed 22 March 2022).

[25] Birchenough and Degraer, note 15, 1075–1076.

[26] A. M. Jadali, A. Ioannou, K. Salonitis et al., "Decommissioning vs. Repowering of Offshore Wind Farms—A Techno-Economic Assessment" (2021) 112 *International Journal of Advanced Manufacturing Technology* 2519, 2521.

[27] Eva Topham, David McMillan, Stuart Bradley et al., "Recycling Offshore Wind Farms at Decommissioning Stage" (2019) 129 *Energy Policy* 698, 699.

[28] Lisa Ziegler, Elena Gonzalez, Tim Rubert et al., "Lifetime Extension of Onshore Wind Turbines: A Review Covering Germany, Spain, Denmark and the UK" (2018) 82 *Renewable and Sustainable Energy Reviews* 1261, 1261; Topham, McMillan, Bradley et al., ibid, 699.

stage is the refurbishment or the "partial" repowering of the OWF, which entails replacing some (minor) components (e.g., rotor, drivetrain, etc.) while at the same time (if possible) keeping the tower, foundations, and cables in operation, which can potentially result in an efficiency increase and higher energy production.[29] The third intermediary phase identified is "full" repowering, whereby new turbines (more powerful and technologically advanced) are installed on the existing foundations.[30] This is possible because foundations are usually designed to last longer than the turbines, but this is highly dependent on the type of foundation[31] and the required distance between the new offshore wind installations. One might expect that 5- to 6-MW wind turbines today will be replaced by 12-, 15-, or 20-MW wind turbines in the future. Owing to distance requirements between those larger wind turbines, the old foundations may no longer be usable. The same goes for the cables (interarray, transmission, etc.), for which the lifetime is expected to be 40 years.[32] As noted in the literature, much depends on the individual characteristics of the OWFs and estimates are quite difficult to extrapolate, since there is little experience with regard to lifetime extension, refurbishment, or "full" repowering. In this article, the authors do not comment on the desirability or the techno-economic soundness of lifetime extension, refurbishment, and repowering, but only consider the legal matters that must be taken into account when proceeding with lifetime extension, refurbishment, and repowering.

International Law

UNCLOS: Different Jurisdictional Zones and Different Types of Installations

UNCLOS prescribes that installations and structures on the continental shelf or in the EEZ should be removed for the purpose of the safety of navigation, taking into account generally accepted international standards established by the competent international organization.[33] Reference to the competent international organization in singular is interpreted to mean the IMO.[34] In addition, UNCLOS emphasizes the importance that due regard must be given to fishing, the protection of the marine environment, and the rights and duties of other states (Article 60(3) of UNCLOS). Article 60 applies *mutatis mutandis* to artificial islands, installations, and structures on the continental shelf (Article 80 of UNCLOS), which means that the regime on the continental shelf is equivalent to the EEZ regime in this respect. Unless indicated otherwise, a reference to the EEZ includes installations and structures on the continental shelf. States have the duty to inform other states of hazards to navigation by providing publicity about the depth, position, and dimension of any installation or structure not entirely

[29] Eva Topham and David McMillan, "Sustainable Decommissioning of an Offshore Wind Farm" (2017) 102 *Energy Policy* 470, 471; Topham, McMillan, Bradley et al., note 27, 699.

[30] Topham, McMillan, Bradley et al., note 27, 699.

[31] Laszlo Arany, S. Bhattacharya, John Macdonald et al., "Design of Monopiles for Offshore Wind Turbines in 10 Steps" (2017) 92 *Soil Dynamics and Earthquake Engineering* 126, 126; Topham, McMillan, Bradley et al., note 27, 699.

[32] Topham, McMillan, Bradley et al., note 27, 699.

[33] UNCLOS, Art 60(3).

[34] IMO, Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization. Study by the Secretariat of the IMO, *LEG/MISC.8*, 30 January 2014, 7, 9.

removed.[35] Since OWFs are generally built in the territorial sea and in the EEZ, other maritime zones are not discussed in this article.

The terms "installation" and "structure" are not generally further defined in UNCLOS.[36] One description of an installation or an artificial island, adopted for the purposes of this article, defines them to be a "human-made edifice in the territorial sea, in the EEZ, on the continental shelf, in archipelagic waters, or in ocean space governed by UNCLOS, which is usually employed to explore for or exploit marine resources."[37] Following this definition, it can be concluded that an offshore windmill qualifies as an installation because, under UNCLOS, producing renewable energy at sea is considered an activity that exploits the natural resources of the EEZ, namely, wind.[38] By contrast, the converter station does not exploit the wind, but facilitates the transmission of electricity to the shore. Hence, some scholars argue that this type of infrastructure cannot qualify as an installation, since it does not directly produce electricity. Nevertheless, the converter station is essential for the successful transmission of electricity, thereby contributing to the economic exploitation of the EEZ.[39] In this regard, Article 60 of UNCLOS clearly mentions that in the EEZ, the coastal state has the exclusive right to construct, to authorize, and to regulate the construction, operation, and use of "installations and structures for the purposes provided for in Article 56 and other economic purposes."[40] Pursuant to this, it is clear that although the converter stations do not directly generate electricity from wind energy, they certainly fulfill an economic purpose, namely, the transmission of electricity. The consequence of the qualification as an installation is that an offshore converter station falls under the functional jurisdiction of the coastal state. Consequentially, the legal status of offshore substations is the same as the legal status of windmills.[41] Similarly to offshore converter stations, the offshore hubs (in a clustered approach) can qualify as installations, because they also facilitate the efficient transmission of electricity to the shore and therefore have an economic purpose.[42]

Article 60(3) of UNCLOS entails an obligation to remove installations or structures that are abandoned or disused in order to ensure the safety of navigation and whereby due regard must be given to fisheries, protection of the marine environment, and the rights and duties of other states. The principle of complete removal of installations or structures was softened in the course of the drafting of UNCLOS under the influence of the Oil Industry International Exploration and Production Forum (E&P Forum), which argued that complete removal as envisaged by Article 5(5) of the 1958 Convention

[35] UNCLOS, Art 60 (3); Malcolm N. Shaw, *International Law* (Cambridge University Press, 2008), 580–584; Yoshifumi Tanaka, *The International Law of the Sea* (Cambridge University Press, 2019), 84–86.

[36] Nieuwenhout, note 16, 28; George K. Walker, *Definitions for Law of the Sea* (Brill Nijhoff, 2012), 104; Alex G. Oude Elferink, "Artificial Islands, Installations and Structures" *Max Planck Encyclopedia of Public International Law [MPEPIL]* (2013), 1–2.

[37] X., "Final Report on Definition of Terms in the 1982 LOS Convention (2009–2010)" *2009 Proceedings of the American Branch of the International Law Association* 162, 283–285.

