University of Bergen

Centre for the Study of the Sciences and the Humanities (SVT)
Department of Biological Sciences

SDG350
Master of Philosophy in Sustainability

Fall 2025

The artificial nature of OWFs

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Abstract

Offshore wind is on the rise in Europe. Between 2030-2040, capacity is estimated to increase from 109-112 to 215-248 GW. This development will increase pressure on the marine environment and contribute to more conflicts between maritime users. On the other hand, new studies show that offshore wind may also function as *de facto* Marine Protected Areas (MPAs) because they prevent certain fishing activities like bottom trawling. Studies also show that various fish species may benefit from increased opportunities for spawning, foraging, and shelter due to the artificial reef effect. In addition, supplementary installations like Nature-inclusive design (NID) can help enhance these effects and contribute to "nature positive" effects.

This study examines how these "nature positive effects" are argued for and negotiated in a Norwegian context. By focusing on two Strategic Environmental Assessments (SEAs) for biodiversity that were published as part of the Strategic Impact Assessment (SIA) for Sørvest F, Vestavind F and Vestavind B in November 2024, the study examines how these documents actively frame, argue and negotiate for "nature positive effects". The study employs the practice-oriented approach as described by Asdal and Reinertsen (2022) which is closely connected to Science and Technology Studies (STS), and studies of so-called *issues*. Inspired by this, I analyze how the SEAs take a part in shaping, modifying and transforming two co-emerging *issues.* This thesis reveals that SEAs actively modify what nature is, and in this way actively transform OWFs into a measure that can both "restore" and "improve" *nature.* The study also discusses how these framings support different ideas of sustainability, by favoring some interest over others.

Sammendrag

Havvind er i «vinden» i Europa. Mellom 2030-2040 er det estimert at kapasiteten skal øke fra 109-112 til 215-248 GW. Dette vil føre til økt belastning på det marine miljøet, samt bidra til flere konflikter mellom aktører til havs. På en annen side, viser nye studier at havvind også kan fungere som mulige marine verne områder (MPAs) fordi de hindrer fiskeriaktivitet som bunntråling. Studier viser også at ulike fiskearter vil kunne få økte muligheter for gyting, næringssøk og skjul som følge av den kunstige rev-effekten. I tillegg kan tilleggsinstallasjoner som naturinkluderende design (NID) bidra til å øke produktiviteten av disse effektene og dermed bidra til så kalte «natur positive» effekter.

Denne studien tar for seg hvordan disse "natur positive effektene" argumenteres for og forhandles i en norsk kontekst. Spesifikt, undersøker denne studien rollen til to fagutredninger (SEAs) for naturmangfold som ble publisert som en del av konsekvensutredningen (SIA) for Sørvest F, Vestavind F og Vestavind B i november 2024. Studien undersøker dermed hvordan disse fagutredningene aktivt former hva natur er og spesielt hvordan argumenter for «naturpositive effekter» av havvind fremstilles. Studien er plassert innen teknologi- og vitenskapsstudier, såkalt *Science and Technology Studies* (STS), der flere forskere har studert såkalte *issues* og hvordan kunnskap bidrar til å produsere og representere hva *natur* er. Inspirert av dette tar jeg utgangspunkt i den praktisk-orientert dokumentanalysen som beskrevet av Asdal og Reinertsen (2022). Denne studien demonstrerer dermed hvordan dokumenter som fagutredninger aktivt former og modifiserer hva natur er og hvordan de aktivt former etableringen av havvind til å bli et tiltak som kan både "restaurere" og "forbedre" det marine miljøet. Denne studien diskuterer også hvordan disse fremstillingene av havvind representerer ulike visjoner av bærekraft.

Acknowledgement

I would like to express my deepest gratitude to my two supervisors, Thomas Völker and Siv Elén Årskog Vedvik, who have both supported me throughout this long journey. They have always believed in my vision, even when I have doubted it myself. Thank you so much for all your help and support!

I would also like to express my gratitude to Roger Strand. I have now finally understood what you meant when you told me that "life is suffering" and that "you should always see problems where others see solutions". Thank you for these valuable lessons ☺

I also want to thank all my fellow master students in the master's program —especially "Sal-jentene" for supporting me through this "wicked journey". Thank you also to my roomie Jenny, my sister Helene, and my partner Andrew. Your support, writing advice, and laughs have meant a great deal to me.

Finally, thank you also to "best of Sade" for being my emotional support album!

With that said, I hope that I have now mastered the art of Sustainability.

Kathrine Wie Helgøy
Bergen 1st September 2025

Abbreviations

MPAs	Marine Protected Areas
NID	Nature-inclusive design
NIVA	"Norsk institutt for vannforskning"
NVE	The Norwegian Water Resource and Energy Directorate
OEA	Offshore Energy Act—*Havenergilova*
OWF	Offshore Wind Farm
OWE	Offshore Wind Energy
SEA	Strategic Environmental Assessments—*fagutreding for naturmangfold*
SIA	Strategic Impact Assessment—*strategisk konsekvensutredning*
SVO	Particularly valuable and vulnerable areas—*Særlig verdifulle og sårbare områder*
SN II	Sørlige Nordsjø II

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1. Introduction

Offshore Wind Energy (OWE) is considered one of the most important renewable energy sources that can help lower global greenhouse gas (GHG) emissions. However, since the early 2000s, when the first Offshore Wind Farms (OWFs) were developed in Denmark, concerns have grown around environmental and socio-economic impacts (Olsen and Mortensen, 2024). Studies have specifically shown that the establishment of OWFs can add pressure to the marine environment—leading to habitat degradation, changing species behavior and increased noise pollution (de Jong *et al.*, 2020). Additionally, competition for ocean space has led to conflict with other marine users, particularly fisheries (Gill *et al.*, 2020; Szostek *et al.*, 2025). Fishing activities are not routinely excluded from OWFs but might be restricted because of safety reasons (Bergström *et al.*, 2014). Consequently, these environmental and socio-economic impacts have casted doubt on whether OWFs can successfully co-exist with other maritime activities and at the same time reduce their impacts on the marine environment (Gill *et al.*, 2020; Bonsu *et al.*, 2024).

On the other hand, another perspective is emerging in the literature—OWFs are being claimed to bring "nature positive" effects (Pardo *et al*., 2023). This is because the foundations and "scour protection" of OWFs may function as artificial reefs—offering foraging, shelter and spawning opportunities for fish species (Degraer *et al*., 2020). These effects are also "particularly noticeable when Nature-inclusive Designs (NID) are used" (Lloret, 2025). In addition, they may reduce the pressure of harmful fishing activities like bottom trawling (Ashley, Mangi and Rodwell, 2014; Pardo *et al.*, 2023). These "nature positive" effects have also sparked a debate in the literature about whether OWFs could successfully function as *de facto* Marine Protected Areas (MPAs) (Christie *et al.*, 2014a; Lloret *et al.*, 2023; Lloret, 2025). While some studies suggest that it can be legally feasible (Christie et al., 2014), other stress caution in deliberately categorizing OWFs as MPAs (Lloret *et al*., 2023).

This debate sparks several questions. First, can OWFs effectively protect nature? More importantly, how are these "nature positive" effects argued for, negotiated and framed? This thesis will examine these questions in a Norwegian context.

1.1 Scope and aim of thesis

The Norwegian case is a particularly interesting one because Norway is a new establisher of offshore wind. Norway has also set an ambitious goal of establishing OWE at a capacity of 30 GW by 2040 (Olje- og energidepartmentet, 2020). The Norwegian government also emphasizes that the establishment should be done in a "sustainable manner" that considers both climate and the environment (Meld. St. 35, (2023-2024), p. 78). To ensure this, future OWFs must undergo a Strategic Impact Assessment (SIA) as this is a requirement from the Offshore Energy Act (OEA) (OEA, 2010, §2-2(2)).

In 2020, the first two OWFs were officially opened for offshore wind (Olje- og energidepartementet, 2020). In 2023, the Norwegian Water Resource and Energy Directorate (NVE) was tasked to assess whether 20 new areas could be suitable for offshore wind. As a part of this assignment, NVE were tasked to conduct a Strategic Impact Assessment (SIA) for the 20 areas (NVE, 2024a). The first part of the assignment was to publish a SIA for three areas—Sørvest F, Vestavind F, and Vestavind B—which was published in November 2024. The SIA was composed of 20 professional reports, where three of these were tasked to assess the impacts of OWFs on biodiversity—*naturmangfold*. One of these included consequences for birds and bats, while the two others examined impacts on marine biodiversity below water surface—benthic community and habitats (Cochrane *et al*., 2024) and biodiversity in free water bodies (Siwertsson *et al*., 2024). In this thesis, I wish to understand what role these two documents have in the opening procedure of Sørvest F, Vestavind F, and Vestavind B. More specifically, how these documents are formatted and produced. I also wish to understand how these documents frame nature, most importantly, "nature positive" effects.

This thesis is situated within the broad scientific field called Science and Technology Studies (STS), where scholars more recently have paid attention to *issues* or the formation of *issues* in society (Asdal, 2015, Asdal and Hobæk, 2016; Marres, 2007). For example, Asdal and Hobæk (2016) demonstrate how the issue of whaling was problematized over the second half of the 1800s by both the government and civil society through studying documents of the Norwegian Parliament. In other words, Asdal and Hobæk (2016) demonstrated how documents of the Norwegian parliament work on a nature-object. This leads me to the second concept from STS that I will draw inspirations from, namely productions of nature which have been studied by STS scholars including Asdal (2003; 2008) and Latour (1998).

According to these authors, it is hardly "Nature with a capital N" (Asdal, 2008, p. 123)—or nature as an external and comprehensive concept—that is the focus of scientific practices, it is rather versions of nature (Latour, 1998). *Nature* must therefore be understood as the outcome of practices rather than their starting point (Asdal, 2003). I will return to this in the conceptual framework (section 3.2).

The goal of this exploration is to demonstrate that SEAs are not neutral summaries explaining the environmental impacts of OWFs, but rather active agents that take part in shaping, modifying and transforming two "nature-*issues"* (Asdal, 2015; Asdal and Reinertsen, 2022). I will explain my conceptual framework further in chapter 3, where I will also present my research questions. A main finding of this research is that nature appears to be both "restored" and "improved" by the establishment of OWFs according to the SEAs. I then argue that this framing is potentially problematic because it ignores other perspectives that are more critical to the production of an "artificial nature".

1.2 Chapter outline

This thesis is divided into 6 chapters. I will here briefly explain the purpose of each chapter.

Chapter 2—Background chapter

In the background chapter, I will start by providing more context to the debate on OWFs as *de facto* MPA and outline notions of "nature positive effects" associated with OWFs (2.2). Then in chapter 2.3, I will narrow the focus to the Norwegian context, and describe the status of the marine areas in North-Sea and Skagerrak where most of the future OWFs are planned. Then, in section 2.4, I will explain the opening procedure of OWE in Norway, with particular focus on the SIA and the two SEAs—for Sørvest F, Vestavind F, and Vestavind B—that are central to this thesis. Finally, in chapter 2.5, I will take a step back and reflect on what is really meant by doing something in a "sustainable manner" and, more generally, what is meant by sustainability as a concept. This reflection will tie up to a bigger discussion in chapter 6.

Chapter 3—Conceptual framework

In this chapter, I will present the conceptual framework of this thesis. I start by introducing relevant concepts from STS including studies of *issues*, and production of *nature(s)*. I will

then explain why these concepts are relevant for the aim of my thesis. Lastly, in section 3.3 I will present my research questions.

Chapter 4—Methodology and material

Here, I will outline my methodological approach—"Practice-oriented document analysis" (Asdal and Reinertsen, 2022)—and describe how I have structured my analysis and approached my data. Lastly, I will describe some limitations of my study.

Chapter 5—Empirical analysis

In chapter 5, I present my findings from the analysis of SEAs, interviews and hearing notes. I will start by demonstrating what the role of SEAs are. Specifically, I will focus on how they are formatted and written. In the last part of the empirical analysis, I will demonstrate how "nature positive effects" are argued for, negotiated and framed in the SEAs. From this I will demonstrate how the documents shape two co-emerging *issues.* I will thereby examine how two hearing notes from *Pelagisk forening* (2025) and *Fiskebåt* (2025).

Chapter 6—Discussion

In chapter 6, I will summarize my main findings and point to areas where this topic needs to be studied further. Lastly, I will interpret my findings considering the sustainability concepts that was presented in section 2.5.

Chapter 7—Conclusion

In the final chapter, I will present my concluding remarks, and point to areas for further research.

2. Background

2.1 Gone with the wind

Offshore Wind Energy (OWE) is considered an important renewable energy source in the global transition towards carbon neutrality. As part of the European climate and energy goal, OWE is predicted to reach a capacity of 109-112 GW by 2030, and 215-248 GW by 2040 (Herrera Anchustegui and Soliman Hunter, 2024). This rapid development of OWE is driven by the urgent need to reduce the global Greenhouse gas (GHG) emissions and mitigate the impacts of climate change. However, the global expansion of OWE is not without challenges. Since the early 2000s, when the first OWFs where developed in Denmark, concerns have grown around environmental and socio-economic impacts (Olsen and Mortensen, 2024). Studies have shown that the establishment of OWFs can add pressure to the marine environment—leading to habitat degradation, change species behavior and increase noise pollution (de Jong *et al.*, 2020). Additionally, competition for ocean space has led to conflict with other marine users, such as fisheries (Gil et al., 2020). Fisheries are not routinely excluded from OWFs, but might be restricted because of safety reasons (Bergström *et al.*, 2014). To address these concerns, the concept of co-existence has become central in policy and planning discussions in the European Union (EU). Co-existence refers to the operation of activities in adjacent spaces (Pardo *et al*., 2023). Co-existence is concept that is particularly reflected in the EU Maritime Spatial Planning Directive (MSPD) 2014/89/EU.

2.1.1 Co existence, multi-use and co-location

In 2014, the EU published MSPD—requiring all EU members to implement a Marine Spatial Plan (MSP). At that time, the EU had seen an increasing number of conflicts between users and between users and the environment. Particularly, the establishment of OWFs had been recognized as adding pressures on other maritime uses—such as commercial fishing—as it requires large areas of the ocean (Schupp *et al.*, 2021). The increasing demand for maritime space had also been recognized as adding pressure to marine ecosystems and habitats. The aim of the MSPD was therefore to introduce a political framework that could help reduce conflict, create synergies between maritime sectors—thus ensure co-existence—and protect and preserve the environment (EU, 2014). One of the objectives in the MSPD is to identify and encourage the implementation of multi-use or multi-purpose options—referring to the "intentional joint use of resources in close geographic proximity" (Bocci *et al.*, 2019). This

reference and encouragement of multi-use practices has also sparked an debate in literature in possible multi-use practices.

In parallel to the publication of the MSPD, a number of academic articles has been published discussing the possible multi-use and multi-purpose of maritime activities. Particularly multi-use of OWFs with fisheries (Schupp *et al.*, 2021), and OWFs and kelp-farming (Maar *et al.*, 2023) has been discussed as possible multi-use practises. There are also a number of studies exploring the potential co-location of OWFs with marine activities (Christie *et al.*, 2014b; Lloret *et al.*, 2023; Bonsu *et al.*, 2024). Co-location differs from multi-use practises as it seeks to explore the possibility of two activities occupying the same spatial footprint at the same time (Pardo *et al*., 2023). Co-location has especially been studied for OWFs in combination with aquaculture, kelp-farming, tourism (Christie *et al.*, 2014b) and fisheries (Bonsu *et al.*, 2024). In addition, the co-location of OWFs and Marine Protected Areas (MPAs) has been a "hot topic" in recent research (Christie *et al.*, 2014b). I will examine the literature discussing the co-location of OWFs and MPAs further, but first I wish to define what is meant by MPAs and why the establishment of MPAs is considered important.

MPAs can be defined according to the Convention for the Protection of the Marine Environment for the North-east Atlantic (OSPAR) as the following:

> "[…] areas for which protective, conservation, restorative or precautionary measures have been instituted for the purpose of protecting and conserving habitats, ecosystems or ecological process of the marine environment" (OSPAR, 2003).

MPA designs vary widely from no-take zones, where all extractive human activities are prohibited, to multi-use MPAs that are partially protected areas and permit certain levels of extractive activities (Thurstan, O'Leary and Yates, 2018). However, both "non-take"- and "multi-use" MPAs should be managed to "achieve long-term conservation" and protect and manage important "ecosystem services" (Lloret, 2025). The implementation of MPAs has been legally reinforced through various conventions and acts. Already in 2003, the OSPAR convention recommended the implementation of MPAs as an important environmental protection and conservation measure (OSPAR, 2003). In 2022, the designation and importance of MPAs was also lifted by the UN Convention on Biological Diversity (CBD) in the so-called "nature agreement". The "nature agreement" is considered an historical

agreement for biodiversity and it was officially published during the 15th annual Conference of the Parties (COP) in Montreal. The nature agreement was signed by 196 countries, including Norway, and was considered a historical decision for environmental conservation and protection (Klima- og miljødepartementet, 2023). Specifically, target 3 of the decision was considered one of the most important goals for preserving global marine environments. This target specifies that at least 30% of the global marine areas should be conserved and protected by 2030 (UN Convention on Biological Diversity, 2022). As such, the designation of MPAs is an important measure for reaching this target (Naturvernforbundet, 2024).

So, now that I pointed out how MPAs are defined or understood within some policy frameworks, I next wish to examine why OWFs and MPAs are being explored as a co-location option. I will here begin by exploring the growing body of literature discussing the possibility of co-locating OWFs with MPAs.

2.1.2 Co-location of OWFs and MPAs: friends or foes?

Recent studies have begun to explore the legal feasibility of co-locating OWFs and MPAs (Christie *et al*., 2014; Lloret *et al*., 2023). One example is the case study by Christie *et al*. (2014) that investigates the legal feasibility of co-locating OWFs with aquaculture, MPAs and commercial fishing in the UK. The authors found that co-locating some of these activities is legally feasible. However, successful implementation will depend on the ecology, hydrology and biology of the site (Christie *et al.*, 2014). Specifically, for MPAs and OWFs, the compatibility will depend on the conservation objectives, in other words whether it is a no-take zone or multi-use MPA.

In another case study by Lloret *et al.,* (2023), the authors examined the complex interactions between OWFs and MPAs in the Mediterranean Sea. Specifically, the study assessed the feasibility and environmental implications of developing OWFs near Natura 2000 sites. The Natura 2000 sites are governed under the Marine Strategy framework Directive 2008, and the EU biodiversity strategy for 2030. Therefore, the sites have an important value for conserving and protecting species and habitats while also being an important measure for achieving the effective protection of 30% of marine biodiversity by 2030 (European Environmental Agency, 2024). The Natura 2000 sites are certified non-take MPAs and already prohibit certain activities like bottom trawling. Consequently, the establishment of OWFs could have

negative impact on the existing non-take MPAs (Lloret *et al.*, 2023). As such, the study emphasized the importance of a precautionary approach when considering the co-location of OWFs and Natura MPAs.

These case studies reveal the growing tension, and potential synergy, between OWF development and marine conservation objectives. While co-location of OWFs with MPAs might be legally feasible, it depends on the conservation objectives in the area (Christie *et al*., 2014). For example, in areas that are already non-take MPAs like Natura 2000s, the co-location with OWFs might work against the objectives. It is therefore becoming necessary to examine the protection objectives to determine whether OWFs and MPAs can be co-located. Alternatively, recent research has explored the *de facto* MPA effect of OWFs, examining their potential to function as protective measures in themselves, rather than being integrated into existing MPAs (Ashley, Mangi and Rodwell, 2014; Pardo *et al*., 2023). I will examine this alternative perspective in the next section (2.2).

2.2 The nature positive effects of OWFs

The reduction of fishing activity associated with OWFs has prompted an increasing interest in exploring the potential for OWFs to meet conservation goals either as *de facto* MPAs or as Other Effective area-based Conservation Measures (OECMs) (Ashley, Mangi and Rodwell, 2014; Dunkley and Solandt, 2022; Pardo *et al.*, 2023). OECMs are geographically defined areas that may not have formal legal protection, but where existing restriction may still demonstrate long-term conservation of biodiversity (IUCN, no date). According to recent research, OWFs could act similar to these protection measures by restricting harmful fishing activities, while also supporting biodiversity through the artificial reef effect (Ashley, Mangi and Rodwell, 2014; Degraer *et al.*, 2020). These effects are also being discussed in relation to Nature-inclusive designs (NID) that can make these effects "particularly noticeable" (Lloret et al., 2025). I will in this sub-chapter, demonstrate how the artificial reef effect, fishery exclusion and NID, are described in the literature.