[38] Nieuwenhout, note 16, 28; Müller, note 17, 36–41; Karen N. Scott, "Tilting at Offshore Windmills: Regulating Wind Farm Development within the Renewable Energy Zone" (2006) 18 (1) *Journal of Environmental Law* 89, 96.

[39] Nieuwenhout, note 16, 32.

[40] UNCLOS, Art 60(1)(b).

[41] Ibid.

[42] Müller, note 17, 41–43.

on the Continental Shelf[43] should be replaced by a more flexible solution.[44] France and the United Kingdom were also in favor of a more flexible approach, so that Article 60(3) UNCLOS allows, when certain conditions are met, partial removal or nonremoval of installations or structures.[45] In case the installation or structure is not entirely removed, appropriate publication must be given about the depth, position, and dimension of those installations and structures (Article 60(3) of UNCLOS). [46] From a textual interpretation, this obligation under UNCLOS relates only to installations or structures and does not apply to artificial islands.

For the removal of installations, the international standards adopted by the IMO must also be considered. Given the purpose of the removal, it can be concluded that "removal" need not necessarily be an entire removal, but can comprise a partial removal or even a nonremoval. In other words, three conditions have to be met carrying out the obligation to remove installations[47]: (1) that the removal must be done in order to ensure safety of navigation, (2) that generally accepted international standards must be considered as part of the decision making, and (3) that due regard to fishing, the protection of the marine environment, and the rights and duties of other states must be considered. Consequentially, nonremoval or partial removal can be contemplated in, for example, areas that are not regularly used for navigation or fisheries.[48] This is also reflected in the 1989 IMO Guidelines, whereby the presumption is complete removal, but under certain conditions partial removal or nonremoval is allowed.[49] For some authors the 1989 IMO Guidelines are soft law (i.e., nonbinding).[50] However, impact of the Guidelines should not be underestimated, since adherence to them may indicate practice or *opinio juris* (in the context of custom creation) or they may provide an impetus for later treaties or national legislation.[51] It could even be argued that the guidelines have been given a conventional status in Article 60(3) of UNCLOS by the reference in that provision to "taking into account any generally accepted international standards" established by the IMO to ensure safety of navigation. The "generally accepted" character of a specific rule or standard can indicate a practice of states, no matter in what form the rule or standard might have been expressed. This may well be by means of a non-binding document, making the legal status of the guidelines only of secondary importance. The ultimate purpose of this rule of reference is to

[43] Convention on the Continental Shelf, Geneva, 29 April 1958. Entered into force on 10 June 1964, 499 *UNTS* 311. Article 5 (5) states that "Any installations which are abandoned or disused must be entirely removed."

[44] Alexander Proelss, "Part V. Exclusive Economic Zone—Artificial Islands, Installations and Structures in the Exclusive Economic Zone," in Alexander Proelss (ed), *United Nations Convention on the Law of the Sea—A Commentary* (Verlag C.H. Beck oHG, Hart Publishing, Nomos Verlagsgesellschaft, 2017), 468–469.

[45] Ibid.

[46] Edward Brown, "The Significance of a Possible EC EEZ for the Law Relating to Artificial Islands, Installations, and Structures, and to Cables and Pipelines, in the Exclusive Economic Zone" (1992) 23 *Ocean Development and International Law* 115, 121.

[47] These three conditions can be derived from Article 60(3) of UNCLOS.

[48] Proelss, note 44, 474.

[49] IMO Assembly Resolution A.672(16), of 19 October 1989, Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, [1.1].

[50] J. M. Anderson, "Decommissioning Pipelines and Subsea Equipment: Legislative Issues and Decommissioning Processes" (2002) 25 *Journal of the Society for Underwater Technology* 105, 107.

[51] Techera and Chandler, note 10, 55–56.

secure the primacy of international rules and standards over national law.[52] "By becoming a party to the 1982 Convention, states ipso facto accept the legal technique of law-making by reference inherent in the very notion of generally accepted international rules and standards."[53] This would mean that through the rule of reference, the standards established in the 1989 IMO Guideline should be considered binding.[54]

Belgium is planning to construct an energy island (most likely a combination of different caisson structures filled with sand), which will accommodate transmission activities, but also other activities, such as interconnection.[55] In October 2022, it was stated that this facility will be named the Princess Elisabeth Island.[56] Under UNCLOS, it is not clear whether an "energy island" should be classified as an installation, structure, or artificial island, despite the fact that UNCLOS makes a distinction between these three types of MMS. As discussed in the following, this distinction is relevant to the issue of removal.[57] It must be stressed that there is no codified legal definition of "artificial island," which complicates the qualification issue.[58] In the run-up to the drafting of UNCLOS, Alfred Soons identified four types of offshore facilities, namely, floating structures (positioned by means of anchor or other means); fixed structures (resting on the seafloor by means of pipes or tubes); concrete structures; and structures that have been created by the dumping of natural substances like sand, rocks and gravel, and so on (i.e., artificial islands).[59] Installations, structures,

[52] See the arguments of the ILA, albeit in a different textual context: International Law Association, Committee on Coastal State Jurisdiction Relating to Marine Pollution, *Final Report* adopted at the London Conference (2000), 37–38, 40.

[53] Ibid, Conclusion 6 on the '*pacta tertiis*' principle and the rule of reference, 45.

[54] Proelss, note 44, 475; Erik Jaap Molenaar, *Coastal State Jurisdiction over Vessel-Source Pollution* (Kluwer Law International, 1998), 172–182.

[55] Source: https://www.elia.be/en/infrastructure-and-projects/infrastructure-projects/princess-elisabeth-island (accessed 14 March 2023).

[56] Source: https://www.elia.be/en/news/press-releases/2022/10/20221003_offshore-energy-island (accessed 3 January 2022).

[57] An artificial island should not be confused with the notion of islands as mentioned in Article 121 of UNCLOS. Islands. In Article 121 islands are naturally formed areas of land that can sustain human habitation or economic life of their own. For a broader discussion on islands, see Walter van Overbeek, "Article 121(3) LOSC in Mexican State Practice in the Pacific" (1989) 4 *International Journal of Estuarine and Coastal Law* 252, 259; Yoshifumi Tanaka, *The International Law of the Sea* (Cambridge University Press, 2019), 74–77; Robert Kolb, "L'Interprétation de l'Article 121, Paragraphe 3, de la Convention de Montego Bay sur le Droit de la Mer: Les « Rochers qui ne se prêtent pas à l'habitation humaine ou à une vie économique propre… » " (1994), 40 *Annuaire français de droit international* 876, 890; Jonathan I. Charney, "Rocks That Cannot Sustain Human Habitation" (1999) 93(4) *American Journal of International Law* 863, 864; Adam W. Kohl, "China's Artificial Island Building Campaign in the South China Sea: Implications for the Reform of the United Nations Convention on the Law of the Sea" (2018) 122 (3) *Dickinson Law Review Symposium Issue: Access to Justice: Innovations and Challenges in Providing Assistance to Pro Se Litigants* 917, 924–925.

[58] Jaap Waverijn, "Artificial Islands Under UNCLOS: Room for 'New Beasts'" in Ruven Fleming, Kars de Graaf, Leigh Hancher and Edwin Woerdman (eds), *A Force of Energy: Essays in Energy Law in Honour of Professor Martha Roggenkamp* (University of Groningen Press, 2011), 103–110; Martha M. Roggenkamp and Lisa van Nieuwkoop, "Decarbonisatie op de Noordzee: de rol van kunstmatige eilanden" (2023) 5 (6) *Nederlands tijdschrift voor Energierecht* 244, 246–247.

[59] Imogen Saunders, "Artificial Islands and Territory in International Law" (2019) 52 *Vanderbilt Journal of Transnational Law* 642, 648–649; Alfred H. A. Soons, *Artificial Islands and Installations in International Law* (Law of the Sea Institute, University of Rhode Island, 1974), 1–2; Salah E. Honein and Ralph Beddard, *The International Law Relating to Offshore Installations and Artificial Islands: An Industry Report* (Lloyd's of London press, 1991), 1; Yi-Hsuan Chen, "South China Sea Tension on Fire: China's Recent Moves on Building Artificial Islands in Troubled Waters and Their Implications on Maritime Law" (2015) 1 *Maritime Safety and Security Law Journal* 1, 2–3; Nikos Papadakis, "Artificial Island in International Law" (1975) 3(1) Maritime Studies and Management 33, 33; Lisa van Nieuwkoop and Martha M. Roggenkamp, *Legal Challenges for Offshore System Integration in Energy Hub: North Sea Energy 2020-2022* (University of Groningen, 2022), 15.

and artificial islands all have in common that they are man-made, immobile, and surrounded by water.[60] The fundamental difference between installations and structures versus artificial islands lies in the "direct connection to economic purposes," whereby an artificial island does not necessarily have to be linked to any economic purpose (as provided for in Articles 56 and 60(1)(b) of UNCLOS).[61] Thus, artificial islands can be built for almost any purpose, whereas this is not the case for installations and structures.[62] Unlike installations and structures, artificial islands are not subject to obligations relating to their removal.[63] An artificial island can be considered as an artificial area of land connected to the seabed and having the nature of terra firma, comparable to natural islands but with a different legal status. Considering how the Princess Elisabeth Island will be built (as far as it is certain) and given the function it will fulfill, it is argued that it should be classified as an installation or a structure and not as an artificial island. In this regard, this type of so-called energy islands would better be described as energy installations or energy structures. It should be emphasized that energy islands are not fixed concepts and that different manifestations will likely occur in the future. Whether or not a functional meaning should be decisive for the classification of an installation, structure, or artificial island goes beyond the scope of this contribution, but the question does illustrate the importance of classification and the legal consequences arising from it regarding the decommissioning of these different types of MMS.

In order to transmit electricity to the onshore electricity grid, a cable must be laid between the OWF and a connection point (onshore or offshore) or a cable must be laid between an offshore substation and a connection point. A cable can be laid on the seabed of the territorial sea and on the continental shelf. Cables to connect an offshore substation and the different windmills are qualified as interarray cables.[64] Furthermore, an interconnector cable can be laid between multiple countries and can cross different national jurisdictions, and can also be regarded as a transit cable if the cable does not land at the territory of an adjacent coastal state. This discussion becomes particularly relevant in relation to the planned hybrid interconnectors between Belgium and Denmark (TritonLink) and Belgium and the United Kingdom (Nautilus-Link).[65] A hybrid interconnector is an interconnector that also accommodates the transmission of offshore generated electricity (this can be through a tee-in connection or through a hub-to-hub connection).[66]

The cable laid on the seabed of the territorial sea falls under the full jurisdiction of the coastal state, irrespective of the type of cable. This implies that the coastal state can legislate on environmental matters regarding the cable, such as the conditions for

[60] Proelss, note 44, 470–471.

[61] Robin R. Churchill and Alain V. Lowe, *Law of the Sea* (Manchester University Press, 1999), 168.

[62] Proelss, note 44, 471.

[63] UNCLOS, Art 60(3).

[64] Wayne F. Nielsen and Tara Davenport, "Chapter 16. Submarine Cables and Offshore Energy" in Douglas R. Burnett, Robert C. Beckman and Tara M. Davenport (eds), *Submarine Cables: The Handbook of Law and Policy*, (Martinus Nijhoff Publishers, 2014), 366.

[65] Source: https://www.elia.be/en/infrastructure-and-projects/infrastructure-projects/nautilus (accessed 14 March 2023). Source: https://www.elia.be/infrastructure-and-projects/infrastructure-projects/tritonlink (accessed 14 March 2023).

[66] Ceciel Nieuwenhout, "Chapter IV Offshore Hybrid Grid Infrastructures" in Martha M. Roggenkamp and Catherine Banet (eds), *European Energy Law Report XII* (Intersentia, 2018), 95–112.

laying and removal.[67] If a third state intends to lay a cable in the territorial sea of another state (e.g., a transit cable), then it cannot benefit from the freedom to lay submarine cables, since this freedom only relates to the high seas, the EEZ, and the continental shelf. Laying a cable in the territorial sea of another state can only be done when the respective coastal state agrees to it and through respecting its laws and regulations. This also means that the coastal state has jurisdiction over that part of the cable, such as setting conditions for its removal, although UNCLOS does not prescribe an obligation to remove abandoned cables in the territorial sea.[68]

The coastal state can lay a cable in order to connect the offshore windfarms located in its EEZ. Although cables are not considered installations or structures,[69] they can be regarded as part of the "use" of a wind energy installation, which also falls under the competence of the coastal state (though cross-reference between Articles 56 and 60 of UNCLOS). This is because the cables are essential to transmit electricity produced by the OWFs to land.[70] If these transmission cables are considered as a whole with the use of the OWF, then it can be derived from this reasoning that the cable must be removed together with the installation if their removal is necessary for the safety of navigation and fisheries. A disused or abandoned cable does not, however, typically jeopardize the safety of navigation or fisheries. Hence, it can be argued that the general removal obligation applicable to installation and structures is not applicable to the associated cables. Nevertheless, a coastal state may impose additional conditions regarding the necessary measures to be taken when cables serving offshore installations or structures located in its EEZ are disused or abandoned.