2.2.1 Artificial reef effect

The artificial reef effect has been recognized since the 1930s. The effect is defined as "man-made structures that are deliberately placed in the sea to mimic natural reefs" and have been commonly deployed to improve biodiversity in an area (Degraer *et al*., 2020). In recent years

artificial reefs have been described as “integral tools for fish management, ecological reconciliation and restoration efforts” (Riera *et al.*, 2024) or as “one of the most popular means of supporting marine ecosystem conservation and coastal fisheries (Brochier *et al.*, 2021). In the context of OWFs, the artificial reef effect is associated with the attraction of hard-substrate species that tend to colonize the monopiles of OWFs (Degraer *et al.*, 2020). While this effect is mostly associated with bottom fixed technologies, some studies have reported it for floating platforms (Ashley, Mangi and Rodwell, 2014; Degraer *et al*., 2020).

In recent years, the artificial reef effect has been studied in the Northern hemisphere where suspension feeders, or filtrating organisms, i.e., the blue mussel *(Mytilus edulis)* have been found to commonly colonize the structures. The blue mussel is a filtrating organism that actively filters water and ingests particles. In doing this, filtrating organisms remove particles resulting in lower turbidity and increased light penetration in the area (Degrer *et al*., 2020). Over time this has shown to increase pelagic food sources available for benthic communities. The artificial reefs have also shown to hold a greater fish density and biomass compared to surrounding areas (Degaer *et al*., 2020). While the artificial reef effect is expected to be observable for most OWFs, literature suggest that changes introduced by the artificial reef effect are “site-specific”. This means that the effect can have different outcomes depending on the placement of the OWF (Pardo *et al*., 2023).

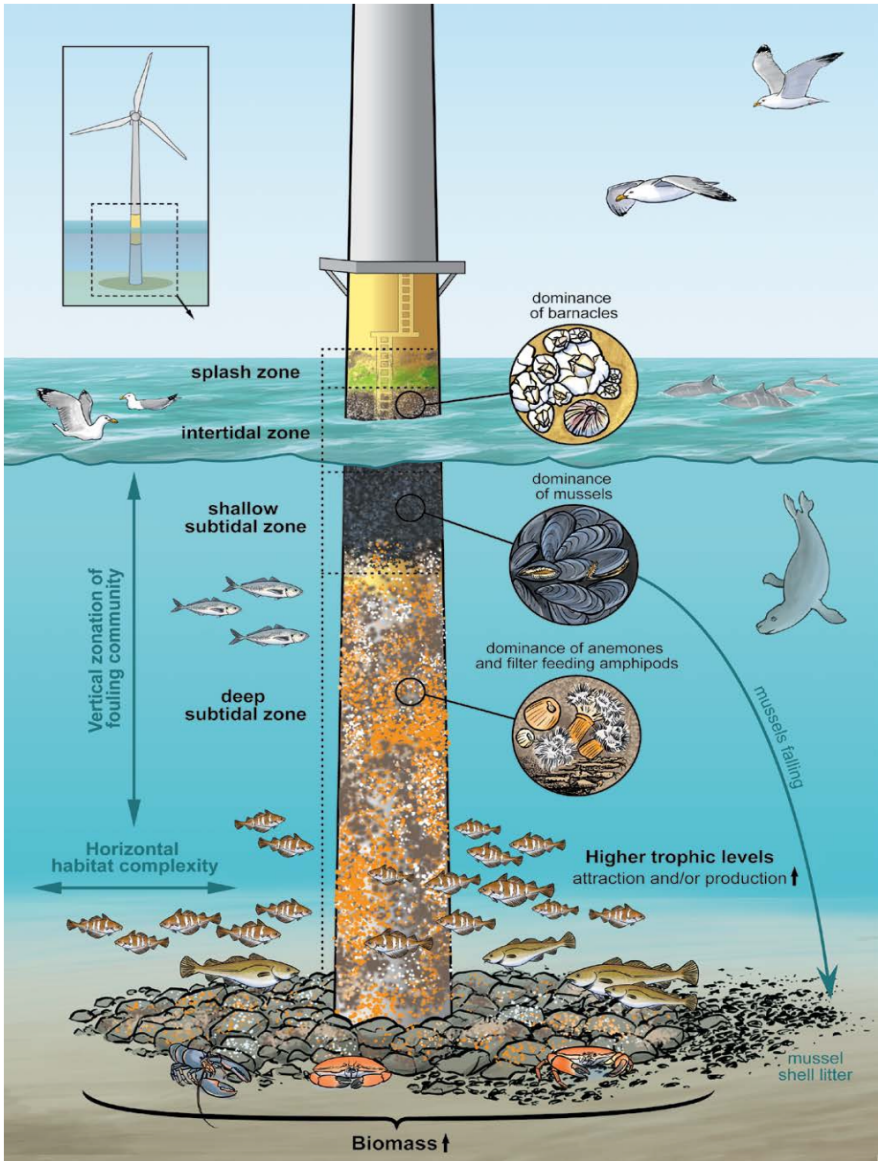

Figure 2.2.1 The artificial reef effect as illustrated in Degraer *et al*. (2020).

The artificial reef effect has also been associated with the introduction of invasive, or non-indigenous species, through acting as "stepping-stones" (Ashley, Mangi and Rodwell, 2014; Degraer *et al.*, 2020; Pardo *et al.*, 2023). This is also referred to as the stepping-stone effect which describes the facilitation of species migration through new pathways due to e.g., hard substrates of offshore installations. In the North-Sea, where some of the first OWFs were installed, reports indicate that invasive species like the pacific oyster and the marine splash midge have been found among the colonizing species (Degraer *et al.*, 2020). These invasive species are likely to extend their population or be distributed to a higher extent, which can pose a threat to the naturally occurring species (Degraer *et al.*, 2020). In the North-Sea invasive species that have been found further south have expanded to northern areas making

use of the artificial habitat provided by OWFs. While there is a concern that OWFs can function as stepping-stones for invasive species and threaten the "natural" biodiversity there are few studies that demonstrate this. However, caution should be applied when describing the artificial reef effect as only having—what may be perceived as—positive effects (Degraer *et al*., 2020).

2.2.2 Fishery exclusion

Active fishing activities like bottom trawling have historically been linked to different physical disturbance of the benthic habitat that could influence species richness (Bradshaw *et al.*, 2024). A reduction in the use of this type of fishing activity is therefore necessary to enhance species abundance—thus reducing mortality rates of both target species and by-catch resulting from trawling (Bergström *et al.*, 2014). This has mainly been done through the designation of so-called non-take MPAs. However, OWFs have a similar effect in restricting active fishing activities as "non-take zones" (Gill et al., 2020). This has led to an increasing number of studies discussing the "nature positive effects" (Pardo *et al*., 2023) of fishery exclusion within OWFs.

Studies have shown that the foraging, spawning and hiding opportunities for fish has increased within OWFs (Coates *et al.*, 2016). The improved conditions are likely due to the exclusion of fisheries from the sites and from increased foraging opportunities from the artificial reef effect (Ashley, Mangi and Rodwell, 2014). This could also encourage species to re-locate to the surrounding areas of the OWF, although such changes might take several years to become ecologically significant for fish populations (Austrheim *et al.*, 2022).

On the other hand, the exclusion of fisheries from OWFs is not without drawbacks. Displacing fishing activity from an OWF could add additional pressure to other fishing grounds (Gill *et al.*, 2020). As a result, previously less-impacted habitats may become more vulnerable than before. In addition, this displacement of fisheries may also lead to addition maritime conflicts as it may result in increasing competition among fishermen (Gil *et al*., 2020). Consequently, the exclusion of fisheries from OWFs remains a controversial topic, requiring careful considerations of both ecological and socio-economic trade-offs (Stelzenmüller *et al.*, 2021).

2.2.3 Nature-inclusive designs (NID)

Nature-inclusive designs (NID) is a newly emerging idea closely connected to so-called "nature-based solutions". This concept appeared for the first time in the literature in 2020 (Pardo *et al.*, 2023) and is mostly discussed in relation to both the artificial reef effect and fishery exclusion (Pardo *et al.*, 2023; Kingma *et al.*, 2024). NiD refers to the option of integrating or adding design to man-made infrastructures to enhance their "ecological function", and to create suitable habitats for native species or communities (Hermans, Bos and Prusina, 2020; Pardo *et al.*, 2023). Such "nature-based solutions" have also been suggested as an implementation to OWFs that can ensure a "sustainable offshore wind industry" that is also being recognized by the IUCN (Pardo *et al*., 2023).

NID can vary in design, from scour protection layers, that have been shown to increase the biomass of commercial fish, to cable protection layers, and lastly bio-huts or fish hotels (See fig. 2.1) (Pardo *et al*., 2023). The use of NID such as scour protection could offer a "unique habitat for rock-dwelling benthic organisms" that has mostly been reduced due to harmful seabed activities such as bottom trawling (Kingma *et al.*, 2024). The implementation of NID is also described together with the artificial reef effect as a way to increase abundance of commercially important species like "Atlantic cod" and the "European lobster" (Pardo *et al*., 2023). By adding structures to the installations, the use of NID could ensure "nature positive effects" of OWFs (Pardo *et al*., 2023). Nature positive effects are defined as "net positive impacts and no net loss of biodiversity" (Pardo et al., 2023).

Despite a growing interest in implementing NID, there is currently no scientific consensus on the specific goal of NID (Pardo *et al*., 2023). Specific questions remain about what constitutes as meaningful nature-positive effects and which ecosystem functions NID should prioritize. In addition, there is a lack of long-term in-situ studies assessing the effectiveness of these designs over time (Pardo *et al*., 2023). Further studies must assess these questions before

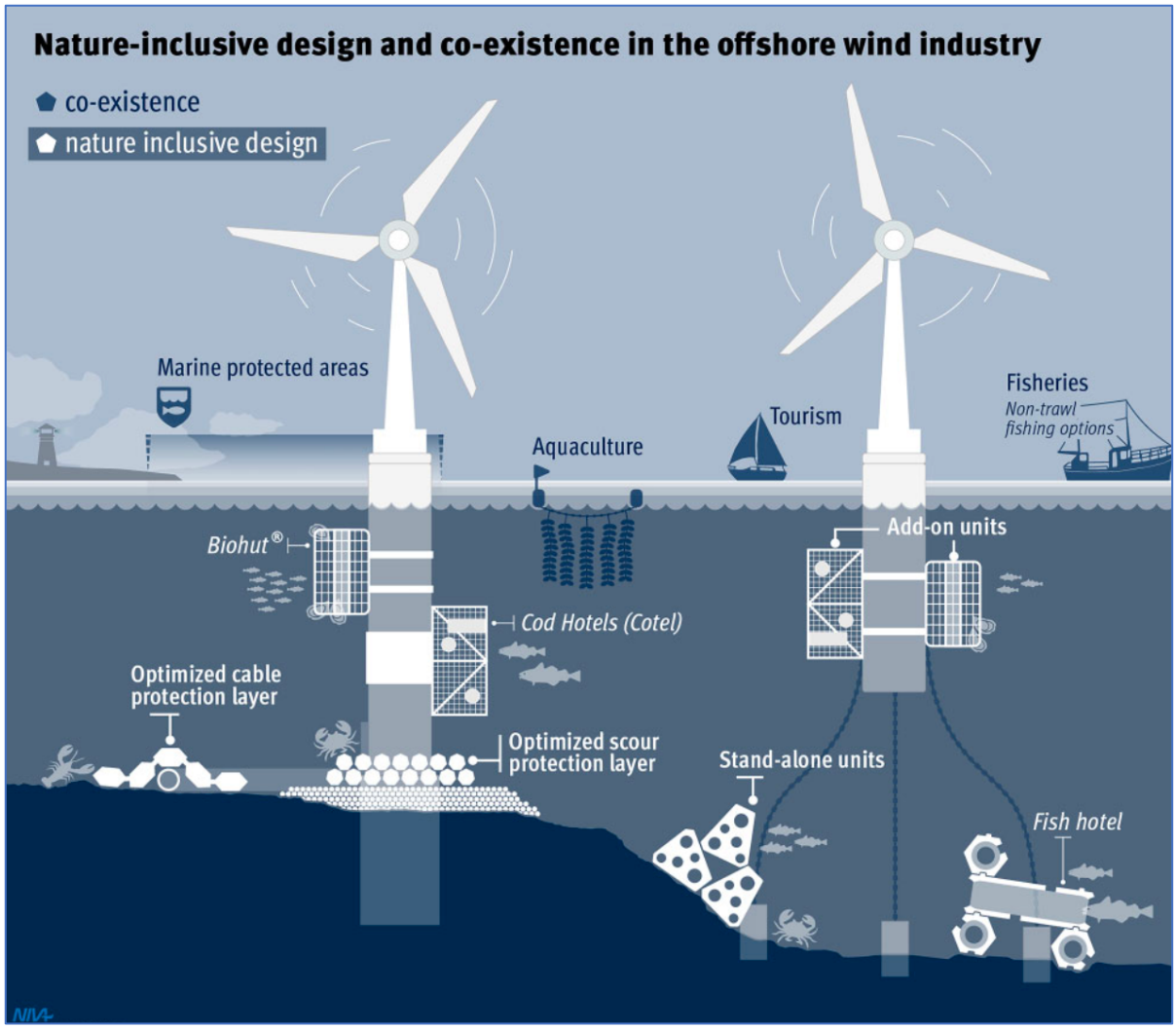

Figure 2.2.3: Nature-inclusive Design. As illustrated by Pardo *et al*., (2023).

2.3 Marine management in Norway—The North-Sea and Skagerrak

Unlike EU member states, Norway does not operate under the MSPD. Instead, Norway's marine areas are governed under the integrated management plans (*forvaltningsplaner*), which are revised every four years by the department for Climate and Environment. These plans cover the Barents Sea-Lofoten, the Norwegian Sea, and the North Sea and Skagerrak, with the most recent plan from 2024 (Meld. St. 21 (2023-2024)). The overall aim of the management plans is to facilitate value creation through "sustainable use of marine resources and ecosystems services" (Meld. St. 21 (2023-2024), p. 7). They shall also ensure that the structure, function and productivity of biodiversity and ecosystem are maintained. Furthermore, the plans aim to enhance the co-existence among marine industries, including fisheries, shipping, petroleum, and OWE. This sub-chapter examines the most recent management plan (Meld. St. 21 (2023-2024)) to understand the conditions of Norwegian

marine areas, and how they are described and valued—especially in areas now considered as most suitable for establishment of OWFs, namely the "North-Sea and Skagerrak".

2.3.1 Invasive species

The ecosystems around North-Sea and Skagerrak have over the last 10 years been heavily impacted by climate change. The increased ocean temperatures and ocean acidification has led to an increasing number of invasive species in the area. Invasive species can be defined as "species that can affect the natural composition of species in an area, which will change the local ecosystem" (Meld. St. 21, (2023-2024), p. 27). The introduction of such species is considered the biggest threat to the biodiversity in nature (Meld. St. 21, (2023-2024)). An example is the pacific-oyster which has been found along the coast of the North-Sea and Skagerrak. The pacific oyster is of particular concern as it can form very dense populations and alter coastal ecosystem. It will also compete with mussels and flat oysters that are native species in the same area (Meld. St. 21, (2023-2024)). While such species have mostly been found close to the coastal areas, the management plans highlight that the particularly increased shipping traffic and some aquaculture practices could lead to an increase in the establishment of such species.

2.3.2 Fishing activities

The ecosystems and North-Sea and Skagerrak are also heavily impacted by commercial fishing (Meld. St. 21, (2023-2024). The areas support a number of key commercial species such as northeast Atlantic Mackerel, North-Sea Herring, shrimp, coastal cod, Saithe and sandeel. Most of these fish stocks are good and within carrying capacity. However, for both sandeel and codfish the conditions have been worsening in the last years (Meld. St. 21 (2023-2024)). The sandeel is a bottom fauna species that is heavily impacted by fishing activity like bottom trawling. If the population of sandeel decreases, it will significantly impact the foraging abilities for seabirds and other marine mammals (Meld. St. 21, (2023-2024)). The conditions for the codfish in the North-Sea and Skagerrak has seen a similar decline. This decline is mostly attributed to a combination of overfishing, habitat degradation and pollution due to climate change (Meld. St. 21, (2023-2024)). As a result of the declining fish population of some commercially important species, the Norwegian government has categorized some of the spawning areas for sandeel as particularly valuable and vulnerable—

Svært verdifulle og verneverdige områder (SVOs). A more detailed explanation of what the status of "SVO" entails will follow in the next section.

2.3.3 Marine protection

In the current management plan, the Norwegian government underscores the importance of maintaining and enhancing biodiversity and biological productivity of the Norwegian marine areas. A key policy goal is to ensure that nature's own function and services are preserved, not only for their intrinsic value but also for their contribution to human well-being and climate resilience (Meld. St. 21 (2023-2024)). This is primarily achieved through the designation of MPAs, which are formally protected under the Nature Diversity Act (2009), and designation of OECMs. The establishment of MPAs are legally designated under chapter V of the Nature Diversity Act (2009), which allows for the creation of national parks, nature reserves and MPAs. The designation of such areas comes with binding restrictions across sectors to ensure long-term protection of habitat, species and ecological function. However, the Nature Diversity Act (*Naturmangfoldloven*) only applies for marine territories within the territorial sea, meaning areas measuring 12 nautical miles from the baseline (Naturmangfoldloven, 2009). Consequently, there are no current legal regulations for establishing MPAs beyond 12 nautical miles. This could change with the new law proposal from 2024 advocating for a new marine protection act for the areas beyond the territorial sea, also known as *Havvernloven* (Prop. 72 L (2024-2025)). This new law proposal will also make it easier for the state to give marine areas actual legal protection, as today there are no legal status on the suggested protected areas. There are only so-called SVOs that have a protection value (Meld, St. 29, (2020-2021)). I will now unpack more what is meant by an "SVO".

A central part of the knowledge base for marine protection is the designation of so-called SVOs (Meld. St. 29 (2020-2021)). These are areas with high environmental value, and particular significance for biodiversity as well as biological production. SVOs are also identified by their high ecological value and sensitivity (Eriksen *et al.*, 2021). Currently there are 19 SVOs in Norway (Meld. St. 29 (2020-2021)). In the North-Sea and Skagerrak there are currently 4 SVOs, where one of them is an important spawning area for sandeel (Meld. St. 21, (2023-2024)). However, while SVOs should serve as an area of particular value where one should proceed with caution, an SVO does not have any legal status and therefore does not automatically lead to restriction on commercial activities like fishing. Instead, the

identification of SVOs highlights the need for caution in order to protect biodiversity and biological productivity. Based on this, Norwegian authorities may consider whether certain activities in these areas requires specific regulatory frameworks or limitations (Meld. St. 21 (2023-2024); Meld. St. 29 (2020-2021)). The figure on the next page shows area in the "North Sea and Skagerrak" that are categorized as SVOs (fig. 2.3.3).

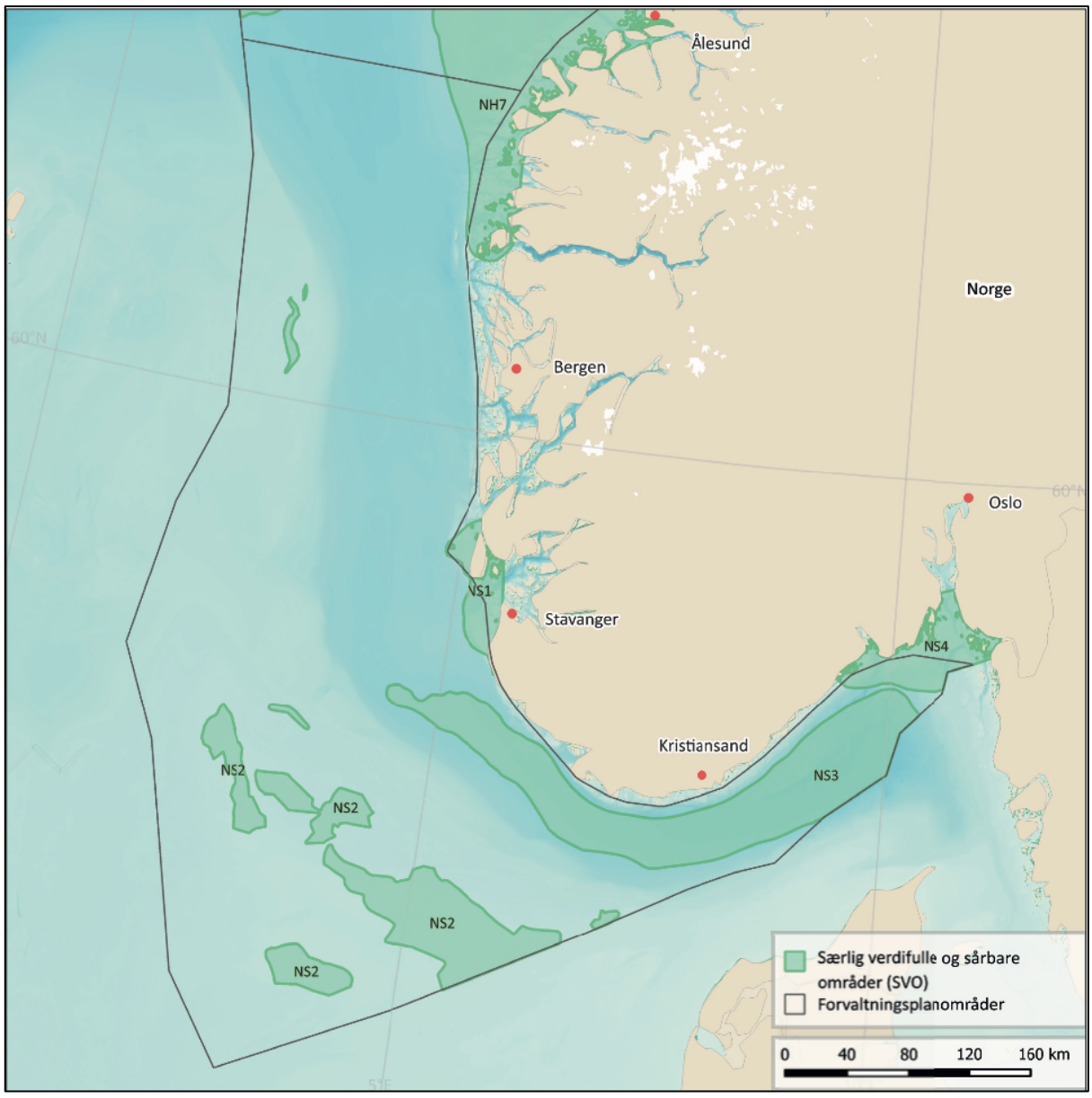

Figure 2.3.3: SVOs in North-Sea and Skagerrak, picture accessed from the newest management plan (St. Meld. 21 (2023-2024)).

2.3.4 Offshore wind ambition

The North-Sea and Skagerrak is a hotspot future OWFs, including recently opened areas Sørlige Nordsjø II located near the Norwegian border to Denmark, and Utsira Nord, located outside the coast of Rogaland (Olje- og energidepartementet, 2020). By 2040, the Norwegian government has planned to establish OWFs at a capacity of 30 GW, where many of these are planned to occupy large areas of the Norwegian North Sea (see fig. 2.3.4) (Energidepartementet, 2022). The establishment of OWFs is considered an important part of the "green energy transition" in Norway (Meld. St. 21, (2023-2024), p. 13). However, as the marine management plan highlight, without appropriate caution the OWF expansion could pose a risk to marine biodiversity by adding additional pressure to already impacted areas (Meld. St. 21, (2023-2024)). In line with this concern, the national plan for "sustainable use and conservation of nature" (Meld. St. 35, (2023-2024)), emphasizes that the development of offshore wind should be done in a "sustainable manner" that takes into account the impact on climate and the marine environment (Meld. St. 35 (2023-2024), p. 78). Similarly an official statement by the Office of the Prime Minister—*Statministerens kontor*—2022, emphasizes the need for ensuring that the OWF development is done in a manner that ensures "very low or positive overall environmental impact over time" (Meld. St. 4 (2022-2023), p. 196). Key environmental concern are noise pollution and habitat degradation (Meld. St. 21 (2023-2024).

At the same time, according to the management plan from 2024, OWFs can also have positive impacts on the receiving environment. For example, some bottom fixed OWFs are expected to provide artificial reef by attracting species through increased foraging and spawning opportunities (Meld. St. 21 (2023-2024)). Consequently, both negative and positive impacts must carefully be assessed, and future projects are therefore required to undergo a Strategic Impact Assessment (SIA). In the following chapter, I will describe more about the legal process behind conducting a SIA, which is a requirement from the Offshore Energy Act (OEA)—*Havenergilova*.

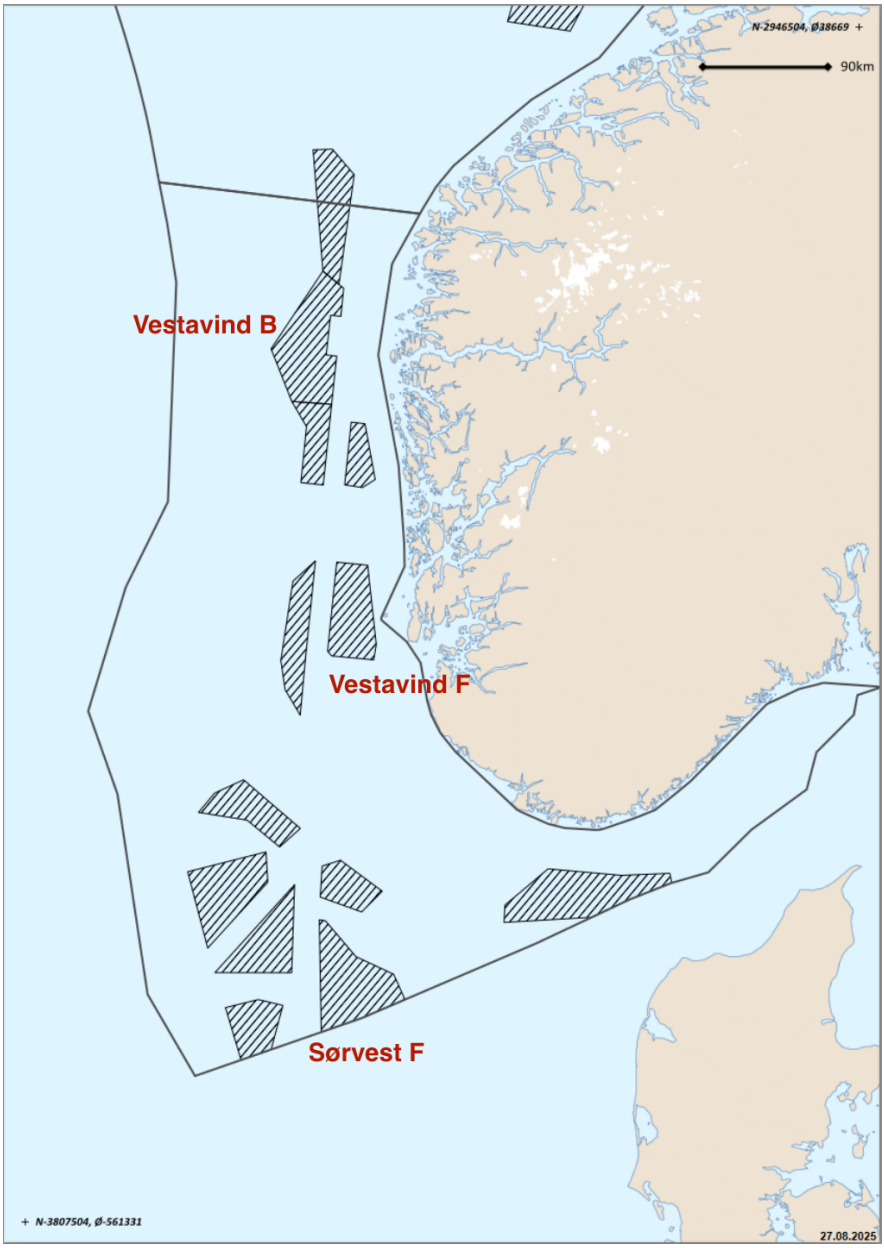

Figure 2.3.4: Planned OWFs in the north-Sea and Skagerrak, with marked out Sørvest F, Vestavind F and Vestavind B. Map available from https://kart.barentswatch.no

2.4 Offshore Wind licensing and planning

The licensing and planning process is governed by the Ministry of Energy—*Energidepartementet* (ED)—which is the licensing authority. Lastly, the decision to open an area must be made by the King in Council—*Kongen i statsråd* (Havenergilova, 2010, §2-2)). But before an area can be officially opened for offshore wind production, it must follow a strict process governed by the OEA from 2010 and the complementary Offshore Energy Act Regulations (OEAR) from 2020. The aim of the OEA—as described under §1-1—is to

facilitate for planning, construction and operation of renewable energy that "safeguards energy supply, the environment, safety and commercial activity" as well as other interests (OEA, 2010, §1-1). In this section, I will explain the "opening" process further. Specifically, how areas are selected as suitable for offshore wind production and why SIAs are conducted. The process that comes after—where developers are granted licenses for building OWFs—is left out of the scope.

Before an area is opened for offshore wind production, it must first be selected as suitable for OWE production through a "mapping" of the Norwegian sea areas. The selected areas must thereafter undergo a SIA—or *konsekvensutredning* (SKU)—according to §2-2(2) of the OEA. This provision specify that a SIA shall assess the social consequences of establishing renewable energy as well as potential conflicts with other interests (OEA, 2020, §2-2(2)). The provisions from §2-2 (2) also specifies assessing the environmental consequences of establishing offshore renewable energy. This is also a requirement from the European Economic Area (EEA) agreement which Norway is a member of. The EU has recognized the immense pressure of marine activities on the environment, and have followingly developed management principles (Finseraas and Eskeland, 2024).The EEA agreement have clear regulation on conducting Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs) as part of the SEA Directive 2001/42/EC and EIA Directive 2011/92/EU.

After the publication of a SIA, the findings from it shall be sent for official hearing in accordance with §4-1(2). This provision also specify that an opening decision shall be based on the findings from the SIA and submitted statements from hearing notes, and what these have said about the SIA (OEA, 2010, §4-1(2)). The hearing notes are submitted by relevant actors including both official and private, tasked to form their opinion about a potential opening process. It is then up to the "King in council" to decide whether the area should be opened or not. A decision that does not consider the findings from the SIA and the input from the consultation process will be subject to a procedural error, which will render the opening decision invalid (OEA, 2010, §2-2).

When a project area is opened or made available, potential developers can be granted a license. However, before a developer can been granted a license, they have to conduct a

project specific impact assessment. In the project specific impact assessment, the consequences of the specific OWF project application will have to be assessed further. This assessment must also be sent out for consultation before a license can officially be granted (OEA, 2010, §3-1 and §4-1(3)). Two areas have officially been opened through this process SNII and Utsira Nord. These two areas were opened based on a SIA conducted in 2012 by NVE (NVE, 2012). In the following section, we will take a closer look at the SIA process for these two areas.

2.4.1 The opening process of SN II and Utsira Nord

In 2010, the Norwegian Water Resources and Energy Directorate (NVE) was commissioned by the ED to conduct a strategic mapping of areas potentially suitable for OWE production. A group led by NVE, identified 15 suitable areas for offshore wind production (NVE, 2010). Following this, NVE was required to conduct a strategic impact assessment (SIA) for all the 15 areas. This SIA was officially published as a report in 2012 NVE (NVE, 2012). The assessment synthesized insights from 13 Professional reports—*fagutredninger*—covering environmental, business, and societal interest, as well as technical-economic conditions (NVE, 2012).

By 2012, the 15 areas that had been identified for OWE had been narrowed down to 5 suitable areas: SN I, SN II, Frøyagrunnane, Sandskallen-Sørøya Nord and Utsira Nord (Olje- og energidepartementet, 2020). However, in 2018, NVE was required to assess whether the knowledge base for opening these areas had been changed since 2012. The conclusion was that the opening process of SN I and SN II and Utsira Nord could continue. The areas Frøyagrunnane" and "Sandskallen- Sørøya Nord" were considered less relevant as they were significantly smaller and had less potential for adaptation to other relevant interests (Olje- og energidepartementet, 2020).

In 2019, a proposal to open the areas Utsira Nord, SN I and SN II for offshore wind production was submitted for public consultation. In the following year Utsira Nord and SN II was finally opened for offshore wind production in 2020. According to the SIA from 2012, SN II and Utsira Nord were considered most suitable for offshore wind power production due to technical and economic benefits. For SN II particularly the area had optimal wind conditions and was considered suitable for both bottom-fixed and floating technology due to

depth of 60-70 m (NVE, 2012). On the other hand, the professional report on bottom fauna, fish and marine mammals—also known as the Strategic Environmental Assessment (SEA)—published by SWECO Norge and AquaBiota Water Research, described SN II along with Frøyabanken and Stadthavet, as an area with vulnerable biodiversity that would suffer the worst overall negative impact (Enhus *et al.,* 2012). I will come back to what SEAs are in the next sub-chapter (2.4.2). But for now, I want to point out some of the findings from the SEA from 2012.

For SN II the authors of the SEAs found an overlap of the OWF with 0.4% of the total spawning area for mackerel and 18% of the only known spawning area for Sandeel in Norway, the SVO "Tobisfelt" (Enhus *et al*., 2012). The authors therefore recommended that these should not be part of the area for SN II. As a concequence, the recommendations from NVE in the SIA was to remove the northern part of the SNII OWF that overlapped with the spawning area for Sandeel and Mackerel. As result, NVE concluded that large parts of the SN II area could still be opened for OWE (NVE, 2012). In addition, NVE noted that most of the predicted environmental impacts would be noise pollution during establishment. As a result, the SN II area was opened for OWE in 2020 (Olje og Energidepartementet, 2020). So, what does this decision tell us? Well, the decision demonstrates the role of the SEAs in determining whether the area is suitable for OWE or not. It also illustrates how considerations between technical and economic feasibility are balanced with environmental considerations in the opening process.

In the next section, I will present the process of opening the areas Sørvest F, Vestavind F, and Vestavind B, which is currently happening. The areas Sørvest F and Vestavind F include SN II and Utsira Nord and should determine whether these should be expanded or not. The last areas Vestavind B is a new area. This process is important for my thesis, and I will therefore demonstrate how this is currently happening. I will also explain what SEAs are.

2.4.2 The SIA for Sørvest F, Vestavind F and Vestavind B

In 2023, a letter from the ED – *fastsetting av utredningsprogram for strategisk konsekvensutredning for havvind*—NVE was commissioned to conduct a new SIA for 20 new areas that had been identified as suitable for OWE (NVE, 2024a). The first part of the assignment was for NVE to deliver a SIA for Sørvest F, Vestavind F, and Vestavind B. The

Sørvest F and Vestavind F are part of the already opened areas for OWE, SN II and Utsira Nord, while Vestavind B is a new proposed area all located in the North-Sea (NVE, 2024a). The SIA would form the basis for an opening process leading up to the announcement in 2025. The second part of the assessment is for the remaining 17 areas that was published in June 2025 (NVE, 2025).

The SIA for Sørvest F, Vestavind F, and Vestavind B was officially published in November 2024 and was composed of a total of 20 expert documents—*fagutredninger*—that were written by different expert groups. Two of these documents assess the impact of establishing OWFs for marine biodiversity, or benthic communities and fauna, and biodiversity in free water bodies. These documents are marked out in the blue boxes in table 2.4 below. We refer to these documents as SEAs. According to the official assignment, these documents shall—based on "existing knowledge"—determine the impacts of OWFs through their life cycle, including planning-, construction-, operational- and decommission phase (Energidepartementet, 2024a). More specifically, they are required to assess the effects on species such as shellfish, fish, and marine mammals. Existing knowledge concerning fish and shellfish and so on, in the relevant areas must therefore be compiled and applied to evaluate potential impacts on species spatial use such as spawning and foraging ground (Energidepartementet, 2024a).

So why are SEAs interesting documents? Well, these documents matter because they clearly have a role in determining whether the areas Sørvest F, Vestavind F, and Vestavind B should be opened for offshore wind production or not. More importantly, they should deliver knowledge about the expected environmental impacts of OWFs in these areas. However, these documents cannot be understood in isolation; they are connected to a broader Norwegian policy ambition. First, the development of offshore wind should—in line with the decision by the Prime Minister's office—have a "very low or positive overall environmental impact over time" (Meld. St. 4, (2022-2023), p. 196). Secondly, as mentioned in the national plan for "sustainable use and conservation of nature" (Meld. St. 35, (2023-2024)), the Norwegian government emphasize that the development of offshore wind should also be done in a "sustainable manner" that takes into account both the climate and environment (Meld. St. 35 (2023-2024), p. 78). Both these two decisions also note that Strategic Impact Assessment (SIA) play an important role in meeting these ambitions (Meld. St. 4, (2022-2023), Meld. St. 35, (2023-2024)). But before I dive further into the role of SIAs and SEAs, I

wish to take a step back and ask: what does it mean to do something in a “sustainable manner”? More importantly, what is meant by the concept sustainability? In the next chapter (2.5), I will unpack this further.

Table 2.4 Based on the table by NVE (2024b). The three documents under "Biodiversity" can be categorized as Strategic Environmental Assessments. In this thesis I will examine two of these (marked in blue) both written by Akvaplan-niva and NIVA.

Theme of report As described in the *utredningsprogram*	**Author** *Fagutreder*	**Professional reports for the SIA** *Fagutredninger*
Technology, cost, power system and legislations	AFRY	Cost
	Multiconsult and Meventus	Power generation and wind regime
	Statnett	Power system and grid connection
	NVE	Laws and international conventions
Biodiversity	NINA	Birds, bats and insects
	Akvaplan-niva and NIVA	Benthic communities and fauna
	Akvaplan-niva, NIVA, Rundeforskning	Biodiversity in free water bodies
Industry	Oslo Economics and SINTEF Ocean	Fisheries
	Kystverket	Shipping
	Sokkeldirektoratet	Petroleum and CO_2 storage
	Oslo Economics and SINTEF Ocean	Aquaculture
	Samfunnsøkonomisk analyse and Norconsult	Business and tourism
Infrastructure	Avinor	Aviation
	Meteorologisk institutt	Radar
	Forsvarsbygg	Defense interests
	Kystverket	Ports
Landscape and culture	Asplan Viak	Cultural monuments and cultural environment
	Multiconsult	Visual effects and landscape
Pollution	IKM Acona and Proactima	Risk of adverse events
	DNV and Asplan Viak	Pollution and waste

2.5 Sustainable development and sustainability

Sustainability is a concept that is often taken for granted, and in many policy frameworks its meaning and definition have been used superficially. In this chapter, I aim to unpack more broadly what is meant by sustainability and sustainable development, paying particular attention to different understanding of these terms. This is relevant for this thesis as it provides a foundation for a later reflection on how "nature positive" effects of OWFs may enact different ideas of sustainability. Situating these debates within the broader policy vision of developing offshore wind in a "sustainable manner" in Norway, this discussion also raises questions about how emerging ideas of nature, environment and offshore wind connects to a wider vision of sustainability—a topic I will return to in the discussion chapter (6).

I will begin this section by defining what is meant by sustainable development. I will then explain a strand of literature that aims at going beyond the traditional understanding of the term. Then in the last section (2.5.2), I will define what is meant by sustainability, and explain the difference between weak- and strong sustainability.

2.5.1 Definitions, approaches and ideas of sustainable development

The UN World Commission on Environment and Development (WCED) was among the first to describe the term Sustainable development as "a world that meets the needs of the present generation without compromising the ability of future generations to meet their own needs"(WCED, 1987). At that time, the environmental problems the world was facing had for a long time been separated by social and economic ones. However, with the recognition of the concept sustainable development, these challenges were understood as being deeply interconnected (Hopwood, Mellor and O'Brien, 2005). More specifically, this understanding of sustainable development rested on the three pillars—social, economic and environmental dimensions (Purvis, Mao and Robinson, 2019; Rosen, 2020). Although the three pillars model is widely used, some argue that it oversimplifies the real complexity of sustainable development (Robinson, 2004). In this section, I look at a strand of literature that seeks to move beyond this traditional understanding of the term "sustainable development", to offer a more nuanced view of what sustainable development means in practice.

While sustainable development has often been presented as a unifying goal, the meaning and approach can vary greatly depending on context, values and political priorities (Hopwood,

Mellor and O'Brien, 2005; Robinson, 2004; Rosen 2020). It has also been criticized for being a vague concept or as trying to achieve the impossible (Robinson, 2004; Bonevac, 2010). For example, Robinson (2004) argues that sustainable development seeks on the one hand, to promote "development" while, on the other, aiming to "sustain" life, nature and the environment. However, these objectives are often in tension, as "development" is often associated with economic "growth", which may conflict with ecological and social limits (Robinson, 2004).