Any state and its nationals have a freedom to lay submarine cables in the EEZ of a coastal state.[71] This also includes the right to maintain and repair cables.[72] Nevertheless, in laying cables, the laying state must have due regard to any cables or pipelines already in position and must take into account any conditions set by the coastal state for cables entering its territory or territorial sea.[73] It must be noted that the delineation of the course for the laying of the cables in the EEZ is not subject to the consent of the coastal state, in contrast to submarine pipelines.[74] This stems from *a contrario* reading and from the preparatory works of UNCLOS.[75] In relation to this, however, it must also be stressed that some coastal states have nevertheless adopted national laws and regulations whereby their consent is required with regard to the delineation

[67] Müller, note 17, 35–64.

[68] Douglas. R. Burnett, "The Legal Status of Out-of-Service Submarine Cables" (2004) 137 *Maritime Studies* 22, 23.

[69] Dorota Englender, "Part VI. Continental Shelf—Submarine Cables and Pipelines on the Continental Shelf" in Alexander Proelss (ed), note 44, 623.

[70] Roeben Volker, "Governing Shared Offshore Electricity Infrastructure in the Northern Seas" (2013) 62 *International and Comparative Law Quarterly* 839, 845; Müller, note 17, 35.

[71] UNCLOS, Arts 58(1) and 87(1)(c).

[72] UNCLOS, Art 79(2), (5).

[73] UNCLOS, Art 79(4), Yoshinobu Takei, "Law and Policy for International Submarine Cables: An Asia-Pacific Perspective" (2012) 2 *Asian Journal of International Law* 205, 212–213; Rainer Lagoni, "Kapitel 3—Festlandsockel und ausschließliche Wirtschaftszone," in Wolfgang Graf Vitzthum (ed), *Handbuch des Seerechts* (Verlag C.H. Beck München, 2006), 204; Robert C. Beckman, "Submarine Cables—A Critically Important but Neglected Area of the Law of the Sea" *(ISIL Conference,* 2010), 7; Englender, note 69, 626.

[74] UNCLOS, Art 79(3).

[75] UNCLOS, Art. 79 (3); Proelss, note 44, 475; Englender, note 69, 626.

of the route of cables in the EEZ.[76] This is motivated by the fact that the coastal state may take "reasonable measures" to preserve the exploration and the exploitation of the EEZ or the continental shelf and to take "all necessary measures" to protect and preserve the marine environment, which of course leaves room for some interpretation.[77] Müller asserts that there is no conclusive answer to the question as to whether the state laying the cable has jurisdiction over that part of the cable located in the EEZ of another country.[78] It may be concluded that the coastal state, in conjunction with its competence regarding the protection of the marine environment and its exclusive exploitation rights, can exercise jurisdiction over that part of the cable laid in the EEZ.[79] In other words, conditions regarding removal of cables (such as those relating to disturbance or noise) can be set by the coastal state. Nevertheless, it cannot be inferred from UNCLOS that there is a general rule requiring the removal of abandoned or disused submarine cables, nor is leaving cables in situ considered dumping.[80] For this reason, it is argued that coastal states are free to determine the conditions for the decommissioning of cables, and they can go further than the standards imposed by international law.

International and Regional Law Regarding Offshore Installations

The 1996 Protocol[81] to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter[82] (hereafter, London Protocol) considers the abandonment or toppling off of offshore platforms and MMS at site as dumping, if this is with the sole purpose of deliberate disposal.[83] The Protocol allows, however, the abandonment of these platforms and MMS subject to a permit. A coastal state party to the London Protocol can nevertheless always prohibit the abandonment or toppling of offshore platforms and MMS.[84] In this situation, the IMO must be notified about any prohibition on abandonment.[85] The general ban on dumping (with the possibility of leaving or toppling of offshore installations or structures) under the London Protocol and Article 60(3) of UNCLOS should be read together to require that the abandonment or toppling of offshore installations or structures must be subject to a permit, and that due notice must be given to ensure the safety of navigation, and that the removal shall have due regard to fishing, the protection of the marine environment, and the rights and duties of other states.

[76] Tara Davenport, "Submarine Communication Cables and Law of the Sea" (2012) 43 *Ocean Development & International Law* 201, 212; Takei, note 73, 213–214; Englender, note 69, 626.

[77] UNCLOS, Art 56(1)(b); UNCLOS, Arts 193–194; Given the central theme of this article and the relevance of this discussion to this article, this issue is not discussed further. See, however, Englender, note 69, 624–625.

[78] Müller, note 17, 44–53.

[79] UNCLOS, Art 192.

[80] Englender, note 69, 626; Anderson, note 50, 107; Burnett, note 68, 23.

[81] 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, adopted 8 November 1996, entered into force 24 March 2006, 36 ILM 1.

[82] The Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, adopted 29 December 1972, entered into force 30 August 1975, 1046 UNTS 120.

[83] London Protocol, Art 1(4); Zhiguo Gao, "Current Issues of International Law on Offshore Abandonment with Special Reference to the United Kingdom" (1996) 28 *Ocean Development & International Law* 59, 71.

[84] London Protocol, Art 4(2); Hamzah, note 10, 340.

[85] Ibid.

The 1989 IMO Guidelines refer to Article 60 of UNCLOS and include provisions for the removal of installations on the continental shelf and in the EEZ.[86] The IMO guidelines do not exclusively relate to offshore installations for hydrocarbons, because the terms "installation" and "structure" are not defined. Moreover, Standard 3.14 clearly states the following: "Unless otherwise stated, these standards should be applied to existing as well as future installations or structures." From a historical perspective, at the time of the adoption of the IMO Guidelines, the main type of installations and structures were associated with hydrocarbon exploitation. Given the formulation of this standard, however, the drafters of the IMO Guidelines also had other structures and installations in mind, such as the installations and structures used for the generation and transmission of offshore wind.[87]

The 1989 IMO Guidelines do not allow the placement of installations or structures after 1 January 1998 on the continental shelf or in the EEZ, if these cannot be entirely removed.[88] Where it is proven that living resources can be enhanced by the placement on the seabed of material from removed installations or structures, then due regard must be given to maritime safety and other lawful uses of the maritime areas when abandoning or placing structures as part of the decommissioning process.[89] The IMO prescribes that the abandoned or disused installations or structures standing in less than 75 m of water and weighing less than 4000 tonnes in air (excluding the deck and superstructure) should be entirely removed. Similarly, abandoned or disused installations or structures, placed on the seabed on or after 1 January 1998, standing in less than 100 m of water and weighing less than 4000 tonnes in air (excluding the deck and superstructure) must also be removed.[90] The coastal state can still impose more stringent rules, such as the removal of structures in all circumstances regardless of their depth and weight. The coastal state can also decide that an installation or structure be left wholly or partially in place if a new use is permitted or if the installation or structure can be left without causing unjustifiable interference with other uses of the sea.[91] What constitutes an "unjustifiable interference" has been left open to interpretation.[92] However, this was discussed in the *Chagos MPA Arbitration Case*, whereby the concept of "unjustifiable interference" as referred to in Articles 78 and 194 of UNCLOS was considered functionally equivalent to the concept of "due regard" (such as in Article 56(2) UNCLOS) and the obligation of good faith stemming from Article 2(3) of UNCLOS.[93]

[86] IMO Assembly Resolution A.672(16), of 19 October 1989, *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone*. See Seline Trevisanut, "Chapter 18. Decommissioning of Offshore Installations: a Fragmented and Ineffective International Regulatory Framework," in Catherine Banet (ed), *The Law of the Seabed* (BRILL Nijhoff, 2020), 440.