To address these tensions, some scholars have proposed different approaches to sustainable development. One example is the paper by Hopwood, Mellor and O'Brien (2005), which identifies three different approaches to sustainable development: "status-quo", "reform" and "transformation". These approaches are differentiated by attitudes towards means of political change as well as ideas of nature, humanity and economic development. The three different approaches are illustrated in the figure "Approaches to Sustainable Development" (Fig. 2.5) on the next page. The x-axis illustrates increasing environmental concern while the y-axis represents increasing "socio-economic well-being and equality concerns. I will in the next paragraphs explain these three approaches, and how they differ from each other.

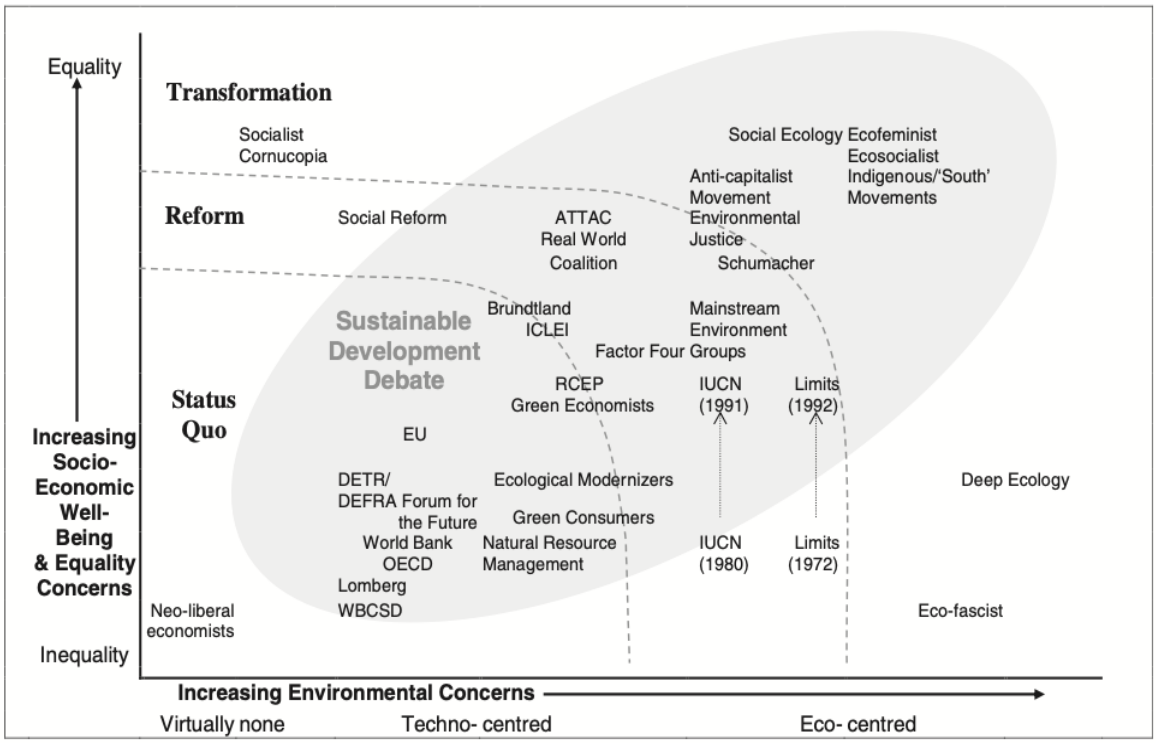

Figure. 2.5: "Mapping of views on sustainable development" retrieved from the paper by Hopwood, Mellor and O'Brien (2005).

The “status quo” approach is according to Hopwood, Mellor and O’Brien (2005) a dominate view of decision-makers in both governments and businesses. Within this line of thinking, the need for a political change is acknowledge, yet environmental and societal problems are not recognized as suffering unsolvable problems. Instead, economic growth is seen as part of the solution in solving both environmental and social problems. Additionally, within this line of thinking solving environmental problems is “barely needed at all as technology can replace nature” (Hopwood, Mellor and O’Brien, 2005, p. 43). In other words, within this view it is believed that technological interventions can overcome most environmental problems. The status quo approach can resemble ideas from the line of “ecological modernizers”. Ecological modernizers would argue that technological development can protect nature while also improving wellbeing (Hopwood, Mellor and O’Brien, 2005).

The “reform” approach resembles many of the same ideas as the status-quo. However, within this line of thinking, there is a stronger critique of current policies, governments and businesses (Hopwood, Mellor and O’Brien, 2005). Regarding environmental issues, this perspective recognizes the need for a change from the use of fossil fuels to renewable energy resources. Yet, it is still assumed that environmental problems can be solved within the current social and economic structures. Change is primarily driven by technological and scientific interventions, which are also seen as capable of protecting the environment and even solving environmental problems (Hopwood, Mellor and O’Brien, 2005). In this way, the reform approach reflects an increasing environmental concern, but assume that technology can solve future environmental issues. This approach is favored by many green economists, and by some environmental groups (Hopwood, Mellor and O’Brien, 2005).

Lastly, the “transformation” differs greatly from the status-quo and reform approaches. Within this line of thinking, the need for an urgent political shift is acknowledged. This approach reflects a deeper understanding of the interconnection between environmental, social, and economic problems. The supporters of the transformation approach also view the environmental problems as deeply rooted in the present society. This line of thinking can resemble many of the same ideas as “deep ecologists”. The primary concern with sustainable development for “deep ecologist” is tackling environmental problems, and addressing the intrinsic value and needs of both nature and the environment (Hopwood, Mellor and O’Brien, 2005).

2.5.2 Sustainability—Weak and strong understanding

In recent years, sustainability has often replaced the term sustainable development, especially within policy, business and governments (Rosen, 2020). The transformation from sustainable development to sustainability is often thought to signify a broader understanding of the interconnection between environmental-, social- and economic dimensions (Rosen, 2020). Sustainability is also preferred when the attention has moved away from societal and economic "growth", and into the ability for humans to "continue to live within environmental constraints" (Robinson, 2004, p. 370). On the other hand, the term can also mean different things to people, which has led to a discussion about the interpretation of the term and debates about its definition.

One key distinction that has been described in literature is between "weak" and "strong" sustainability. This discussion is mostly rooted in different views of economic sustainability (Rosen, 2020). First, weak sustainability views natural capital—earth's stock of living organisms and natural resources—as replaceable with human-made capital—stocks of labor, knowledge and human attributions (Rosen, 2020). In other words, from this perspective, technology and other forms of human capital can substitute for the loss of natural capital. This view resembles that of the "status-quo" perspective that Hopwood, Mellor and O'Brien (2005), in which technology is being framed to "replace nature". On the other hand, strong sustainability argues that human-made capital cannot be replaced by natural capital. For example, from a strong sustainability perspective, environmental processes such as "photosynthesis" and the "ozone layer" are critical for human existence, and cannot easily be replaced (Hopwood, Mellor, O'Brien, 2005, p. 40). This view can resemble that of the transformation approach, as it also would argue that *nature* should be protected for its intrinsic value (Hopwood, Mellor, and O'Brien, 2005).

I have now described a strand of literature that goes beyond the traditional understanding of sustainable development and sustainability. I will return to these in chapter 6, where I will discuss some of my findings in light of them. I will move into the next chapter of my thesis, where I will present the conceptual framework.

3. Conceptual framework

This chapter outlines the conceptual framework for this thesis. This thesis is situated within the broad interdisciplinary field called Science and Technology Studies (STS), which I will explain further here. I will start the chapter by examining relevant concepts from STS on ideas of knowledge production and specifically ideas of nature production as discussed by Asdal (2003; 2008) and Bruno Latour (1998). I will then move into studies of *issues,* that are a central part of this thesis. Here, I will explain what we mean by an *issue* and how *issues* emerge in society. Finally, I will explain the aim of my thesis and define my research questions.

3.1 Science and Technology Studies (STS)

STS is an interdisciplinary field of research that emerged between the 1970s and 1980s, when historians, sociologists, and scientists became interested in the relationship between scientific knowledge, technological systems, and society (Asdal, 2004; Asdal, Brenna and Moser, 2007; Jasanoff, 2017). One of the early foundations of this field was the work by Thomas Kuhn, and in particular his book "The Structure of Scientific Revolution*"* (1962). In his work, Kuhn described how scientific discovery and its technical applications are linked to other social developments in law, ethics, politics, public policies, and culture (Kuhn, 1970). Kuhn's work marked a significant shift in the way we study the history of science, particularly how scientific claims are made. Khun argued that products of scientific knowledge were conditioned by a specific "context of discovery" (Jasanoff, 2017).

One important research tradition within STS is actor-network-theory (ANT) or material semiotics (Asdal and Reinertsen, 2022). ANT was developed by scholars like Callon (2001), Bruno Latour (2007), Akrich (1992), and John Law (2008). Scholars in this research tradition are usually interested in how human and non-human actors are connected through a network and develop together (Asdal, 2004; Latour, 2007). In other words, it looks at how nature, people, ideas, and technologies form networks. One important acknowledgement of the ANT is the rejection of a "single truth", which has been a central part of Bruno Latour's work. Latour explored the semiotics behind the production of scientific "truth-claims" (Law, 2009). More specifically, Latour was interested in the production of knowledge about Nature through scientific research.

Through the *Laboratory Life: The Construction of Scientific Facts* (1986), Latour and Woolgar explained how scientific researchers "translated" from the outside world into literary work of the lab (Asdal and Reinertsen, 2022). In this way, Latour and Woolgar's work pioneered the way in which human-actants attend to non-human actants, like *nature*, by understanding how the "external nature" outside was translated into the materials (Asdal and Reinertsen, 2022). These concepts of how nature is produced through scientific practices are central to this thesis and will therefore unpack this in the next section.

3.2 Nature production

"We no longer believe in nature, at least not Nature with a capital N. Nature as such does not exist, and even if it did, we would not have wanted it to" (Asdal, 2008, p. 123). Nature is often understood as something that is simply "out there" surrounding us, a pre-existing whole in which our actions take place. As such it can become the object of science, itself a holder of truth about nature. This view of nature – or "Nature with capital N" as Kristin Asdal would say – has been challenged and contrasted with a perspective that describes nature as the outcome and not the starting point of science and technology (Asdal, 2008). This is also the point of another paper by Kristin Asdal from (2003): "The Problematic nature of nature: the post-constructivists' challenge to environmental history". In this paper, Asdal (2003) illustrates how versions of nature are produced and translated into concepts, policies, and discourses. Asdal makes this point by comparing the works of scholars such as Donald Worster, Anna Bramwell, Bruno Latour, and Donna Haraway. In the next paragraphs, I will unpack some of the main arguments by Asdal (2003). What I wish to demonstrate here is how *nature* is produced, represented, and made into matter.

Asdal (2003) begins her paper by arguing that there is no single Nature out-there but rather a collection of different co-existing natures. These natures that we encounter are produced through different scientific concepts (Asdal, 2003). For example, nature can be produced through scientific fields like ecology, oceanography, meteorology, and so on (Yearley, 2008). For some—like historian Donald Worster—concepts like ecology have been treated as a kind of "ultimate truth"(Asdal, 2003, p. 63). But the problem with this—as Asdal (2003) argues—is that ecology is not "synonymous with nature"; rather, it is a historically constructed concept (Asdal, 2003, p. 63). In summary, because there is no single Nature, what we call

nature is always shaped and enacted through specific practices, concepts, and scientific frameworks.

This leads me to the second point made by Asdal (2003). Nature has never been something natural or "untarnished"; instead, it should be understood as the outcome of practices rather than their starting point (Asdal, 2008). This argument is similar to that of French philosopher Bruno Latour, who would also argue that it is always a specific area or fragment of nature that is focused on in scientific practices, and hardly Nature as an external and comprehensive concept (Latour, 1998). More specifically, Latour argues; "it is always '*this* invertebrate, *this* part of the river, *this* garbage dump or *that* land regulation plan that is the object of concern, protection, criticism, or political protest" in scientific practices (Latour, 1998, as cited in Asdal, 2008, p. 126). By emphasizing these fragments, both Latour (1998) and Asdal (2003) show how what we call nature is produced, managed, and often politicized through specific practices. Once we have this, the next question become: Who decides how these versions of nature are represented and acted upon? Or who speaks on nature's behalf?

This leads to the final point by Asdal (2003), *nature* as a non-human entity cannot advocate for itself and must instead be represented by actors. Haraway, as discussed by Asdal (2003), illustrates this by arguing that once something is defined as *nature,* it grants authority to certain actors or "experts" who speak on its behalf (Asdal, 2003). Consequently, *nature* is never a neutral or value-free object; rather, it is produced by actors or subjects with opinions (Asdal and Reinertsen, 2022). In this way, what counts as nature is tied to struggles over who has the right to define and represent it—in other words, who should really speak on nature's behalf?

In summary, these arguments about representation and productions of *nature* by Asdal (2003) challenge the idea of Nature as a singular, external concept. Instead, as she argues, there are multiple natures "out-there", produced through scientific practices, that also allow *nature* to be a subject of power and conflicts (Asdal, 2003; 2008). These arguments have become a central part of studies of *issues*. Particularly, STS scholars like Asdal (2015), Marres (2007), and Asdal and Hobæk (2016) have been interested in the "politics of nature". In other words, how political institutions work on different "nature-objects" and with what *issues* emerge around these debates. In the next section, I will describe further what we mean by both a "nature-object" and an *issue.*

3.3 Studies of *issues* and *issue* formation

More recently, STS scholars have paid increasing attention to *issues* or specifically the formation of *issues* in society (Latour, 2007; Marres, 2007; Asdal and Hobæk, 2016). More specifically, STS scholars, including Noortje Marres (2007), Bruno Latour (2007), Kristin Asdal and Bård Hobæk (2016) have attended to *issues*. When these authors talk about an *issue,* they are not simply interested in a problem that can be declared upfront. Rather, they talk about *issues* as an unstable "thing", or something yet to be handled by a political or bureaucratic apparatus (Asdal, 2015). In this way, we can think of *issues* as being manifested through the process of assembling actors, institutions, discourses, and objects around a specific concern (Asdal, 2015; Marres, 2007). For Marres (2007), *issue* formation is mostly driven by political controversies. In her paper, Marres (2007) demonstrates how public engagement arises when existing institutions fail to address "problems" in society. This is often the result of an emerging controversy and the government's effort to settle it. In this way, issue formation itself has become a central empirical object in STS, with scholars tracing how issues are shaped, modified, and contested in practice. This approach is evident in the work by Asdal and Hobæk (2016).

In their paper, Asdal and Hobæk (2016) examine how the controversy around whaling in Norway became a political *issue*. For a long time, whales had been captured and hunted in the northern areas of Norway around *Finnmark*. However, in 1879, a law was proposed to ban whaling inside the Norwegian fjords. At that time, fishermen along the coast argued that there was a linkage between the hunt for whales and the reduction of capelin stocks. Capelin stocks were vital for seasonal cod-fishing. However, the decision to ban whaling was met with resistance. Asdal and Hobæk (2016) illustrate this conflict by following documents around the Norwegian Parliament, and thus showing how an issue of whaling came into being by understanding how it was first shaped, and later modified and worked upon by various actors. In this way, Asdal and Hobæk (2016) demonstrate how whaling became a political issue.

The paper by Asdal and Hobæk (2016) is of particular relevance for this master's thesis. Not only does this paper demonstrate how *issues* are formed, modified, and transformed, but it also highlights the critical role of political sites—like the Norwegian Parliament—in shaping and managing a "nature-issue"—in this case, "a whale". In this thesis, I am interested in how

issues emerge around controversies related to the establishment of OWFs in Norway. More specifically, I am—similar to Asdal and Hobæk (2016)—interested in how political documents or expert-documents work on "nature-objects" and how this may shape an issue(s). I will explain the role of documents a bit further in the methodology, but first, I wish to define the aim and objective of my study further.

3.4 Problem framing and objectives of study

In this chapter, I have presented central concepts from STS. First, I examined how scientific practices produce and represent *nature* through the work of Asdal (2003; 2008). Secondly, I explained studies of *issues*, which have been a central part of STS in e.g., understanding how environmental problems come to matter in society (Asdal and Hobæk, 2016). I now wish to explain how these conceptual ideas fit into my research interest. And more specifically, what the aim of my study is. I will begin this section (3.4) by summarizing some of the research gaps from the literature. I will then present why I wish to use these concepts from STS to understand this "artificial nature" of OWFs further. I will lastly present my research questions.

In the background chapter, I examined the growing body of literature investigating both the potential for OWFs to act as *de facto* MPAs and the possible co-location of OWFs and MPAs. Research from the EU revealed that although the co-location of OWFs may be legally feasible, it depends on the protection objectives in the area (Christie *et al*., 2014; Lloret *et al.*, 2023). The biological literature also revealed a tension in whether OWFs could actually function as *de facto* MPAs through the artificial reef effect, fishery exclusion, and use of NID. The artificial reef effect was described as being site-specific and could also result in increased abundance of invasive species through acting as "stepping-stones". In addition, the exclusion of fisheries was both framed as a positive effect and, on the other hand, as potentially adding additional pressure to other ecosystems. Lastly, the authors of the article by Pardo *et al.,* (2023) also highlighted the lack of scientific consensus in measuring "nature positive" effects offered by OWFs and NID. These tensions in literature reveal an uncertainty in whether OWFs could function as active protection measures. It also poses a fundamental question about what OWFs are really protecting. Or more importantly, what version of *nature* are OWFs really protecting?

In this thesis, I will examine these questions further by investigating it from a Norwegian context. In Norway, there is currently an increasing interest in developing OWFs, while also ensuring that it is done in a "sustainable manner" that takes into account both the climate and environment (Meld. St. 35, (2023-2024) p. 78). There are also indications from the management plans from 2024 that OWFs can have both positive and negative impacts on the receiving marine environment through concepts like the artificial reef effect ((Meld. St. 21, (2023-2024)). The development of offshore wind, therefore raises important questions about how environmental impacts, and more importantly, "nature positive" effects, are framed, argued, and negotiated within a Norwegian context, and which aspects of nature are taken into account when describing these effects. This will also tie up to a bigger discussion in chapter 6, which reflects on whether these "nature positive" effects could help reach its goal of developing offshore wind energy in a "sustainable manner".

To investigate this, I will focus on Strategic Environmental Assessments (SEAs). In Norway, the environmental impacts of OWFs are determined by the SIA as embedded under the OEA (OEA, 2010, §2-2(2)). More specifically, the environmental impacts are determined by SEAs—*fagutredninger for naturmangfold*—that are written as part of the SIA. In November 2024 three new SEAs were published. Two of these assessed the impacts of OWFs for marine biodiversity—benthic fauna and habitat—and these are both written by NIVA and akvaplan-niva as part of the SIA that should determine whether the areas Sørvest F, Vestavind F, and Vestavind B should be expanded or not. The question, therefore, becomes: what role do such documents have? How are they produced? And more importantly, how do they shape environmental impacts, and how do they produce and represent *nature*?

So how do the questions above relate to the conceptual ideas? Well, first and foremost, SEAs do not merely describe environmental impacts—they actively participate in framing them, and thus shape what part of *nature* is made visible. In this way, *nature* is not just observed by the SEAs, it is actively constructed through a scientific practice—as Asdal (2003; 2008) would argue. Secondly, these documents may therefore "take part in working upon, modifying, and transforming" the reality they aim to describe (Asdal, 2015, p. 74). More importantly, they may shape, modify, and transform an issue(s). This is closely connected to studies of issues as I described in section 3.3.

In their paper, Asdal and Hobæk (2016) demonstrated how political sites—such as the Norwegian parliament—were composed of documents that actively shaped, modified and transformed a reality. More specifically, they demonstrate how documents of this site actively shaped, modified, and transformed a "nature-object"—the whale—through a series of modifications. In my thesis, I am interested in how a similar site—the process of opening areas for OWE—may actively shape what *nature* is and, therefore, how environmental impacts are understood. On one hand, there is evidence of OWFs having negative impacts on the receiving environment. On the other hand, there are also indications in a Norwegian context that OWFs may have positive effects on the receiving environment. The aim of my thesis is therefore to analyze how these documents actively shape environmental impacts, versions of *nature*, and what issue(s) emerge from this.

With this aim in mind, I arrive at the following research questions that I wish to address in this thesis:

1. *What are the roles of the Strategic Environmental Assessments (SEAs) in the opening process of the OWFs Sørvest F, Vestavind F, and Vestavind B?*
2. *Which ideas of nature are argued, negotiated, and framed within the SEAs for Sørvest F, Vestavind F, and Vestavind B?*
    a. *What is the issue?*

I will answer these research questions throughout the empirical analysis (chapter 5) using the "practice-oriented document analysis" by Asdal and Reinertsen (2022), which is closely related to studies of issues. I will explain this methodology further in the next chapter, and why I have chosen to study this topic through documents.

4.Methodology and Material

This chapter describes the methodological approach taken to address the research questions described in the previous chapter. I will first describe what is meant by a "practice-oriented document analysis", how it is different from traditional document analysis, and why it has been used as a methodological framework in this thesis. Secondly, I will describe the empirical material analysed in this thesis. I will next describe the process of gathering and systemizing the data. Lastly, I will point out some limitations of my study.

4.1 Practice-oriented document analysis

In this thesis, I have chosen the "practice-oriented document analysis" by Asdal and Reinertsen (2022) as the methodological framework due to its close relation to STS and studies of *issues.* It has also been chosen as a methodological framework as it is suitable for interdisciplinary studies, because documents allow us to move across disciplinary boundaries (Asdal and Reinertsen, 2022). Practice-oriented document analysis was developed by Kristin Asdal and Hilde Reinertsen and differs from traditional document analysis in how documents are conceptualized. Most importantly, they focus on how documents are both text and material objects. Framed in this way, documents allow us to observe, acknowledge and define something. Documents are also attached to something "outside of itself" (Asdal and Reinertsen, 2022, p. 3). In this way, documents are never neutral; they are made for a specific purpose and are often integrated in controversies that are unfolding in the society around us (Asdal and Reinertsen, 2022). These are some of the most fundamental functions of documents that Asdal and Reinertsen (2022) challenge us to investigate further through a "practice-oriented approach".

The practice-oriented document analysis was developed by Asdal and colleagues in their research. One good example of this is her research on whaling, published in the paper "Assembling the whale: Parliaments in the politics of nature" (Asdal and Hobæk, 2016). It is also developed from more conceptual papers on the relation between documents and *issue* formation (Asdal, 2015). In another paper by Asdal (2015), she demonstrates how environmental problems or *issues* are brought into and presented in documents and argues that documents are more than just neutral objects (Asdal, 2015; Asdal and Hobæk, 2016). Documents do not simply describe an external reality, but they also "take part in working upon, modifying and transforming that reality" (Asdal, 2015, p. 74). This is one of the most fundamental ideas of the practice-oriented document analysis—documents shape, modify and transform *issues.* This is also why it is particularly relevant for my thesis.

In a recent book devoted to this method, Asdal and Reinertsen (2022) describe six methodological concepts and moves of documents: document site, document tools, document work, document text, document issues and document movements. I will in the next

paragraphs explain these different methodological concepts and why some of them are relevant for my thesis.

4.1.1 Document Site

Document site is the first dimension of documents that Asdal and Reinertsen describe in their book. It challenges us to understand how documents are always part of a specific site: "where something happens, where a number of different actions take place" (Asdal and Reinertsen, 2022, p. 146). Examples are institutions, governments, parliaments, and organisations that are composed of different documents that can be subject to "negotiations and voting" (Asdal and Reinertsen, p. 147). We can think of these "places"—governments and parliaments—as "sites" that are composed of different documents, which allow something to happen. Through analysing these documents, we can therefore better understand what their role is and how they are part of the specific site. Specifically, we can ask questions such as what the role of this document is, and how it is handled. In this thesis, I will examine two documents that are involved in the licensing and planning of OWE in Norway. In this way, we can think of the site as the licensing and planning process, where the documents—SEAs—take an active part in getting something done.

Analysing "document site" also involves examining documents as sites in themselves. For instance, we could ask what is unique and special about the documents we are interested in? A document can have specific rules or regulations for what is studied within it (Asdal and Reinertsen, 2022). In relation to this thesis, I will use this idea of document site to examine how specific guidelines have influenced how SEAs are written: what do these documents consider specifically, and what is left out of them? More specifically, I wish to examine how the work of documents impacts what ideas of *nature* are shaped. This is strongly linked to the second methodological movement of the practice-oriented method—document tools.

4.1.2 Document tools

Document tools refer to what is being done by documents and how they make something happen. According to Asdal and Reinertsen (2022), documents can be tools of governance, knowledge, and economy. In this thesis, I am interested in documents as tools of knowledge and governance. Documents as tools of governance are closely linked to document sites as they allow us to think about how documents are crucial elements in governing processes.

This approach also challenges us to think about "how expert knowledge acts upon politics", or how something can become a political issue? (Asdal and Reinersten, 2022, p. 43). I approach SEAs as governing tools in this thesis by asking how these documents are used and how they take part in the bigger site. Specifically, I wish to demonstrate how they are "tools" that are part of something bigger, namely, a SIA that will determine whether OWFs should be opened or not. In this way, they produce expert knowledge that acts upon a political decision. This leads us to the second understanding of documents as tools—documents as tools of knowledge. Documents allow us to "observe, acknowledge, analyse and discuss a specific phenomenon" (Asdal and Reinertsen, 2022, p. 45).

In this thesis, I will specifically analyse how documents function as tools that shape our understanding of what nature is. I will analyse this by focusing on how the methodological guidelines of the Norwegian environmental agency and *Statens vegvesen* influence the definitions of nature in the SEAs. Additionally, I aim to explore how shaping a particular version of *nature* may actively contribute to the emergence and formation of *issues* (Asdal and Reinertsen, 2022). I will return to issues and document issues in section 4.1.4. Before that, I will first explain the methodological concept document work, which is closely linked to document tools.

4.1.3 Document work

Document work is strongly connected to document tools, but rather than understanding how documents make something happen, it involves attending closer to "the practical and concrete work being done" by documents (Asdal and Reinertsen, 2022, p. 64). For example, it can involve investigating how the people and institutions that are involved in producing specific documents work with and on them. More specifically, document work explores how involved actors read, work, edit or review documents (Asdal and Reinertsen, 2022). Additionally, it could also involve analyzing how documents are "formatted" and how they might be "prepared individually or collectively" (Asdal and Reinertsen, 2022, p. 149). By analyzing document work, one can gain insight into the significance of the work being performed and how "practical competence or skills" involved shapes the sites or issues within the documents (Asdal and Reinertsen, 2022, p. 149).

I will use the methodological concept of "document work" in chapter 5.1 to analyze how producing SEAs are prepared and formatted, and how this process affects the understanding of environmental impacts and our understanding of "what nature is". Specifically, I will examine how producing SEAs individually, and separately from the other professional reports that are involved in the total Strategic Impact Assessment (SIA), influences the way environmental impacts are represented. Additionally, I will analyze how producing SEAs for Sørvest F, Vestavind F, and Vestavind B before the other 17 areas affects what is considered both environment and "nature" in these assessments.

4.1.4 Document issues

Analyzing document issues builds upon the previous approaches, and it is also closely related to STS and studies of *issues*. In practice, analyzing document *issues* allows us to understand how documents become involved in, act upon and modify specific issues. As described in chapter 3 of the thesis, *issues* are not something that can simply be "declared up front" rather, it is something yet to be handled by politics. We therefore attend to documents to understand "what the issue is", how an *issue* plays out, and how it affects an "issue-object". An issue object can be thought of as what Asdal and Hobæk (2016) described as "the whale". It is a certain object that is acted upon in documents and allows us to see something in a certain way. In this thesis, I am not interested in "a whale"; instead, I am interested in how documents shape a certain version of *nature.* More specifically, I am interested in *nature* as an issue object, and how certain versions of nature are shaped in the document. Lastly, I am also interested in how these ideas might be modified or transformed as these ideas move into other documents (Asdal and Reinertsen, 2022).

The last point—to study how documents move—implies that we can understand what the issue is by "comparing forms of issues formation across documents" (Asdal and Reinertsen, 2022, p. 150). For example, by asking; how does the formation of issue differ between documents? I will explain how I intend to do this a bit further. In my thesis, I will analyze "what issue" the SEAs become involved in by first exploring how ideas of nature are shaped in SEAs. More, specifically how are "nature positive" effects argued, negotiated, and framed? I will thereby follow how the ideas from these SEAs are moved into the hearing notes. The authors of the hearing notes are required to assess how they view the findings from the SEAs and give recommendations for the ED on whether they think the areas should be opened for

OWE or not. By exploring these hearing notes, I want to understand how issues move, are transformed, and reshaped. Particularly, how do the hearing notes modify, shape and transform ideas of nature? In the next section, I will further describe what hearing notes are and the rest of the empirical material used in this thesis.

4.1.5 Document movement and document text

Document text and document movement are the final methodological concepts in Asdal and Reinertsen's "practice-oriented approach". I will here briefly explain what they are and why they have been less relevant in my thesis. I will start by explaining document text and then move on to document movement.

First, document text is the fourth methodological concept described by Asdal and Reinertsen (2022). The purpose of this move is to investigate how the text itself does important work. Specifically, Asdal and Reinertsen (2022) challenge us to think about what the rhetorical and textual properties of documents are. For example, how is the document structured and organized, and which methods are used to persuade the reader? (Asdal and Reinertsen, 2022). Lastly, document text also implies to investigate the elements of documents—its visuals, graphs, numbers, and references (Asdal and Reinertsen, 2022). In this thesis, I have only focused to some degree on the methodological framework document text. Specifically, this movement has partially been used to understand how the text has argued, framed and negotiated "nature positive effect". However, I have paid less attention to the textual layout of documents. Particularly, I have paid little attention to the graphs, illustrations and photographs in the documents. I have also paid less attention to where the references from these documents come from, and how they link up to the contexts surrounding them.

Secondly, document movement is the last methodological movement described by Asdal and Reinertsen (2022). It is specifically used for understanding how documents "move". For example, as described previously, documents can move within a political "site". This is what Asdal and Hobæk (2016) demonstrated in their paper. Specifically, Asdal and Hobæk (2016) demonstrated how the *issue* of whaling was shaped, modified and transformed by following the movement of documents within the Norwegian Parliament. In this way, what document movement can allow us to understand is how something is "transported into and by documents" (Asdal and Reinertsen, 2022). In this thesis, I have employed document

movement to understand how "nature positive effects" are transported from SEAs and into hearing notes. Specifically, I aimed at understanding how issues are moved between these documents. I have therefore, to some degree, also employed this concept. However, I believe that I could have employed this methodological concept further. I will explain why and how in section 4.3.

4.2 Data gathering and analysis

I will here present the selected empirical material chosen for this master thesis. I will secondly describe how I have approached the material or data.

4.2.1 Empirical material

The main empirical material used for this thesis is the two SEAs for biodiversity (see table 2.4) that were published as part of the SIA for Sørvest F, Vestavind F, and Vestavind B in November 2024. SEAs are important documents in the licensing and planning of OWFs in Norway, as they are used in the political decision by the ED on whether to open the respective areas for OWFs or not. These documents are also particularly interesting as they are not neutral summaries; they actively participate in shaping what counts as *nature.* We can think of them as "issue-expert" documents—they are written by experts who are expected to "know their field well" (Asdal and Reinertsen, 2022, p. 110). They are also part of the "state machinery" and are tasked to deliver knowledge on a specific *issue.*

These documents are also interesting because they define nature, what it is and not. As Asdal (2004; 2015) argues, documents that are part of a "state machinery" help produce a governable nature—or what she calls "regjerlig natur"—that can be managed, acted upon by politics (Asdal, 2004). In doing so, documents can therefore demonstrate connections between politics and nature (Reinertsen and Asdal, 2018). Similarly, Yearley (2008) demonstrates how such documents—that being impact assessments—generate scientific knowledge used for environmental policy, and therefore telling us "what nature is" (Yearley, 2008). In this way, documents like the SEAs are interesting because they both define and limit nature in a way that makes it actionable and governable, and used for political decisions. In analyzing these documents, I therefore wish to examine how they are formatted, what they allow us to observe, acknowledge and what is left out. This is all related to the research questions concerning the role of these documents. In other words, in asking the question:

"What is the role of these documents?" I am not mainly interested in how they are used in the political decisions, but also how they are shaped and formatted. And which nature do they allow us to observe? In summary, I wish to understand these documents not as neutral summaries, but as documents that actively participate in making parts of *nature* visible.

In this thesis, I have also analyzed hearing notes involved in the opening process of Sørvest F, Vestavind F, and Vestavind B. As mentioned in the background chapter, hearing notes are used by the ED to determine whether an area should be opened for OWFs or not. All hearing notes for the respective areas were published on the 12th of March 2025. In this thesis, I have analyzed two of these: one from *Pelagisk forening* and the one from *Fiskebåt*. *Pelagisk forening* is a professional interest organization for fishing boat owners along the Norwegian coast (Pelagisk forening, no date). On the other hand, *Fiskebåt* represents the interest of the Norwegian fishing fleet (Fiskebåt, 2025). Both these hearing notes have commented on findings from the SEAs and specifically about how these documents are made, and also how they argue for "nature positive effects". I analyzed these notes to understand how potential *issues* are modified, transformed, and worked-upon.

Lastly, I have conducted two expert interviews. According to Asdal & Reinertsen (2022), interviewing the actors whose documents we are studying can be helpful in understanding "how documents are playing a role in the issue [...]" (Asdal & Reinertsen, 2022, p. 172). Specifically, it can help us to understand how issues are formed and handled. Interviews can also be helpful for understanding the specific work documents do. This can, according to Asdal and Reinertsen (2022), be understood by asking the interviewees questions about the process of writing the documents or having them define how they perform their work. Lastly, Asdal and Reinertsen (2022) also demonstrate how we may understand the "role of documents" by asking the interviewees to describe the "routines of a given document process" (Asdal and Reinertsen, 2022).

In this thesis, I have been fortunate to interview two experts on SEAs who are following this particular process closely. These experts are not themselves authors of the SEAs but are very familiar with the process of writing SEAs, and also with these in particular. One of the interviewees has interviewed the authors—NIVA and Akvaplan-niva—around similar questions as me. These interviews allowed me to gain an understanding of how these documents are written and some of the challenges in writing these documents. The interviews

where therefore helpful for deepening my understanding of the role of SEAs and most importantly in understanding more about the possible "nature positive effects" of OWFs. Each of the interviews lasted for about 45-60 minutes and was recorded and transcribed. One of the interviews was conducted over Teams, the other one was done in person. The interview questions can be found under Appendix 9.2.

4.2.2 Approach to data collection and coding process

The data was analyzed using a grounded theory approach (Timmermans and Tavory, 2012). I started the process with an open coding process by reading through the SEAs, interview transcripts and hearing notes multiple times to become familiar with the material and identify emerging patterns. What I was mostly interested in was "nature positive effects" of OWFs, like the artificial reef effect, fishery exclusion and NID. I was also interested in understanding how SEAs are produced, formatted, and what their overall role is. I therefore started the process by searching for keywords like artificial reef effect, fishery exclusion and NID. I also looked for areas where the data said something about how the SEAs should write about nature, or how they are produced. During this phase, I identified meaningful units of text that captured recurring themes or attitudes. These were labelled with short, descriptive phrases. This means that I have approached the data and developed codes iteratively from both studying patterns that emerged during initial readings and open coding of SEAs, hearing notes, and interview transcripts, and by applying ideas from the conceptual framework (see chapter 3).

In this process, I developed 5 codes: (1) ideas of sustainability, (2) ideas of nature, (3) implications or risks, (4) use of knowledge and (5) Role of documents. I will here briefly explain what these codes mean; for a closer description see Appendix 9.1. First, the "ideas of sustainability" is developed from the approaches to sustainable development as described by Hopwood, Mellor and O'Brien (2005). Secondly, the "ideas of nature" is developed after the productions of *nature* as described by Asdal (2003: 2008) (see conceptual framework). This asks questions like: what counts as nature in the documents? Who speaks on its behalf, and what versions of *nature* are made visible? The codes "implications or risks" and "use of knowledge" are closely related to the ideas of nature and the environment. They reference areas where the data say something about how the SEAs use knowledge from foreign cases, and how they understand risks and implications associated with "nature positive effects".

Lastly, the code “the role of the document” is developed from the analytic approaches to documents: “document tools”, “document work”, and “document site” as developed by Asdal and Reinertsen (2022). The code refers to areas where the empirical material says something about how the documents are written, produced, formatted, and so on.

I structured the empirical material and the codes by using NVIVO-14. NVIVO is a digital software tool that can be helpful in organizing, sorting, and analyzing qualitative data (Jackson and Bazeley, 2019). I started by uploading the SEAs, hearing notes and transcripts into NVIVO14 and from there categorized different statements from the materials into codes. All references that were coded were originally in Norwegian, and they have therefore been translated and paraphrased into English. This was done by me, and also with help from translation tools like Google Translate. The citations or statements used in the analysis are based on frequency and illustrative characteristics.

4.3 Limitations

I here wish to reflect on some limitations of my methodological approach. In this thesis, I have supplemented the document analysis with two expert interviews. The purpose of expert interviews—or what Asdal and Reinertsen call “text-author ensemble” (Asdal and Reinertsen, 2022, p. 171)—is to help understand how authors of documents understand issues or how they work with and on documents. At the beginning of writing this thesis, I reached out to the authors at NIVA and Akvaplan-niva themselves for an interview. The authors were unfortunately not able to help me with interviews, and instead I have had to rely on secondary information from actors who are not directly involved in writing the SEAs. This may limit my analysis and understanding of the co-emerging *issues*, as well as the role of these documents. In addition, I believe that the sample size of interviews is also a concern. I have only supplemented the document analysis with two interviews. This may be an important limitation of my study, as it may have limited my understanding of what the issue(s) is.

I also believe that by supplementing the document analysis with more interviews with author involved actors, such as NVE and the ED, could have deepened my understanding of how documents move across institutional and disciplinary boundaries—this relates to document movement as Asdal and Reinersten (2022) would call it. Specifically, it could again have helped me in understanding how the final decision-maker in this process considers the

findings from the SEAs. How they make a final decision? And which power struggles exist within the negotiation process? It could also have clarified more about the role of "nature positive" effects and how the ED considers these effects.

On the other hand, it is important to emphasize that within the "practice-oriented approach", interviews are intended to be used as a supplement to the document analysis—not as a primary empirical source. I would therefore argue that my study aligns with the principle of the "practice-oriented documents analysis", and that my sample of interviews are consistent with it.

4.4 Ethical considerations

The thesis and data are registered in RETT, which is the administrative system for processing personal data for research projects at the University of Bergen. The "expert interviewees" have, during the process, been informed about the purpose of the interviews and their role in my master's thesis. Each interviewee was given a consent form with information about the interviews that had to be signed before the interview started.

5. Empirical analysis

This chapter forms the empirical analysis of this thesis, where I will begin to answer the research questions as described in chapter 3. I will start by examining the role of Strategic Environmental Assessments (SEAs)—how they are made, and with what consequences this has for how the environmental impacts are understood. Here I will mostly examine these documents as doing specific work, being part of site, and acting as tools, as Asdal and Reinertsen (2022) would say. In the second part of the analysis, I will examine how "nature positive effects" are framed, argued, and negotiated. By drawing on Asdal and Reinertsen (2022), I approach the SEAs not as neutral summaries, but as tools that shape which part of nature becomes visible, comparable, and governable. I will thus ask what *issue* the SEAs take part in shaping, modifying, and working-upon. I will now move into the first part of the analysis.

5.1 What are the roles of Strategic Environmental Assessments?

This sub-chapter is divided into two main parts. First, I examine how the Norwegian way of conducting the overall Strategic Impact Assessments (SIA) may limit the ability to understand cumulative and transboundary environmental impacts in the Strategic Environmental Assessments (SEAs) written by NIVA and Akvaplan-niva. In the second part of this chapter (5.1.2), I analyze how the methodological guidelines influence what part of *nature* is made visible and how this also shapes how environmental impacts are understood. Together, this section will examine the role of these two documents in the overall process by drawing on concepts from Asdal and Reinertsen (2022), like document tools, document work, and document site. My main arguments here will be that the SEAs do not merely summarize environmental impacts and what *nature* is—they actively shape the boundaries of what counts a nature and as relevant environmental knowledge in the governance of OWFs in Norway.

5.1.1 The Norwegian model

In 2023, the Ministry of Energy—*Energidepartementet* (ED)—commissioned NVE to conduct a SIA for 20 areas that had been identified as suitable for OWE production. The first part of the assignment was to conduct the SIA for the areas Sørvest F, Vestavind F, and Vestavind B, intended to form the basis for a potential opening process leading up to the announcement in 2025 (Olje- og energidepartementet, 2023). The next part of the assignment was to conduct the assessment for the other 17 areas, which would not be published until June 2025. The impact assessment from June 2025 was published with 20 additional professional reports, including two new SEAs from NIVA and Akvaplan-niva (NVE, 2025). According to NVE, the SIA for Sørvest F, Vestavind F, and Vestavind B was purposely published before the remaining 17 areas, as the aim is to open and announce these projects by 2025 (NVE, 2024c). Particularly, since Vestavind F and Sørvest F are part of the already opened areas SN II and Utsira Nord, the findings from the SIA could decide whether these areas could be suitable for a capacity expansion (NVE, 2024d). The proposed capacity expansion in the two areas SN II and Utsira Nord also changes the assumptions for the SIA that was published in 2012, were only a small part of the project areas where opened. A new SIA must therefore be carried out to determine the environmental effects of the possible capacity expansions (NVE, 2024c).