[87] Proelss, note 44, 475.

[88] IMO Assembly Resolution A.672(16), of 19 October 1989, *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone*, standard 3.13.

[89] Ibid, standard 3.12 and guideline 2.1.

[90] Ibid, standards 3.1 and 3.2.

[91] Ibid, standard 3.4.

[92] The application of these concepts requires a balancing act whereby the competing rights and obligations must weighed against each other by taking into account an evaluation of the extent of the interference, the availability of alternatives, and the importance of rights and policies at stake. *Chagos Marine Protected Area Arbitration (Mauritius v. United Kingdom)*, Award of 18 March 2015, [540].

[93] Ibid, [540].

The 1992 OSPAR Convention provides rules for the decommissioning of offshore installations or structures used for the exploitation of liquid and gaseous hydrocarbons, but not for offshore installations for the generation and transmission of offshore (wind) electricity.[94] Nevertheless, the principles regarding the decommissioning of offshore installations or structures under the OSPAR Convention and the binding OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations are not without relevance, since they not only apply to Belgium but also provide a precedent in that the decommissioning framework for oil and gas installations may serve as an example for a national/regional decommissioning framework for OWFs and associated infrastructure. Similar to the IMO Guidelines, the 1992 OSPAR requires the leaving partially or wholly of a disused offshore installation in the maritime area to be assessed on a case-by-case scenario and subjects it to a permitting procedure.[95] Unlike the IMO Guidelines, OSPAR does not provide for rules regarding the depth or weight of the offshore installations or structures, which means that offshore installations regardless of the depth and the weight are covered by the Convention. There is no strict removal obligation under OSPAR since the competent authority is able to grant a permit for leaving the installations or structures in place.

The OSPAR Commission has developed the OSPAR Guidelines on Artificial Reefs in relation to Living Marine Resources,[96] but excludes the use of non-virgin material, such as offshore installations and structures, as acceptable reef construction materials, which implies the banning of creating artificial rigs from decommissioned installations, so-called "rigs-to-reefs."[97] This can be explained by the fact that the OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations also limits the possibilities for the dumping or leaving at site of disused offshore installations.[98] One can argue that offshore installations and structures used for the generation of wind energy and transmission of electricity can be considered waste once they are disused or abandoned. However, the OSPAR Convention does not consider offshore installations as waste or other matter,[99] and the leaving wholly or partly at site of those offshore installations is excluded from the definition of dumping.[100]

Despite the fact that the provisions under the OSPAR Convention and the rules around offshore installations and dumping do not primarily apply to OWFs and associated infrastructure, the OSPAR commission adopted OSPAR Guidance 2008-3 on Environmental Considerations for Offshore Wind Farm Development, which aims to assist in identifying and considering some environmental impacts of OWF developments.[101] This guidance is based on Article 2 of the OSPAR Convention, which relates to the protection of the maritime area against the adverse effects of human activities.

[94] OSPAR Convention, Art 1(j).

[95] OSPAR Convention, Art 5(1) Annex III.

[96] OSPAR Commission, OSPAR Guidelines on Artificial Reefs in relation to Living Marine Resources (Reference number: 2012-3).

[97] Dolly Jørgensen, "OSPAR's Exclusion of Rigs-to-Reefs in the North Sea" (2012) 58 *Ocean & Coastal Management* 57, 57-61, Youna Lyons, "The New Offshore Oil and Gas Installation Abandonment Wave and the International Rules on Removal and Dumping" (2014) 28(3) *International Journal of Marine and Coastal Law* 480, 500.

[98] OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations; Drankier and Roggenkamp, note 10, 296.

[99] OSPAR Convention, Art 1(o)(ii).

[100] Ibid, Art 1(g)(iii); Ibid, Art 1, Annex II on dumping.

[101] OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (2008-3), point 89.

First, OSPAR Guidance 2008-3 emphasizes that, in line with OSPAR's policy, the main principle is entire removal of the installation or structure.[102] Second, if a national authority decides that a component of an OWF should remain at site, then it must ensure that the remaining components do not have a negative impact on the environment, the safety of shipping and other lawful uses of the sea. Any components remaining in situ should be subject to monitoring. Instead of establishing a fixed allowable depth, the OSPAR Guidance 2008-3 determines that the depth should be based on the prevailing natural sediment dynamics at site.[103] Third, the licensee or other suitable body (in line with the polluter pays principle) must ensure "adequate" financial reserves to enable the appropriate removal and subsequent disposal on land. If a decision is made to permit components to remain on site, the costs for monitoring and associated measures should be addressed in a similar way.[104] OSPAR Guidance 2008-3 is not binding, unlike OSPAR Decision 98/3, but can have an authoritative effect in making policy decisions.

Lifetime Extension, Refurbishment, and Repowering Under International Law

As outlined above, international law imposes an obligation to remove installations and structures, but in certain circumstances allows installations or structures to remain partly in place when they are no longer in use. Three possible intermediate phases are identified before the decommissioning of OWFs, namely, lifetime extension, refurbishment, and repowering. When it is technically and economically feasible to opt for one of these three intermediate phases, the removal obligation does not apply, as they are still in use. Usually such a decision will precede the moment when the concession comes to an end. The intermediate phase is not specifically governed under international law, because the wind farm simply remains in operation for a longer period. The legal bottlenecks, rather, are situated at a national level, where permission must be sought to extend the duration of the concessions (or other temporary rights to use of a specific zone), as well as to extend the term of the required permits, including environmental permits.