This way of producing SIAs—by assessing the three areas before the remaining 17 areas, offers significant challenges for understanding the environmental impacts. This was a point made by one of the expert interviewees. Here, referring to this process as the "Norwegian model":

> "There are advantages and disadvantages with the Norwegian model […]. Challenges are very much related to the possibility of looking at cumulative impacts, and transboundary effects. When an area is assessed separately, you don't look at the other areas, and the total effect. So, it is a significant challenge for those who will make a decision based on these reports" (Expert interview 1).

There are a couple of interesting things to unpack here. First, the "Norwegian model" makes it difficult to understand the "cumulative" effects of establishing OWFs. This is because the assessments are written individually and in isolation from one another. The overall SIA for the three areas Sørvest F, Vestavind F, and Vestavind B—including 20 professional reports—was published in November 2024. Then the SIA for the other 17 areas was published in June 2025, with 20 additional professional reports (NVE, 2025). This way of producing the SIAs can have a significant impact on how the environmental impacts are understood and how the Strategic Environmental Assessments (SEAs) are written. This is because, as part of this process NIVA and Akvaplan-niva were instructed to conduct two SEAs for Sørvest F, Vestavind F, and Vestavind B, that was published in November 2024. After this, they were required to publish two new SEAs for the 17 other areas that were published in June 2025. In this way, they assess environmental impacts area by area, instead of understanding them together.

This leads me to the second thing I wish to unpack here: how does this way of producing both SIAs and SEAs affect decision-making? As the interviewee points to above, the Norwegian model brings "significant challenge for those who will make a decision based on these reports". What the interviewee points to above is that by producing knowledge about the environmental impacts of OWFs—area-by-area—the cumulative impacts of OWFs are often ignored. By cumulative impacts, I mean the added pressure of multiple OWFs on marine biodiversity. Instead, this way of producing assessments only allows for understanding environmental impacts in one area at a time. The lack of this "cumulative" understanding could, according to the expert, therefore, bring challenges for those who are expected to

“make decisions”. In other word, when the “King in council” makes up their decision on whether to officially open Sørvest F, Vestavind F, and Vestavind B for OWE, it is without understanding the cumulative environmental impact of these areas and the remaining 17 areas.

So how can we understand these findings in light of Asdal and Reinertsen (2022)? Well, first of all, what the interviewee describes as the “Norwegian model” can be thought of as the document site in Asdal and Reinertsen’s (2022) term. What we see here is that the “site”—the opening procedure—shape what environmental impacts are understood as in the SEAs. More specifically, we see how specific instructions from the Ministry of Energy (ED)—the ones who delegated this assignment—influence how NIVA and akvaplan-niva produce SEAs. Specifically, they are instructed to assess the environmental impacts for a few areas at a time, rather than assessing the impacts of multiple OWFs. This point demonstrates how these documents are formatted and what is unique about them, which is again related to how they attach to a “site”. It also illustrates how the document site shapes what decisions are based on. It is a decision based on knowing only a fraction of the impacts of OWFs on the receiving environment.

In the next sub-chapter, I will expand on the role of the SEAs and how they are further shaped by the site they represent. I will specifically look at how the SEAs are written and how this has further implications for how environmental impacts are understood, and what part of nature the SEAs are tasked to handle.

5.1.2 What counts as nature? Guidelines, valuation,and limitations of SEAs?

In the *Utredningsprogram*—the official assignment by the ED—from 2023, the ED specified that the total SIA had to include impacts for 19 relevant topics (Energidepartementet, 2024). Based on the 19 topics, NVE grouped and divided these into 20 different professional reports—*fagutredninger*—covering 22 different themes (see table 2.4) (NVE, 2024a). The professional reports were written by both governmental departments and agencies, as well as external suppliers (NVE, 2024b). Each of the 20 reports should first set a “value” on the “interest” being assessed, evaluate how much this interest will be affected, and finally conclude with what consequences the establishment of OWF will have for this interest, or subject matter (NVE, 2024b).

Because the 20 professional reports were written independently and focued on different thematic, it was essential for NVE that their findings could be "collated and compared" to produce a coherent recommendation for the ED (NVE, 2024b). To enable this comparability, NVE required that all reports follow the same methodological guidelines, as outlined in *Statens Vegvesen handbook V712* and *The Norwegian environmental agency M-1941* (NVE, 2024b). The guideline from the Norwegian environmental agency emphasizes the need to evaluate environmental impacts for specific species that are of particular "value". In addition, both guidelines also emphasize the need to divide the areas into smaller sub-areas, as this can help to systematize the studies and provide a better overview of the development area (Statens Vegvesen, 2021; Miljødirektoratet, no date). So, how has this impacted how the SEAs are written? I will unpack this more in the next sections and point to two interesting implications.

Applying onshore guidelines to the offshore environment

First of all, the guidelines in themselves have been proven to be problematic to apply to the SEAs. In the SEAs themselves, the authors express challenges in applying these guidelines for offshore impact assessments (Cochrane *et al.,* 2024, Siwertsson *et al*., 2024). This was also pointed out by one of the expert interviews:

> "[…] these guidelines are somewhat vague and were developed for more project-specific assessments on land [...]. So, there is no good guideline for impact assessments at sea, and there are significant differences" (Expert interview, 1).

As the expert interviewee notes here, the M-1941 and V712 were originally made for "project-specific assessments" for onshore windfarms, and not offshore strategic planning. This created challenges when applied to the marine environment, which is more dynamic and interconnected. While the "project-specific" guidelines assume a relatively fixed area and a discrete activity, the SEAs were tasked with assessing broader impacts over time, across large marine areas. In this way, the guidelines do not align with the broader scale and complexity of the development of OWFs. The challenge becomes even more apparent when considering cumulative impacts. Rather than focusing on how various pressures interact over time or across areas, the methodological guidelines limit the assessment to individual impacts within a predefined area. As the expert interviewee further explained:

> "[…] the fact is that it is difficult to assess the cumulative impacts, and to understand what it actually is, whether it is within an area or over time? Or across borders? And also, how it looks in the context of other influencing factors from other human activities, climate change, pollution and so on" (Expert interview 1).

As pointed out by the interviewee here, the reliance on methodological guidelines for onshore projects limits the document's ability to fully understand environmental impacts for offshore projects. These guidelines assume that environmental impacts can be handled independently, as impacts for onshore projects may be more predictable, measurable, and separable from other factors. However, when applied to the offshore marine environment, this logic limits the SEA's capacity to understand more complex, cumulative, or transboundary dynamics. As already pointed out, the marine environment and its ecosystems are more complex and difficult to assess over time. In other words, you can't easily draw a line between "this turbine" and "that effect". This outcome is not only evident in the limitations described by the expert interviewee but also acknowledged by the SEAs themselves. In the final chapter of the SEA on biodiversity in free water bodies, the authors reflect on these constraints by stating:

> "Better understanding of how impacts from OWFs interact with other influencing factors such as climate change, fisheries and environmental pollutants is important for developing good measures and management practices that both preserve marine biodiversity and support the development of renewable energy sources" (Siwertsson *et al.* 2024, p. 159).

In the statement the authors of the SEAs express awareness of the lack of understanding cumulative impacts of OWFs on the receiving environment. The authors also acknowledge that there is an uncertainty related to how other influencing factors will affect the marine environment in the future.

So, what do these findings tell us? First, these findings tell us that by using similar guidelines for onshore and offshore environments, NVE suggest that these two environments behave similar. Secondly, by using guidelines for "project specific" assessment, it also suggests that the marine environment is a fixed area where impacts can be measured and managed. But, as the expert interviewee notes, offshore marine environments are more complex than onshore

ones, and impacts are harder to measure. These findings demonstrate how SEAs do not merely organize how impacts are documented—they also actively shape which aspects of the environment are made visible and which are left out. They also help to actively produce a version of *nature*—something I will unpack further in the next paragraph.

The finding above—about how the guidelines shape what environmental impacts are understood as—can be understood in light of the work by Asdal (2003; 2008). As Asdal (2003; 2008) argues, *nature* is not simply a pre-existing reality that can be observed; it is rather produced through practices—in this case, methodological guidelines. By defining what parts of the environment, the SEAs should focus on, the guidelines also participate in making parts of nature visible. This is a version of nature that is spatially fixed and isolated from other influencing impacts such as "climate change, fisheries and environmental pollutants". In this way, the SEAs do not assess the environment as something pre-given—they also participate in constructing a version of nature. In the next section, we will explore how these methodological guidelines further shape which version of nature is valued and made visible within the SEAs.

Valuing specific species

As already mentioned, the guidelines by *Statens vegvensen* and the Norwegian environmental agency also specify that the impact assessments shall focus on groups of species that are of particular "value"; near-threatened, threatened-species, species of the OSPAR's list over threatened species, ecological and commercially important species. In other words, species that are likely to be particularly "vulnerable" to the establishment of OWFs (Cochrane *et al*., 2024, p. 45; Siwertsson *et al*., 2024, p. 42). This focus is not only a premise set by the guidelines, but also a focus that comes from legal obligations of the Nature Diversity Act and the OSPAR convention, which demands that threatened and vulnerable habitats are given specific attention in impact assessments (Energidepartementet, 2023).

While the legal groundwork from OSPAR and the Nature Diversity Act is important, it also narrows the lens through which nature is evaluated in the SEAs. Environmental value is largely measured in terms of the presence of vulnerable species. Consequently, other aspects of nature are less visible, such as habitat connectivity, ecosystem functioning, or long-term resilience. This was another challenge raised by expert interviewee 1:

> "What I found a bit interesting was that they had to deal mostly with commercial and red-listed species. So that is interesting as a challenge too. For some of the *fagutredninger* there were three groups being assessed, but without clear links between them. And it was also a big challenge to see it in context. [S]o they had to consider it separately. There was no clear method to investigate the effects in a broader context" (Expert interview 1).

The statement above underscores how the guidelines categorize nature into specific assessment units—"commercially and red-listed species"—rather than viewing it as an entire ecosystem. As a result, the SEAs struggle to represent the interconnection between species in the marine environment. Specifically, impacts on species are evaluated in parallel with each other instead of assessing how these impacts relate to one another. This allows the SEAs to produce a fragmented view of nature—one that fits into policy frameworks and guidelines but is less responsive to the ecological complexity of marine ecosystems. This again relates to how Asdal (2003; 2008) and Latour (1998) argue that nature is produced in certain ways. It is always a version of nature that is being the object of concern—"*this* species, *that* area"—rather than *nature* as a whole. This version of *nature* is produced by the documents and should help determine whether OWFs could be developed in the area or not. I will come back to these productions of nature in the SEAs in the next chapter, 5.2. But first, how do my findings relate to Asdal and Reinertsen (2022)?

In this chapter, I have examined how the way of producing Strategic Impact Assessments (SIAs) affects how the environmental impacts are understood in the Strategic Environmental Assessments (SEAs)—written by NIVA and Akvaplan-niva. We can, through Asdal and Reinertsen (2022), understand the SEAs as part of a site that actively shapes what environmental impacts are understood as, and what parts of which *natures* are valued. We can also think of the SEAs as "tools". They actively make certain areas of *nature* governable. In other words, they produce a version of *nature* that is used by decision-makers to determine whether OWFs should be developed or not. I will, in the next section (5.2), examine how this framing of nature and environmental impacts helps to frame and argue for OWFs as having restorative and "nature positive" effects. In other words, I will demonstrate how by valuing certain species, and accounting for specific parts of the environment, two issues emerge from these documents.

5.2 What is the issue?

In this section, we analyze the specific issues that the SEAs help to establish, modify and work upon, and what effect it has for the relevant "nature-object". In this thesis, the "nature-object" is not *nature* in its entirety, but the specific version of *nature* that is constructed in the SEAs. This is a *nature* that can be managed, restored, and even improved by OWFs. The SEAs do not simply describe this *nature;* they perform it through valuation and strategic framings of the artificial reef effect, fishery exclusion, and NID. I will argue in what follows, that two *issues* are co-emerging with the establishment of OWFs. I will examine how these closely related *issues* are worked upon by the documents themselves and by the published hearing notes. I will specifically demonstrate how these issues are presented through the three different "nature positive effects": one revolves around a so-called "artificial reef effect", the other one is about fishery exclusion and Nature-inclusive-design (NID).

5.2.1 The artificial reef effect

One of the most prominent claims made in the SEAs is that during operational phase, OWFs may generate positive environmental outcomes through the so-called artificial reef effect (Cochrane *et al.*, 2024; Siwertsson *et al.*, 2024). This refers to the tendency of man-made structures in the open ocean, such as the turbine foundations, cables and chains, to be colonized by sessile and fouling organisms. This could potentially lead to jellyfish bloom, provide shelter for fish, while also attracting marine mammals, thus creating new habitats (Siwertsson *et al.*, 2024). On the other hand, the artificial reef effect can also threaten local biodiversity through attracting invasive species by acting as "stepping-stones". In this way, there is a tension in the SEAs between presenting the artificial reef effect as both a positive effect and a potential threat. I will attend to how the artificial reef effect is framed, negotiated, and argued for in the SEAs, and what effects it has for nature. I will also examine how it is modified by the document itself and by the hearing note by *Pelagisk forening* (2024).

The artificial reef effect is presented in both the general knowledge chapter of the SEAs as a way for OWFs to improve conditions for marine ecosystems:

> "[…] access to food and spawning grounds in areas where this has previously been limited or absent can lead to new species finding habitats and staying in the area to a

> greater extent than natural. This can change the species composition and the interactions between different trophic levels, which can have impacts on nearby ecosystems" (Siwertsson *et al*., 2024, p. 17).

The statement helps to establish the artificial reef effect as a physical impact of OWFs that could lead to better "interactions" between "trophic levels", thus having a positive impact on the local and "nearby ecosystem". The authors also make the argument that "new species" will find new habitats through the artificial reef effect, thus leading to species staying in the area to a "greater extent than natural". In this way, the SEAs help to establish OWFs as not only negative impacts, but also as infrastructures through which marine ecosystems can thrive. In other words, the SEAs frame OWFs as bringing possible improvement to nature, as it could lead to species staying in the area to a "greater extent than natural". In this way, the *issue* being introduced with the artificial reef effect is that the establishment of OWFs could "improve" *nature*—this *nature* being both specific species and "nearby ecosystems". However, this issue and this broad ecological vision of the artificial reef effect narrow as the focus of the SEAs moves towards the area-specific assessment, where the improvement of commercially important species becomes the main focus:

> "Artificial reef effect will be able to attract different species of fish […]. Especially for bottom-attached species, the groups of demersal fish and codfish, this is expected to create new habitats that can provide improved growth conditions and thus a positive effect for the population […]" (Siwertsson *et al*., 2024, p. 62).

The statement above frames the artificial reef effect not as a general beneficial effect for the ecosystem, but as a targeted "improvement" for "codfish" and "demersal fish"—species with clear commercial value. In this way, the idea of improving *nature*—as a complex marine ecosystem with different trophic levels—begins to narrow into a vision of OWFs bringing "improved" conditions only for specific parts of nature—valuable species. This illustrates how the SEAs perform different versions of nature. First, it is "species of different trophic levels" that is the focus. But as the SEAs progress, the artificial reef effect is presented mostly through two commercially important species, namely "codfish" and "demersal fish". This vision of nature—as commercially important species—is shaped by the way the SEAs are written. In chapter 5.1.2, I examined how NIVA and Akvaplan-niva have been instructed by NVE to focus on species with commercial values. In this way, the SEAs shape this version

of nature as the most important one. As a result of this framing, the artificial reef effect here seems to be presented as impact that could "improve" conditions for specific groups of species—cod and demersal fish.

I have now examined how the artificial reef effect is framed in the SEAs. But how is this effect given scientific credibility, and where does the knowledge come from? In the SEAs, the effect is given scientific credibility by pointing to evidence from the Southern North Sea:

> "Most of the knowledge on the artificial reef effect comes from the southern, shallow part of the North-Sea […] and is therefore most relevant for bottom fixed installations that are planned in the Norwegian part of the North-Sea (Areas Sørvest A-F)" (Cochrane *et al*., 2024, p. 26).

The statement above allows the SEAs to establish analogies between OWFs in the North Sea. Since the artificial reef effect has been observed in the southern shallow parts of the North Sea, it is also expected for areas "Sørvest A-F" which are bottom-fixed installations in the Norwegian EEZ. By "borrowing" knowledge in this way, the SEAs reduce nature into something that behaves similarly across different ecosystems. However, as expert interviewees caution, this is a problematic assumption:

> "[…] you can't just transfer this with artificial reefs to another ecosystem. So, you have to look very carefully and very critically at possible solutions" (Expert interview 1).

> "If you have an ecosystem that is destroyed, as large parts of the North Sea, in this case it can be a positive way to restore nature […]. Many of the companies that come to Norway come from the part of the North Sea that looks like this, so I can understand that this is a concept, but if you place a structure in an ecosystem that actually works, like in our SVOs, then it is a completely different story" (Expert interview 2).

There are a few things I wish to unpack from these statements. First, these statements point to how the artificial reef effect is a site-specific effect, and that one can therefore not easily transfer it across contexts. More specifically, the artificial reef effect may offer ecological

benefits in areas where ecosystems have already been "destroyed", potentially leading to improvement. But as expert interviewee 2 points out, this logic does not apply to intact environments like those in the Norwegian "particularly valuable and vulnerable areas" (SVOs). Therefore, the idea of "improving", or in this case, "restoring" nature depends on the condition of the marine area we are talking about.

Another interesting thing to notice from this statement is that expert interview 2 frames the artificial reef effect as having the ability to "restore nature". This implies that OWFs can create a nature that is in some way better than the original or "natural" state. But is this really the case, and how is this argument made? I will come back to this in chapter 5.2.2 where this narrative of OWFs' ability to "restore" nature is reinforced. For now, however, I wish to turn to my initial question: how is knowledge about the artificial reef effect used to argue for its transferability to a Norwegian context? To understand this, I turn to the area-specific assessments again.

As the SEAs progresses into the area-specific assessment for the area Sørvest F—which is the only bottom fixed installation—the artificial reef effect is again presented as providing "improved conditions" for the commercially important species codfish and demersal fish. While the assessment acknowledges that the spawning grounds of codfish and demersal fish might face short-term disturbance during the planning, construction and decommissioning phases of OWFs, it suggests that during the operational phase, these species will benefit:

> "[…] a positive effect on the populations is expected due to the introduction of habitat-forming physical structures and artificial reef effects, with improved condition" (Siwertsson *et al*., 2024, p. 150).

In this statement, the artificial reef effect is again presented as a beneficial impact of OWFs for codfish and demersal fish as it can lead to "improved" conditions during the operational phase. The difference here is that the artificial reef effect is given scientific credibility, and this helps to frame the placement of an OWF in Sørvest F as providing an "improved" or even "positive" effect for specific species. Thus, the *issue* is again that OWFs are framed as installations that can provide an improved or better nature, and that the placement of these are even positive. However, this framing of OWFs again assumes *nature* in a certain way. It is the conditions for specific species that are "improved" and not *nature* as a whole. This

narrow framing of the artificial reef effect is directly challenged by the published hearing note of *Pelagisk forening*. I will now move into how the *issue* is transformed, and argue that Pelagisk forening changes the assumption that the artificial reef effect brings "improved" conditions.

In their official hearing note, *Pelagisk forening* challenges the assumption that the artificial reef effect may only result in "positive impacts" and how it tends to focus on specific species:

> "We disagree that artificial reefs should only result in positive effects. It is often normal to consider that a new type of habitat is to be considered a change from the natural state. There are also large knowledge gaps related to which species will have advantages and disadvantages of an artificial reef. It is also likely that invasive organisms can use such reefs as stepping-stones for further expansion. We therefore strongly disagree that the study only sees artificial reefs as positive, which in turn means that the consequences are not real. We believe that the consequences of artificial reefs should be concluded to be negative or neutral. We request that this be done in the study for the other areas that the directorate group has proposed" (Pelagisk forening, 2025, p. 7-8).

This statement can be understood as a critique of how the artificial reef effect is framed in the SEAs as "only resulting in positive effects". The hearing note makes this point by first questioning what type of habitat is created by the artificial reef effect, stating: "it is often normal to consider that a new type of habitat is to be considered a change from the natural state" (Pelagisk forening, 2024, p. 7). In this way, *Pelagisk forening* implies that maintaining habitats in their natural state carries intrinsic value. Thus, by adding a man-made structure like OWFs in the marine environment, it will alter it from its "natural state"; therefore, the artificial reef effect should instead be understood as a "negative or neutral" effect. Secondly, *Pelagisk forening* critiques the existing "knowledge gaps" in determining which species will have "advantages and disadvantages" due to the artificial reef effect. Specifically, they also point to the stepping-stone effect, which is a recognized risk of the artificial reef effect, where there is currently a lack of knowledge. To understand how they modify the issue, we turn to how the SEAs frame the "stepping-stone effect".

The" stepping-stone effect" is described in the SEAs as a way for the artificial reef effect to "promote the growth of both native and non-native species" due to the availability of new habitats (Siwertsson *et al*., 2024, p. 18). These non-native or invasive species can have negative impacts on the native ecosystem. In this way, the artificial reefs effects is no longer just a way of "improving" or "restoring" nature, it also becomes a site of ecological vulnerability. Consequently, the positive impacts of the artificial reef effect are modified with the introduction of the stepping-stone effect. However, as we will explore next, the SEAs help to moderate the risk of invasive species in a Norwegian context.

The "stepping-stone effect" is given empirical weight in the SEAs by pointing to evidence from the southern North Sea, where some of the fouling species on OWFs have been invasive, such as "the barnacle (*Megabalanus coccopoma*), *tangloppen* (*Jassa marmorata*), the Pacific oyster, and the Asian shore crab" (Cochrane *et al.,* 2024, p. 22; Siwertsson *et al*., 2024, p. 158). In describing these specific species, the SEAs help reflect the risk of introducing invasive species as a theoretical concern, but not as an immediate practical concern. In addition, the SEAs quickly move to diminish this risk when presenting it in a Norwegian context. Specifically, while the SEAs acknowledges that species with "bottom-dwelling" life stages such as "jellyfish and bivalves" may benefit from OWFs in a Norwegian context, the SEAs stress the "current limited research" on which of these invasive species might benefit from the establishment of OWFs in Norwegian waters, or how they might impact the "function of natural ecosystems" (Siwertsson *et al*., 2024, p. 158). In addition, the SEAs report that ocean temperatures are generally the most "important factor controlling the distribution of marine species", and that the Norwegian waters are currently too cold for many invasive species to survive or reproduce (Siwertsson *et al*., 2024, p. 158). In this way, the SEAs perform an act of containment—the risk of introducing invasive species is acknowledged but framed as unlikely in the current climate. In this way, the risk is presented as real, but more distant and dependent on a future where the impacts of climate change have increased ocean temperatures.

We can understand this way of presenting the "stepping-stone effect" as a way to acknowledge the risk while still maintaining it. This helps the SEAs to present the artificial reef effect as mostly a positive impact. However, the hearing note by *Pelagisk forening* questions this framing, suggesting that there are existing knowledge gaps about the effect. The artificial reef effect should therefore be framed as having neutral or negative effects. As

previously mentioned, we understand the hearing note by *Pelagisk forening* as a way to modify the *issue* presented with the artificial reef effect. *Pelagisk forening* does this by emphasizing that there are far more knowledge gaps concerning the stepping-stone effect than what is being presented with the artificial reef effect in the SEAs.

In summary, this sub-chapter demonstrates how the establishment of OWFs in the SEAs is being framed as bringing "improved" conditions for nature through the artificial reef effect. However, this framing of the artificial reef effect assumes a certain version of *nature*—it is specific species that will have advantages or disadvantages of OWF establishment. We can understand this in light of Asdal and Reinertsen (2022). First, the documents act as tools, they frame nature in a certain way through specific species, as also demonstrated in chapter 5.1.2. It is this version of *nature* that is framed as being "improved", and consequently, OWFs are being presented as a way to produce a better nature. This demonstrates how documents—in this case, the SEAs—help to shape an *issue*. However, after the SEAs were published *Pelagisk forening* (2025) challenges this exact assumption. They argue that the introduction of OWFs and the artificial reef effect will bring advantages to specific species—or specific parts of *nature*—and not nature "as a whole". They therefore argue that it should not be mainly described as a positive effect. In addition, *Pelagisk forening* also argues that the artificial reef effect will lead to the attraction of invasive species, and therefore change also change *nature* from its natural state. This illustrates how their hearing note transforms the issue: it is no longer about OWFs providing improvements to nature, but also about the potential harms their establishment could cause, and which aspects of *nature* they are considered to improve.

I will now move from the artificial reef effect and into how fishery exclusion is framed and argued for in the SEAs. I will here argue that a similar issue emerges, but also that nature is presented as something that can be restored through the establishment of OWFs.

5.2.2 The nature positive effect of fishery exclusion

As the development of OWFs expands, increasing spatial conflicts arise between energy infrastructure and more traditional ocean uses in Norway, like fisheries. One of the less visible, yet politically charged problems, is the exclusion of fishing activity from areas surrounding OWFs. While such exclusion may be justified in terms of safety regulations, the

SEAs go further by framing the reduced fishing activity as a "nature positive effect". More specifically, the limited fishing activity within OWFs is framed as providing "nature positive effects" for commercially important species like "bottom-attached", or "demersal and codfish, who are expected to get "improved growing conditions" due to reduced fishing pressure (Siwertsson *et al*., 2024, p. 62). This effect is particularly relevant for floating OWFs where chains and cables may limit access to fishing, thus potentially leading to the "re-establishment of habitats and populations", although this depends on the type of fishing activity "that has taken place historically" (Cochrane *et al*., 2024, p. 39-40).

These statements above can be understood as a performative act by the SEAs, in which the floating OWFs are positioned as enablers of reducing fishing pressure, and in this way improve "habitats and populations". This again allows the SEAs to frame OWFs not merely as harmful infrastructures but also "nature positive" contributions that can both "restore" nature back to "historical standards" or "improve" *nature*. This narrative is further reinforced in the SEAs, by drawing parallels between OWFs and MPAs, but here the effect is imagined as being able to "restore" or "recover" nature:

> "Scientific consensus is that closing an area to fishing (for example, marine protected areas) provides opportunities for fish and benthic habitats to recover to natural and historical standards. This in turn can provide benefits in the form of increased species and individual numbers and the spread of fish species to the area outside the offshore wind farm" (Cochrane *et al*., 2024, p. 40).

Similar to MPAs, OWFs are here imagined as having the ability to "recover" specific parts of *nature*. Specifically, it is thought that the exclusion of fisheries from OWFs can increase the "number" and abundance of species to "natural" or "historical" standards. In this way, the SEAs help to generate ecological value to OWFs by linking the removal of one use—fishing, with the recovery of another—marine life. However, this optimistic framing of OWFs that is presented in the SEAs assumes a certain way of seeing *nature*. Firstly, nature becomes something measurable, in this case measured in terms of "individual numbers" of species, specifically commercially important species like codfish and demersal fish. As such, the "nature positive" effect assumes that an "increased" number of individual species allows us to make a positive value judgement regarding the condition of the natural environment. Secondly, *nature* becomes something local in a sense. It is the local *nature* within the OWFs

and, to some degree, the "areas outside" the OWFs that will be benefited by reduced fishing activity. This way of envisioning nature—as something local—was challenged by one of the expert interviewees:

> "When considering that fisheries are excluded, it is a very passive effect. […] For example, if fishing is reduced in one area, the fishing activity simply moves elsewhere, so the overall impact on a larger scale is uncertain" (Expert interview 1).

This statement challenges the SEA's argument that less local fishing pressure in an area equals a "nature positive effect". Instead, from the interviewees' point of view, the exclusion of fishing does not eliminate the fishing pressure but merely redistributes it to other marine areas. This could potentially intensify impacts in regions not assessed by the SEAs. In other words, what appears locally beneficial may result in ecological pressure elsewhere. The redistributed fishing activity could also lead to increased competition among fishermen. In this way, this statement points to the two blind spots presented in chapter 5.1. Firstly, because the SIAs and the 20 complementary professional reports for Sørvest F, Vestavind F, and Vestavind B are developed individually from the 17 other areas, the wider ecological impacts of OWFs on *nature* are not accounted for. Secondly, since the professional reports under the SIA for Sørvest F, Vestavind F, and Vestavind B are written as individual reports the inter-sectoral trade-offs between environmental and socio-economic impacts of displacing fishing activity are left unaddressed.

So, what is the issue emerging here? And how can we relate these framings of nature to concepts by Asdal (2003; 2008)? I will first unpack some of my findings and state what issues emerge from this. First, the findings above illustrate an important gap in how the documents are written. There are specific frames and established boundaries for what each professional report should address. The SEAs should focus on the implications of establishing OWFs for the receiving environment, including specific species and part of the ecosystem, and not intersectoral trade-offs. This is again a result of the site—as Asdal and Reinertsen (2022) would say—that the SEAs are part of. The "site" has established boundaries for what is within the scope of these documents and what is left out.

This leads me to the second point that I wish to make here. Because the SEAs are made in a certain way, they enact a certain version of nature. This nature is again two specific species of

commercial value that seem to be benefit from the establishment of OWFs because it will reduce the fishing pressure. However, this nature is not neutral or agreed upon—it is a constructed version of nature, tied to a particular moment in time. This raises questions about who decides which version of nature is worth "restoring" and about which "historical" moment is taken as the "natural" standard. In other words, it prompts the question of who speaks on nature's behalf. Is it the experts from Akvaplan-niva and NIVA or is it the Norwegian Environmental Agency or *Statens vegvensen*, who have made the guidelines that decide what *nature* is or how the positive effect should be measured? As a consequence of this, two issues emerge from the SEAs. First, OWFs are framed as being able to construct a version of nature that becomes "improved" from its original state. Secondly, the establishment of OWFs becomes a way to "restore" nature back to historical standards.

I will now move into the last part of my empirical analysis, where I wish to examine how the use of NID is framed, argued for, and negotiated in the SEAs. I will also explain how similar issues emerge with the use of NID.

5.2.3 Nature-inclusive design—improving ecological function of OWFs

Nature-inclusive design (NID) is presented in the SEAs as an "alternative that can be integrated or added to the design of man-made structures". The aim of NID is to "compensate" for the negative environmental impacts of OWFs (Siwertsson *et al*., 2024, p. 29). Specifically, this integration may create types of artificial reefs, thus helping "improve" the "ecological function" of OWFs (Cochrane *et al.,* 2024; Siwertsson *et al*., 2024). Particularly, the use of NID has been "focused on increasing preferred habitats for a range of species" (Siwertsson *et al*., 2024, p. 29). In this way, the framing of NID in the documents helps to establish OWFs as more than just energy infrastructure. They are seen as a way to improve *nature*, thus turning the potential environmental harm of OWFs into an ecological and commercial beneficial solution.

This narrative is backed up by empirical evidence from foreign cases from the Southern North Sea. In the Southern North Sea, the use of NID has taken on a more restoration-oriented focus, targeting species that have "historically been overfished", some examples are the inclusion of structures to support European flat oyster and codfish, or to "enhance the diversity of benthic organisms" (Cochrane *et al*., 2024, p. 39). The empirical evidence here

helps to present NID as a viable mitigating measure. By illustrating positive outcomes from foreign cases, the SEA frames NID as an evidence-based, transferable solution that can be added to OWFs in Norway. However, the ideal nature that the use of NID should help build is one where the conditions for specific commercially valued species that have been "overfished" are improved.

So, what is the issue being introduced with OWFs and NID? Well first, NID helps present OWFs as a way to "improve" nature, but as the SEAs progresses it enters a restoration-oriented perspective. Specifically, from the statement above, OWFs are presented as an object for ecological restoration, that should help species that have "historically been overfished". In this way, the most prominent *issue* is that OWFs are being framed as being able to first "restore" *nature*. However, it is only a specific part of nature that is being "restored, namely species that have "historically been overfished". The problem with this view is that the establishment of OWFs is being framed as a way to solve problems related to overfishing in the North Sea. However, this view is later challenged in the SEAs with the introduction of an important knowledge gap. Specifically, the "long-term" effects of implementing NID remain uncertain, and there is a need for further research on potential "hydrodynamic changes and impacts on biodiversity" (Siwertsson *et al*., 2024, p 30). Statements like this position NID as an evolving solution and expose a deeper uncertainty: what type of *nature* should be restored or produced using NID? Who defines what this ideal nature is? The SEAs ask these questions by pointing to the lack of "scientific consensus" on the aim of NID:

> "[…] there is no scientific consensus on how biodiversity targets for offshore wind farms should be designed. Should they focus on increasing the number of species, protecting specific species, preserving the existing habitat, or restoring it to a natural or historical state that may have been altered by other human activities such as bottom trawling?" (Siwertsson *et al*., 2024, p. 29).

In asking the questions above, the SEAs problematize what the ideal produced *nature* of NID ought to be. Should it "restore" *nature* to its "natural or historical state" or help "increase" the number of species? The first one would again imply that OWFs can produce a version of *nature* that is somehow back to its "natural" and "historical" state, or a state before it had been altered by "over-fishing" or "bottom trawling". This again helps to position OWFs as

bringing nature positive effects for commercially important species that would otherwise be affected by fishing pressures. The second, to achieve an "increased number of species" from the "natural state", again implies that an increased number of species in an area equals an improved *nature.* This is also challenged later by the SEAs by stating that "increased biodiversity is not necessarily *better* biodiversity*"* (Cochrane *et al*., 2024, p. 40).

These statements work to modify the *issue* that is emerging with the use of NID. The use of NID might bring "improved" effects for parts of nature, but the SEAs challenge which part of nature it should focus on. It also challenges whether it should be seen as a positive or negative effect by stating that "more biodiversity is not necessarily better". This is also challenged by the hearing note from Fiskebåt where the authors comment on the findings from the SEA on benthic communities and fauna:

> "The report also discusses the advantages and disadvantages of Nature-inclusive design. It then summarizes that *in the open sea, it is not considered appropriate to compensate for negative effects by introducing measures to increase the habitat or production of other species or groups of organisms. Rather, the goal is to create the least possible disturbance to the existing habitat.* Fiskebåt fully supports this conclusion. As is also mentioned further on, increased biodiversity will not necessarily be *better* biodiversity. For example, for Sørvest F, we fear negative impacts for sandeel if one actively advocates establishing habitat for new and possible competing or predating species for sandeel" (Fiskebåt, 2025, p. 4-5).

The hearing note by Fiskebåt helps to modify the *issue* by emphasizing potential negative impacts and uncertainties related to the implementation of NID in the North Sea. First, the statement challenges the idea that nature should be improved or enhanced through human interventions like NID. Instead, it helps to reframe nature not as something that can be restored or compensated for, but as something that should be left as undisturbed as possible. Secondly, the statement cast doubt on the credibility of NID in the North-Sea by pointing to the risks for sandeel. Fiskebåt emphasizes that NID might displace or harm existing species like "sandeel" by introducing competing species or predators. This statement can be understood as a problematization of how a NID is thought to bring advantages to one specific species. By improving the conditions for one species, other important species like "sandeel" might be influenced by a higher degree of predators. Consequently, the hearing note by

Fiskebåt helps to disrupt the idea that the use of an NID is a technical fix that can "improve" *nature.* Rather, the hearing note reframes NID as an intervention with trade-offs and uncertainties. In this way, we again see how the hearing notes help to modify an emerging *issue* from the SEAs.

In summary, this section (5.2) has shown how the SEAs become involved in two co-emerging *issues* centered around the "nature positive effects" of OWFs. On one hand, OWFs are being framed as offering restorative impacts for *nature*, on the other hand, they present SEAs as bringing improved conditions for *nature.* As such, there is a tension between OWFs as being able to bring back a past nature—restoring nature in some way—or OWFs being able to "improve" *nature* from the current state—make it better. However, in both these contexts, the SEAs assume a specific fragment of *nature*—commercially important species—that will benefit from the establishment of OWFs. This illustrates how political documents like SEAs actively construct fragments of *nature* and make it governable (Asdal and Reinertsen, 2022). It also shows how *nature* is never a neutral object; it is the subject of a political decision.

From this follows two important questions: who should speak for *nature* and who should make decisions on behalf of it? In this case, this role is mainly held by the experts at NIVA and Akvaplan-niva, who produce the SEAs based on instructions by NVE and the Ministry of Energy to rely on existing knowledge and to assess impacts for species of particular "value" (See chapter 5.1). However, this reliance on existing knowledge also shows the limits of broader participation: whose knowledge is included, and whose is left out? For example, as the expert interviewee in section 5.2.2 points out, "nature positive effects" should not be categorized as automatically making nature "better" if it disrupts established fishing grounds or adds pressure to marine ecosystems somewhere else. Therefore, by presenting the fisheries effect as inherently "positive", the SEAs risk overlooking the concerns and perspectives of fisheries. However, this is not only a consequence of how the authors themselves choose to produce knowledge; it is also shaped by how the opening process is designed. Specifically, the professional reports are written individually from each other, and then findings are "collated and compared" (NVE, 2024b).

Together, these observations highlight how SEAs do more than report on environmental impacts—they actively participate in deciding what is valuable nature and whose knowledge matters. Because of this, the SEAs help define what is harmful and beneficial environmental

impacts of OWFs. I will now move into the discussion part of the thesis, where I will shortly summarize my main findings, discuss the limitations of my study, and discuss my findings in light of the ideas of sustainability.

6. Discussion

In this chapter I wish to discuss some of my findings in light of relevant concepts from both the background chapter and the conceptual framework. I also wish to answer my research questions. The aim of my thesis was to answer the following research questions:

1. *What are the roles of the Strategic Environmental Assessments (SEAs) in the opening process of the OWFs Sørvest F, Vestavind F, and Vestavind B?*
2. *Which ideas of nature are argued, negotiated, and framed within the SEAs for Sørvest F, Vestavind F, and Vestavind B?*
    a. *What is the issue?*

I will first summarize my main findings from the empirical analysis. Secondly, I will point to limitations of my study, and areas for future research. Lastly, in section 6.3 I will discuss my findings considering ideas of "sustainability or sustainable development" as discussed in section 2.5.

6.1 Main findings

I will here present my main findings from the empirical analysis. In the first part of the empirical analysis (5.1), I aimed to examine the role of SEAs in the licensing and planning process of OWFs. In the analysis, I showed that the SEAs take an active part in shaping environmental impact. Specifically, the first section (5.1.1) "The Norwegian model" examined how the cumulative environmental impacts could be lacking from the published SEAs, as these are written individually from the other expert documents. This shows how the documents are part of a "site" that actively shapes what parts of the environment are made visible and not.

In the second part of 5.1.2, I directed attention to how SEAs actively shape versions of nature—being species of particular value such as near-threatened, threatened, red-listed, and commercially important species. This was set by the premises of the methodological

guidelines “M-1941” from the Norwegian Environmental Agency and the handbook “V712” by *Statens Vegvesen*. In this way, the chapter showed how the SEAs actively construct a version of nature. This illustrates how documents are tools of knowledge—they tell us what matters and what does not. It is this version of nature—as Asdal (2003) and Latour (1998) would argue—that is defined by certain requirements. It is then this version of nature that should be used by decision-makers to decide whether it is feasible or responsible to establish OWFs in these areas. In this way, the analysis also shows how documents are produced, specifically what is written down and not. This relates to the “document work” that Asdal and Reinertsen (2022) describe. From section 4.1.3, I showed how documents do specific work, and how specific actors do work with and on them. My findings from 5.1.2, therefore, demonstrate how the SEAs do “nature-work” (Asdal and Hobæk, 2016, p. 101). In other words, they help produce a certain version of nature—in this case, it is two specific species, codfish and demersal fish.

From these framings of nature, two *issues* emerge. This was demonstrated in the final section of the empirical analysis (5.2). In this section, I asked, “What is the issue?” and the analysis demonstrated how two distinct, but interconnected issues co-emerged. First, the artificial reef effect frames OWFs as able to “improve” nature, thus making a “better” *nature.* Secondly, through fishery exclusion and the use of NID, OWFs are framed and argued as bringing both “restored” and “improved” conditions for nature. However, both these issues assume that *nature* is primarily measured by the abundance of commercially important species. Thus, within this framing, “restoring” and “improving” nature means increasing the populations of “cod” or “demersal” fish that have a certain “value”, rather than considering nature as something ecologically complex.

I will discuss my findings closer in section 6.3, but first, I wish to reflect on limitations of my study and areas where this topic should be studied further.