Belgian Law

Interdependency Between International Law and National Law

The BPNS amounts to 0.5 percent of the total surface of the North Sea (3454 km^2 of 575,000 km^2).[105] Despite this small area, Belgium has succeeded in developing many economic activities in the BPNS, in which offshore wind energy plays a crucial role. This is largely owing to Belgium's pioneering role in marine spatial planning.[106] Because

[102] Ibid, point 93.
[103] Ibid, point 95.
[104] Ibid, point 96.
[105] Source: https://www.kustportaal.be/nl/de-belgische-kust (accessed 3 March 2023).
[106] Maes, note 4; Frank Maes, "The International Legal Framework for Marine Spatial Planning" (2008) 32 *Marine Policy* 797, 797–810; Frank Maes, "Ruimtelijke planning op zee in België: van plan naar proces en een nieuw plan" (2016) 4 *Tijdschrift voor Milieurecht* 416, 416–439.

Belgium attaches great importance to marine development, Belgium is a party to all the international and regional instruments discussed above.

The Multilayered Legal Framework

The 1999 Act concerning the exclusive economic zone of Belgium (EEZ Act)[107] is relatively clear about what should happen with disused or abandoned installations and structures. The installations or structures need to be removed in order to ensure, inter alia, the safety of navigation.[108] During the preparation of the EEZ Act it was proposed that a duty to completely remove disused installations from the seabed be introduced, but this proposal was not accepted and the law remains in line with UNCLOS, allowing for partial removal under certain conditions.[109] As for Article 60 of UNCLOS, the removal obligation does not apply to artificial islands. In contrast to UNCLOS, the principle of removal is extended to the territorial sea.[110] Also unlike UNCLOS, the EEZ Act does not explicitly state that abandonment or partial removal is permitted under certain conditions. Nevertheless, given that the EEZ Act requires removal to ensure the safety of navigation, it can be deduced that if the safety of navigation is taken into account, the Act should allow installations and structures to be abandoned or partially removed. This interpretation is also in line with the 1989 IMO Guidelines. In relation to this, in the explanatory memorandum of the EEZ Act, the drafters refer to the IMO Guidelines of 19 October 1989, taking into account the depth and weight criteria described above.[111] Given that the water depth in the BPNS varies between 0 and 55 meters, installations and structures need in principle to be completely removed according to the IMO Guidelines.

Installations

The current OWF domain concessions are granted on the basis of the Royal Decree of 20 December 2000[112] and the domain concessions for electricity transmission installations are based on the Royal Decree of 1 March 2018.[113] The planned OWFs in the PEZ will be subject to another Royal Decree, which is under development. In addition to the domain concessions, an environmental permit is required, which is also relevant

[107] Act of 22 April 1999 Concerning the Exclusive Economic Zone of Belgium, *Belgian Law Gazette* 10 July 1999 (EEZ Act).

[108] Ibid, Art 39.

[109] Edouard Somers and Frank Maes, "The Law Applicable on the Continental Shelf and in the Exclusive Economic Zone: The Belgian Perspective" (2011) 25 *Ocean Yearbook* 249, 265.

[110] EEZ Act, Art 39.

[111] Explanatory memorandum, Draft act regarding the exclusive economic zone of Belgium in the North Sea, *Parliamentary Document* Chamber of Representatives 1998–1999, No 1902/1, 16.

[112] Royal Decree of 20 December 2000 on the conditions and procedure for granting domain concessions for the construction and operation of installations for the production of electricity from water, currents or winds, in the sea areas in which Belgium can exercise jurisdiction in accordance with international law of the sea, *Belgian Law Gazette* 30 December 2000 (Royal Decree of 20 December 2000).

[113] Royal Decree of 1 March 2018 on the conditions and procedure for granting domain concessions to the system operator for the construction and operation of electricity transmission facilities, in the maritime areas in which Belgium can exercise jurisdiction in accordance with the international law of the sea, *Belgian Law Gazette* 8 March 2018 (Royal Decree of 1 March 2018).

for the removal or partial removal of the offshore installations and associated infrastructure.

The term of the domain concessions for the current OWFs is 20 years, extendable to 30 years.[114] This allows the existing domain concession to be subject to lifetime extension, refurbishment, and repowering, albeit with a theoretical maximum of 30 years. If the term of 30 years needs to be exceeded in favor of lifetime extension, refurbishment, or repowering, a new domain concession must be applied for. This may be a possible obstacle to these options, but much will depend on whether any legal flexibility is exercised in light of future insights with regard to lifetime extension, refurbishment, and repowering, as well as the economic and technical desirability of doing so in those specific areas.

In the Royal Decree of 20 December 2000, the award criteria stipulate that candidates have to propose the technical measures they are planning to take and associated financial provision for the treatment and removal of installations that will be permanently decommissioned. In particular, it stipulates that developers must provide a financial guarantee via a reserve fund, which is levied on the operating results, and which is monitored by the Commission for the Regulation of Electricity and Gas (CREG), in order to ensure the redevelopment of the areas subject to the domain concessions.[115] Pursuant to Article 24 of the Royal Decree of 20 December 2000, the measures prescribed for the final decommissioning and removal of the installation (according to the proposal at the time of the application) must be undertaken by the holder of the domain concession.[116] This allows for lifetime extension, refurbishment, and repowering. However, when the theoretical term of 30 years is exceeded, a new concession must be applied for.

Until now, experience with decommissioning of offshore wind installations has been very modest, and non-existent in the BPNS. The decommissioning techniques are also subject to technical evolution, which makes it difficult to estimate their cost. In addition, there has also been an ongoing discussion about the removal techniques and, specifically, the potential environmental effects of partial removal. Consequently, Article 24 of the Royal Decree of 20 December 2000 allows a concession holder to deviate from the proposed removal measures, if the Minister of Energy agrees to it. Other measures that give at the least an equivalent result to those originally specified can be accepted. What constitutes an "equivalent result" is not clear. In first instance, under the EEZ Act the removal of the installation is required. This is set out in an obligation in the environmental permit granted to each OWF.[117] Every environmental permit has a clause that obliges the operator to restore the site to its original condition, which is a situation without wind turbines. The environmental permits oblige operators to

[114] Royal Decree of 20 December 2000, Art 13; Electricity Act, Art 6, §1.

[115] Royal Decree of 20 December 2000, Art 3, 5°.

[116] Jaap Waverijn, "Chapter 21. Navigating Legal Barriers to Mortgaging Energy Installations at Sea—The Case of the North Sea and the Netherlands" in Catherine Banet (ed), note 86, 506.

[117] The fact that the construction of OWFs and offshore grid infrastructure goes hand in hand with the trenching and raising of the seabed means that an OWF developer and system operator needs a permit (*vergunning*) (Act of 11 December 2022 on the protection of the marine environment and on the organization of marine spatial planning in Belgian sea areas, *Belgian Law Gazette* 16 December 2022 (Act on the Marine Environment), Art 25).

remove structures up to two meters below the seabed.[118] The operator holding the permit needs to provide a restoration plan at least one year before the planned dismantling of the installation. The permit holders are also required to provide a financial security as a guarantee that they will cover the costs for restoring the site to its original condition.[119]

Since decommissioning in principle takes place at the end of the lifetime of the installation and most likely at the end of the concession period, an authorization is required for removing the installations and infrastructure. Similarly, authorization must be granted for a lifetime extension, refurbishment, or repowering of the OWF. When applying for such an authorization an environmental impact assessment (EIA) is required.[120] It may be the case that the EIA determines that removing installations and infrastructure completely in order to restore the site in its original condition could have serious negative impacts on the marine environment, if, for example, the installations have previously contributed and continue to contribute to the restoration of biodiversity or specific ecosystems. Where there is a tension between the duty to completely remove the installations and the benefits of nature restoration, partial removal of the installation may be a better environmental solution. Some experience can be drawn from decommissioning offshore oil and gas installations, but care should be taken in using such precedents as the environmental conditions in and around OWFs differ from those in and around offshore oil and gas installations.[121] The current permitting procedure allows for a performance-based approach, which pursues the best decommissioning result by taking into account various parameters such as environmental, economic, and technological considerations, albeit with an emphasis on environmental considerations. This allows the industry to seek more sustainable solutions as knowledge progresses, and alleviates the need for a frequent change in rules, which would be required if strict (prescriptive) decommissioning rules were chosen.

The domain concessions for OWF operators are limited in time by the 1999 Electricity Act[122] to 30 years, whereas the time limitation for the domain concessions for the system operator was established by the Royal Decree of 1 March 2018. The domain concessions for the system operator are time limited to 40 years, but can be

[118] This is considered to be completely removed; Ministerial Decree of 20 February 2008 granting the NV Belwind an authorization for the construction and a permit for the operation of a wind farm on the Blight Bank in the Belgian marine areas.

[119] Cf. article 10 of the Ministerial Decrees granting environmental permits to the OWF operators and implementing Articles 30 and 31 of Royal Decree of 7 September 2003 concerning the procedure for permitting and authorizing certain activities in the sea areas under the jurisdiction of Belgium, *Belgian Law Gazette* 17 September 2003; e.g., The environmental permit related to the Rentel OWF determines the financial security in the following way (in base value of November 2012, to be indexed):

For the monopile configuration: per wind turbine: 10 858 €.

For the configuration with gravity foundations, per wind turbine: 29 674 €.

For the configuration with jacket foundations, per wind turbine: 19 999 €.

Act on the Marine Environment, art 42; Laurens De Brucker, *De vergunning van windturbines in het Vlaamse Gewest* (Intersentia, 2021), 29.

[120] Royal Decree of 7 September 2003, Art 13, 5°.

[121] Steven Degraer, Robin Brabant, Bob Rumes et al., *Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea* (Royal Belgian Institute of Natural Sciences (RBINS), 2021), 58–59; Serena R. Wright, Christopher P. Lynam, David A. Righton et al., "Structure in a Sea of Sand: Fish Abundance in Relation to Man-Made Structures in the North Sea" (2020) 77 (3) *ICES Journal of Marine Science* 1206, 1215.

[122] Act of 29 April 1999 concerning the organization of the electricity market, *Belgian Law Gazette* 11 May 1999 (Electricity Act).

extended by periods of 10 years up to a maximum duration of 70 years. This means that when wind farms are subject to lifetime extension, refurbishment, or repowering (even when the theoretical maximum term is exceeded and a new domain concession is granted), the operator of the transmission infrastructure does not have to apply for a new concession, provided the theoretical maximum term of 70 years is not exceeded. The difference is justified by future increases in scale and the greater capacity of these installations. Similar to the domain concessions under the Royal Decree of 20 December 2000, the award criteria stipulate that the application must contain proposed technical and financial provisions for the treatment and removal of the installations when they are definitively disused with a goal to restore the sea areas. The system operator must provide a reserve, which is established for ensuring the redevelopment of the areas.[123] Furthermore, the application must contain a detailed estimate of the decommissioning costs. This provision prescribes, on the one hand, that the installation must be completely removed, while, on the other hand, requiring the redevelopment of the area, which will probably include the redevelopment of that area for new windmills and other renewable energy installations. The ambiguities as described above also apply to this provision.

Submarine Cables

Article 4 of the 1969 Act on the Territorial Sea and the Continental Shelf[124] prescribes that cables entering the territorial sea or the mainland of Belgium, cables used for the exploration of the continental shelf, for the exploitation of the mineral and nonliving resources thereof, or for the operation of artificial islands, installations, or structures under Belgian jurisdiction, require a permit.[125] The rules and procedure regarding such permits are set out in the Royal Decree of 12 March 2002.[126]

In order to obtain a permit, the applicant must comply with the award criteria.[127] In this regard, the applicant must be functionally and financially able to ensure that cables are handled or abandoned in optimal and safe conditions and with respect for the environment.[128] This means that applicants must demonstrate that they can cover the costs of handling or abandoning the cables by making technical and financial arrangements when the cables are eventually taken out of service.[129] It is clear that under this Royal Decree there is no obligation to remove the cables when they are no longer in use. Furthermore, the application for an electricity cable must include a note describing the technical measures imposed relating to the final decommissioning of the electricity cable and the financial measures to guarantee the implementation of

[123] Royal Decree of 1 March 2018, Art 2, 6°.

[124] Act of 13 June 1969 on the exploration and the exploitation of nonliving resources of the territorial sea and the continental shelf, *Belgian Law Gazette* 8 October 1969 (Act on the territorial sea and the continental shelf).

[125] Ibid, Art 4.

[126] Royal Decree of 12 March 2002 concerning the detailed rules for the laying of cables that enter the territorial sea or the national territory or that are placed or used in the context of the exploration of the continental shelf, the exploitation of the mineral resources and other nonliving resources thereof or of the work of artificial islands, installations or establishments under Belgian jurisdiction, *Belgian Law Gazette* 9 May 2002 (Royal Decree of 11 March 2002).

[127] Royal Decree of 11 March 2002, Art 5.

[128] Royal Decree of 11 March 2002, Art 5, 11°.

[129] Royal Decree of 11 March 2002, Art 5, 12°.

these measures.[130] In line with international law, the cable can be left at site while taking into account navigational, fisheries, and environmental concerns. It must be noted that the environmental permits (granted with regard to the OWFs) include the stipulation that cables (in this context, the interarray cables, which are considered part of the OWF) must be removed/excavated completely. However, it can be decided that the use of the cables may be prolonged on condition that this prolongation is subject to a new application (e.g., pursuant to the decision regarding lifetime extension, refurbishment or repowering).

The Royal Decree of 11 March 2002 concerns only cables entering the Belgian territory and does not apply to transit cables. With regard to the laying of transit cables on the Belgian continental shelf, there are no specific rules in Belgian legislation. Where transit cables are laid in the EEZ or on the continental shelf of another country, that coastal state can adopt rules relating to environmental protection and navigation associate with the cable, as discussed above. It is reasonable to assume that these rules can include specific provisions for decommissioned cables. Given the plans to realize more interconnection between the North Sea states and with a view to the future European offshore grid, it is desirable to have some rules with regard to transit cables. The lack of proper regulation of transit cables occurs at both the national level and the international level.

The Future Regime for OWFs Regulation

In 2019, a legal basis for the future concessions in the PEZ was established, which sets out some basic principles for a new Royal Decree regarding offshore domain concessions for renewable energy.[131] First, the term of the domain concession of 40 years includes the dismantling phase, which already gives direction to the removal of the installation. Second, Article 6/3 delegates to the executive power to establish rules for the dismantling phase.[132] Third, the article mandates the executive the power to determine financial guarantees.[133] In 2022, the Belgian legislator decided to increase the term for domain concessions for offshore renewable energy from 30 to 40 years.[134] This was motivated by the fact that the estimated technical life span of the wind turbines to be built will be 35 years. Taking into account the duration of the preliminary work, the construction, and the decommissioning that may take five years in combination with the estimated life span of wind turbines, 40 years provides a better business case for the developers.[135] It remains to be seen whether there will be room here for the lifetime extension, refurbishment, and repowering for these OWFs, as no

[130] Royal Decree of 11 March 2002, Art 6, 11°.

[131] Electricity Act, Art 6/3.

[132] Electricity Act, Art 6/3, §3, 6°.

[133] Electricity Act, Art 6/3, §3, 8°.

[134] Electricity Act, Art 6/3, §2; Act of 23 October 2022 amending the Act of 29 April 1999 on the organization of the electricity market and transposing Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, *Belgian Official Gazette* 26 October 2022, Art 4.

[135] Amendment, Draft act amending the law of 29 April 1999 on the organization of the electricity market and transposing Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal electricity market and amending Directive 2012/27/EU, *Parliamentary Document,* Chamber of Representatives 2021–22, No. 2831/002, 2.

conditional extension term has been stipulated yet. Much will depend on the new Royal Decree on offshore domain concessions.

Conclusion

It can be concluded that there are significant legal uncertainties around the decommissioning of OWFs and associated grid infrastructure. The basic rule is that wind farms must be removed at the end of their lifetime, as set out in Article 60(3) of UNCLOS. Nevertheless, this same provision also allows installations and structures to remain in place in whole or in part under certain circumstances and subject to compliance with certain conditions. This approach is also reflected in the 1989 IMO Guidelines and other relevant instruments, as discussed above. However, these rules apply only in the case of installations and structures and do not apply to artificial islands. International law does not clearly define the difference between an artificial island and an installation or structure. This is a particularly important distinction in the context of the so-called Princess Elisabeth Island. Based on the information we have so far, the "island" is not in fact an artificial island but will qualify as an installation or structure owing to its lacking key elements of an artificial island, such as an area of land connected to the seabed and having the nature of terra firma. International law seems to accept that installations and structures can remain in place for purposes such as nature conservation, provided that the safety of navigation is ensured and due regard is given to fisheries and rights and duties of other states. In addition, the regime for cables, with regard to both transit cables and connection cables, is different, since there is no international legal obligation to remove cables. Some additional rules have nevertheless been adopted at the national level within some states. It is particularly recommended that a clearer regime, especially for transit cables, be adopted, as the development of the North Sea Offshore Grid is gradually taking shape on the basis of various interconnectors.

The current legal framework regarding decommissioning of OWFs is to a certain extent highly fragmented and this does not contribute to the clarity of the rights and obligations of states. It is perhaps not desirable to establish a fully elaborated regime today because the state of the art concerning decommissioning is not yet fully developed. This is due to limited experience in dismantling OWFs and associated infrastructure and to the fact that the scientific assessment of marine biodiversity created in and around wind farms is still developing and can differ from region to region. It has yet to be established whether remaining parts of offshore wind installations can contribute to nature restoration or whether they are likely to result in an undesirable local biodiversity shift. Partial removal, taking into account the safety of navigation, could be more beneficial for nature conservation, in particular under the conditions that certain fishing bans or site access restrictions apply, which is the case in the Belgian OWFs.[136] In the future, it may be desirable to establish a uniform legal

[136] ICES Advisory Committee, *Report: OSPAR Request to Advise on the Current State and Knowledge of Studies into the Deployment and Environmental Impacts of Wet Renewable Technologies and Marine Enery Storage Systems* (ICES, 2019), 6; Smyth, Christie, Burdon et al., note 15, 255; Ashley M. Fowler, Anne-Mette Jørgensen, Jon C. Svendsen et al., "Environmental Benefits of Leaving Offshore Infrastructure in the Ocean" (2018) 16 (10) *Frontiers in Ecology and the Environment* 571, 576–577.

framework that opts for a performance-based approach that offers the industry room to continue to innovate in various relevant domains (including environment, economy, and technology) and that is also clear about the objectives and conditions to be achieved in terms of removal, complete or partial.

In Belgium, the starting point is a comfortable legal position whereby the principle of complete removal of installations and complete removal of the cables is the point of departure in the environmental permit for the OWF. One year before the end of the domain concessions, the operator must draw up a restoration plan and provide an EIA in order to obtain another environmental permit for the removal of the installations and associated infrastructure. With this approach, national law can provide an incentive for partial removal, which on the one hand may entail more sustainable decommissioning, but on the other hand may lead to less predictable results. It is expected that science and technology will provide more concrete benchmarks for decommissioning. Technical and scientific uncertainty are the reasons to adopt a precautionary approach in Belgian legislation and to focus on full decommissioning as a starting point. In the future, attention will also have to be paid to lifetime extension, refurbishment, and repowering. Today there are few practical examples of this, but it can be expected that, partly as a result of future insights and technological progress, more effort will be made in this area in the future. However, this is not an issue under international law, since the OWFs are not decommissioned as such and will therefore not fall under the general removal obligation. Under national law, some problems may arise in particular jurisdictions such a Belgium where, for example, there are term limitations on domain concessions and the related environmental permits. Such options therefore must be properly mapped out before the concessions and associated environmental permits expire.

Disclosure section

The authors report there are no competing interests to declare.Notes

Acknowledgment

This work was supported by the Energy Transition Fund (PhairywinD-project; FPS Economy).

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Angelo Goethals http://orcid.org/0000-0002-7131-0378
Frank Maes http://orcid.org/0000-0001-5110-2160