6.2 Further research and limitations

In this thesis, I have examined the role of SEAs in the opening process of the areas Sørvest F, Vestavind F, and Vestavind B. I have also investigated how “nature positive” effects are framed, argued for, and negotiated within these documents. The thesis has been based on the “practice-oriented document analysis” by Asdal and Reinertsen (2022) and has opted to

answer the research questions by thorough reading and analysis of the documents, supplemented by interviews with two experts. I here wish to address some limitations of this thesis, and present areas where this topic should be studied further.

First of all, this study aimed at looking at the role of SEAs in the opening decision of Sørvest F, Vestavind F, and Vestavind B. However, since this process is still ongoing, I have not been able to fully understand how the findings from the SEAs are used in the final decision. I have also not addressed how NVE has collated and compared the findings after the publication of the SEAs. As described in chapter 5.1.1, once the two SEAs and the other 18 professional reports were published, NVE was tasked to compare and collate their findings, and make recommendations for the ED. What remains unanswered is how the findings are synthesized and used in the final decision-making. This aspect is left out of the scope of the thesis because it involves an ongoing process. This thesis has rather focused on how the SEAs themselves are made, what knowledge they include, and how they describe "nature positive" effects. Further research should investigate how NVE uses these findings, and the ones from the other professional reports, to make the final recommendations on whether to open the areas. It should also examine how the final decision is made, and which knowledge is given the most weight.

Secondly, I wish to highlight another area for further research, namely the legal feasibility of categorizing OWFs as *de facto* MPAs in a Norwegian context, which remains largely unexplored. As described in the background chapter, the current marine protection act in Norway, the so-called *Naturmangfoldloven* (2009), does not apply to the areas where OWFs are potentially being built—the Exclusive Economic Zone (EEZ). In addition, the current Norwegian SVOs—that are a central part of the knowledge base for marine protection—do not restrict any forms of activities within them, and consequently OWFs can legally be placed within these areas. However, this might change with the new upcoming law that was sent for official hearing in 2024 (Prop. 72 L, (2024-2025)). After this hearing, the government made a law proposal (Prop. 72 L, (2024-2025)). This proposal was adopted in May 2025, and will provide the authorities with a new legal tool that can be used to give areas, and species of the marine ecosystem, actual legal protection that the current SVOs do not (Klima- og miljødepartementet, 2025). It could therefore be valuable to investigate how this law might influence the potential categorization of OWFs as MPAs. For example, could the "nature positive" effects be used as an argument in favor of having OWFs as MPAs?

6.3 Ideas of sustainability

The development of offshore wind energy is in the Norwegian marine management plan of 2024, highlighted as an important part of the "green transition" that should help reduce the annual GHG emissions (Meld. St. 21 (2023-2024), p. 13). At the same time, the national plan for the "sustainable use and conservation of nature" emphasizes that the development of offshore wind should be done in a "sustainable manner" that takes into account both the climate and the environment (Meld. St. 35, (2023-2024), p. 78). With this policy ambition in mind, this section of my thesis will examine what my empirical findings suggest for the future development of OWE in Norway. I will start by exploring how the emerging ideas of nature, the environment, and OWE intersects with broader visions of sustainable development and sustainability. More specifically, I will reflect on how the "nature positive" effects enact different understandings of sustainability.

6.3.1 The artificial reef effect—OWFs as nature's replacement?

In the empirical analysis, I examined how the establishment of OWFs was argued as offering "improved" conditions for commercially important species like cod and demersal fish, through the artificial reef effect. This framing positions OWFs as technical solutions that can improve nature. This vision aligns with the "status-quo" approach to sustainable development, as Hopwood, Mellor, and O'Brien (2005) describe. Within this line of thinking, technological interventions and business are seen as the most important driver of sustainability, and technology is even seen as a replacement for nature. However, this narrative of OWFs stands in strong contrast with the reality.

According to the management plan (Meld. St. 21, (2023-2024)), the North Sea and Skagerrak—where Sørvest F, Vestavind F, and Vestavind B are planned—are among the most environmentally polluted areas in Norway. First, the management plan highlights that there has been a long-term decline in commercially important species such as sandeel and codfish, largely due to bottom trawling activities. Secondly, there has been an increase in invasive species in the areas—particularly along the coast—likely due to an increase in shipping traffic and increasing sea temperatures, which have facilitated the spread of species from the southern North Sea such as the pacific oyster (Meld. St. 21, (2023-2024)). Despite these findings, the SEAs portray OWFs as a potential solution, suggesting that it can increase

foraging, hiding and spawning opportunities for commercially important species. In addition, the risk of invasive species linked to OWFs—the stepping-stone effect—is minimized by suggesting that Norwegian water temperatures are currently too low for these invasive species to thrive, despite the projections of warmer ocean temperatures with climate change (Siwertsson *et al*., 2024).

Through the artificial reef effect, the development of OWFs is therefore positioned not only as a means of reducing GHG emissions but also as a technical intervention that can replace nature. More specifically, it suggests that the artificial *nature* that OWFs create is better than what is naturally there. By doing this, the SEAs sustain a "status-quo" vision of sustainability—or one that prioritizes technological and economic expansion while downplaying the risks for the marine environment. This vision of OWFs perfectly aligns with the interests of the offshore wind developers because it presents the development of OWFs as positive for both the marine environment and for the reduction of GHG emissions. This also seems to align with the broader policy from 2022 by the office of the Prime Minister (*Statsministerens kontor*), that states that offshore wind development should be done in a manner that ensures "low or positive environmental impacts" (Meld. St. 4 (2022-2023), p. 196). It also aligns with the ambition of ensuring a development that is done in a "sustainable manner" that takes into account both the climate and the environment (Meld. St. 35, (2023-2024), p. 78).

However, this framing of OWFs is not uncontested. Actors like *Pelagisk forening* (2025), have raised critical concerns about this framing of OWFs, that also challenge the assumptions that underpin the artificial reef effect. As shown in the empirical analysis, *Pelagisk forening* (2025) questions whether the development of OWFs can truly be considered to bring "nature positive" effects, by noting that the very establishment of these structures will alter ecosystems from their natural state. Instead, *Pelagisk forening* argued that *nature* should be thought of as something that should be protected for its intrinsic value. This modification of the *issue* that *Pelagisk forening* does can be thought of as a "strong" understanding of sustainability. As Robinson (2004) would argue, from a strong perspective of sustainability, natural capital is not seen as replaceable by human-made capital. This is what *Pelagisk forening* does when they challenge why the stepping-stone effect is not acknowledged more in the SEAs, and how the artificial reef effect is thought to bring "advantages" for only specific species.

This debate between the hearing note and the SEAs exposes a deeper tension between how sustainability is framed. More specifically, while the SEAs position OWFs as a tool that can improve and even replace nature, the hearing notes critique such a framing that prioritizes certain species, and also certain interests—like offshore wind developers—while sidelining others. If the Norwegian government goes in the same direction as the SEAs, and argues that OWFs can replace *nature,* it suggests a future in Norway where renewable technology and environmental protection go hand in hand. However, this vision raises questions about whose interests are really served, which environmental values are prioritized, and what risks are acknowledged in the process.

I will now turn the discussion towards how fishery exclusion and use of NID both represent similar ideas as the "reform" approach to sustainable development.

6.3.2 Fishery exclusion—OWFs and their *de facto* MPA effect

The framing of fishery exclusion in the SEAs helps present the development of OWFs as providing "nature positive" effects, suggesting that OWFs can "recover" benthic habitats and fish populations back to "historical standards" while functioning similar effects as *de facto* MPAs (Cochrane *et al*., 2024; Siwertsson *et al*., 2024). In doing so, the development of OWFs is presented as a technological intervention that can both reduce GHG emissions and help protect the marine environment, similar to *de facto* MPAs. This aligns with the "reform" approach to sustainable development; an approach that expresses an increasing environmental concern and advocates for a shift from fossil fuels to renewable energy, but still assumes that environmental problems can be solved within the current social and economic structures.

So, what does this framing say about the future development of OWFs in Norway? With this framing of OWFs in mind, it could point to a future where OWFs in Norway fit the objectives of *de facto* MPAs, as is currently being discussed in the EU. However, there are several problems with this framing of fishery exclusion, that I wish to unpack here. First, what kind of protection do OWFs actually provide? As highlighted in the empirical analysis, the "positive" effects provided by OWFs is strictly for a fragment of *nature*. In other words, it is only the two commercially important species, codfish and demersal fish, which are imagined to be "restored" back to historical standards. This framing of OWFs also assumes *nature* as

being something local—it is the area where the OWFs is placed that is positively affected. But what about the impacts of OWFs somewhere else? This uncertainty is left unaddressed in the SEAs. Secondly, the framing of OWFs, suggests that the exclusion of one activity—fishing—will help the recovery of another, in this case, commercially important fish species that are heavily impacted by fishing activity. A problem with this perspective is that it neglects the rights of fishermen that are affected by this exclusion. As expert interviewee 1 pointed out, exclusion of fishery is a very passive effect of OWFs, and one should therefore be critical in arguing that it is positive. Both these framing of OWFs, could also align with a weak perspective of sustainability (Robinson, 2004). This is because they suggest that OWFs—as a technical intervention—can help reduce the impacts of fishing activities and restore nature back to "historical standards". This again suggest that human-made capital can overcome the problems in nature.

In summary, the visions of fishery exclusions that is presented in the SEAs assume that the future establishment of OWFs in Norway can be a means to balance ecological protection, and economic values with offshore wind development. This is because it suggests that OWFs can reduce the heavy fishing activity in the North-Sea and Skagerrak, recover the stock of commercially important species like codfish, sandeel and demersal fish, and lastly reduce the GHG emissions. However, without appropriate caution in the decision-making process, this could result in a future establishment where there are more conflicts between actors—fisheries and OWFs. This was also one of the cations raised in literature by Gill *et al.* (2020), and should be studied further in a Norwegian context.

6.3.3 Nature-inclusive design—OWFs as an enhancement for nature

The use of NiD was presented in the SEAs as an addition to OWFs that can "improve" ecological function. This framing also aligns with the "reform" perspective of sustainable development (Hopwood, Mellor, and O'Brien, 2005). This is because the use of NID also helps to present the development of OWFs as a "technical fix" (Robinson, 2004) that can be beneficial for "protecting" *nature.* In this view, the use of NID becomes a way for the Norwegian government to both develop OWFs and still meet its commitment to do it in a manner that considers the marine environment. However, there is one fundamental problem with this framing of OWFs, which was both raised by the authors of the SEAs themselves and the hearing note by *Fiskebåt.*

The overall aim of NID was problematized by the hearing note and the SEAs. Specifically, they stated that "more biodiversity is not necessarily better". This points to bigger questions about what *nature* is, who gets to define it, and what we are in turn protecting using NID? By asking these questions, the hearing notes and the SEAs raise a fundamental question about whether OWFs can contribute to making *nature* "better", and as such whether it should be thought of as an effective protection measure. This problematization of NID would align with a "strong sustainability" perspective—where *nature* is not seen as something that can be improved by technological solutions. More specifically, this perspective challenges the assumption that OWFs as man-made structures can compensate for or improve natural ecosystems. Rather, from a strong sustainability point of view, value created through technological interventions cannot replace the intrinsic value of untouched nature. This critique also prompts questions about whether the use of NID risks oversimplifying complex ecosystems.

These framings of NID, in the SEAs and the hearing note, demonstrate a tension between two conflicting visions of sustainability. While it is on one hand, argued that the use of NID can be a *technical fix* that can help enhance the impacts of the artificial reef effect and fishery exclusion, it is on the other hand argued that NIDs do not necessarily provide a better nature. This tension illustrates a fundamental question in Norway's future energy transition: should sustainability be pursued through technological interventions, as Pardo et al., (2023) also suggest by stating that the use of NID could ensure a "sustainable offshore wind industry"? Or should we protect nature for its intrinsic value, and by this reduce the OWF expansion? Ultimately, the answer depends on which path Norway decides to follow: one that relies on technological interventions to make up for the environmental harm of OWFs, or one that focuses on valuing nature for its intrinsic value, and thereby ensuring strict marine protection.

I have now demonstrated how the "nature positive" effects of OWFs enact different ideas of sustainability. I will now move into my last chapter, the conclusion. Where I will present my concluding remarks.

7. Conclusion

This thesis has examined the role of two SEAs in the opening process of the OWFs Sørvest F, Vestavind F, and Vestavind B in Norway. It has also examined how *nature* is argued, negotiated, and framed as being positively impacted by the establishment of OWFs through the artificial reef effect, fishery exclusion, and NID. By using a practice-oriented approach to document analysis, informed by concepts from STS and studies of issues, this thesis demonstrated how the SEAs are more than neutral summaries; they actively participate in shaping versions of *nature*.

The empirical analysis demonstrated this in different ways. First, I examined how the SEAs are produced individually from the other professional reports, and how the cumulative environmental impacts of OWFs could therefore be lacking from the published SEAs. Second, I demonstrated how the project-specific guidelines from the Norwegian Environmental Agency and *Statens Vegvesen* instructed the SEAs to focus on specific species in a particular area. Lastly, I demonstrated how two issues co-emerged in the SEAs: on one hand, OWFs are described as "improving" *nature*; on the other, they are framed as being able to "restore" *nature* back to "historical standards". These narratives of OWFs prompt a critical question which I first introduced in the introduction: can OWFs effectively protect nature?

Well, what OWFs are appearing to "improve" or "restore" here is not *nature* "as a whole", but rather a fragment of it—two commercially important species—at a specific time and location. However, the marine ecosystems are far more complex than just these two species, and focusing narrowly on these species could risk overlooking broader interactions and the long-term cumulative impacts. This concern, and similar ones, were raised by the expert interviewees, *Pelagisk forening* and *Fiskebåt.* These actors were more critical to how the "artificial nature" of OWFs was argued in the SEAs. For example, they critiqued how the knowledge of the artificial reef effect was imagined to be transferable from one site to another, and why it was mostly described as being positive. One of the expert interviewees further noted that the "nature positive" effects of OWFs did not consider increasing impacts in other areas or the perspectives of the fishermen. Lastly, Fiskebåt also challenged the assumption that more biodiversity is not necessarily better.

Thus, the answer to the question above ultimately rests on what kind of "sustainability" perspective Norway decides to pursue. In other words, whether it is one where technological infrastructure such as OWFs are viewed as being able to protect or even replace nature, aligning with a "reform" and a "status-quo" approach to sustainable development. Or one where *nature* is protected for its intrinsic value, aligning with a strong-sustainability perspective. The first narrative would be consistent with the views of offshore wind developers whose main interest is to develop OWFs. The second one, could align with similar narratives presented in the hearing notes by *Pelagisk forening* and *Fiskebåt*, and the expert interviewee, who are more critical of the "artificial nature" that OWFs produce.

Based on my findings, I have suggested a few areas where this topic should be studied further. First, further research should examine how the findings, the "nature positive" effects, from the SEAs will be used in the ongoing opening process of Sørvest F, Vestavind F, and Vestavind B, and whether they affect the decision-making process. This includes looking at where and how the effects are mentioned, for example in the recommendation by NVE, and how other actors potentially make use of them. Secondly, further research should also investigate the impacts of the upcoming law on marine protection beyond the territorial sea. More specifically, how will this law influence the potential categorization of OWFs as MPAs, and could the "nature positive" effects be used as an argument in favor of having OWFs as *de facto* MPAs? This should be studied after the new law has entered into force.

8. Bibliography

Akrich, M. (1992) 'The De-scription of Technical Objects', *Shaping Technology- Building Society: Studies in Sociotechnical Change* [Preprint].

Asdal, K. (2003) 'The Problematic Nature of Nature: The Post-constructivist Challenge to Environmental History', *History and Theory*, 42(4), pp. 60–74. Available at: https://doi.org/10.1046/j.1468-2303.2003.00257.x.

Asdal, K. (2004) *Politikkens teknologier: Produksjon av regjerlig natur*. Oslo: Det historisk-filosofiske fakultet, Universitetet i Oslo Unipub.

Asdal, K. (2008) 'Enacting things through numbers: Taking nature into account/ing', *Geoforum*, 39(1), pp. 123–132. Available at: https://doi.org/10.1016/j.geoforum.2006.11.004.

Asdal, K. (2015) 'What is the issue? The transformative capacity of documents', *Distinktion: Journal of Social Theory*, 16(1), pp. 74–90. Available at: https://doi.org/10.1080/1600910X.2015.1022194.

Asdal, K., Brenna, B. and Moser, I. (eds) (2007) *Technoscience: the politics of interventions*. Oslo: Unipub.

Asdal, K. and Hobæk, B. (2016) 'Assembling the Whale: Parliaments in the Politics of Nature', *Science as Culture*, 25(1), pp. 96–116. Available at: https://doi.org/10.1080/09505431.2015.1093744.

Asdal, K. and Reinertsen, H. (2022) 'Doing document analysis : a practice-oriented method'. Los Angeles: SAGE.

Ashley, M.C., Mangi, S.C. and Rodwell, L.D. (2014) 'The potential of offshore windfarms to act as marine protected areas – A systematic review of current evidence', *Marine Policy*, 45, pp. 301–309. Available at: https://doi.org/10.1016/j.marpol.2013.09.002.

Austrheim, E., Dahlgren, T.G., Handberg, Ø.N., Hestetun, J.T., Haugland, L.M., Aslesen, S.R. and Navrud, S. (2022) *Wind and Fisheries: Desktop Study on the Coexistence Between Offshore Wind and Fisheries in Sothern North Sea II*. NORCE Norwegian Research Centre. Available at: https://hdl.handle.net/11250/3030037.

Bergström, L., Kautsky, L., Malm, T., Rosenberg, R., Wahlberg, M., Åstrand Capetillo, N. and Wilhelmsson, D. (2014) 'Effects of offshore wind farms on marine wildlife—a generalized impact assessment', *Environmental Research Letters*, 9(3), p. 034012. Available at: https://doi.org/10.1088/1748-9326/9/3/034012.

Bocci, M., Sangiuliano, S.J., Sarretta, A., Ansong, J.O., Buchanan, B., Kafas, A., Caña-Varona, M., Onyango, V., Papaioannou, E., Ramieri, E., Schultz-Zehden, A., Schupp, M.F., Vassilopoulou, V. and Vergílio, M. (2019) 'Multi-use of the sea: A wide array of opportunities from site-specific cases across Europe', *PLOS ONE*. Edited by K. Morrissey, 14(4), p. e0215010. Available at: https://doi.org/10.1371/journal.pone.0215010.

Bonevac, D. (2010) 'Is Sustainability Sustainable?', *Academic Questions*, 23(1), pp. 84–101. Available at: https://doi.org/10.1007/s12129-009-9152-4.

Bonsu, P.O., Letschert, J., Yates, K.L., Svendsen, J.C., Berkenhagen, J., Rozemeijer, M.J.C., Kerkhove, T.R.H., Rehren, J. and Stelzenmüller, V. (2024) 'Co-location of fisheries and offshore wind farms: Current practices and enabling conditions in the North Sea', *Marine Policy*, 159, p. 105941. Available at: https://doi.org/10.1016/j.marpol.2023.105941.

Bradshaw, C., Iburg, S., Morys, C., Sköld, M., Pusceddu, A., Ennas, C., Jonsson, P. and Nascimento, F.J.A. (2024) 'Effects of bottom trawling and environmental factors on benthic bacteria, meiofauna and macrofauna communities and benthic ecosystem processes', *Science of The Total Environment*, 921, p. 171076. Available at: https://doi.org/10.1016/j.scitotenv.2024.171076.

Brochier, T., Brehmer, P., Mbaye, A., Diop, M., Watanuki, N., Terashima, H., Kaplan, D. and Auger, P. (2021) 'Successful artificial reefs depend on getting the context right due to complex socio-bio-economic interactions', *Scientific Reports*, 11(1), p. 16698. Available at: https://doi.org/10.1038/s41598-021-95454-0.

Callon, M. (2001) 'Actor Network Theory', in *International Encyclopedia of the Social & Behavioral Sciences*. Elsevier, pp. 62–66. Available at: https://doi.org/10.1016/B0-08-043076-7/03168-5.

Christie, N., Smyth, K., Barnes, R. and Elliott, M. (2014a) 'Co-location of activities and designations: A means of solving or creating problems in marine spatial planning?', *Marine Policy*, 43, pp. 254–261. Available at: https://doi.org/10.1016/j.marpol.2013.06.002.

Christie, N., Smyth, K., Barnes, R. and Elliott, M. (2014b) 'Co-location of activities and designations: A means of solving or creating problems in marine spatial planning?', *Marine Policy*, 43, pp. 254–261. Available at: https://doi.org/10.1016/j.marpol.2013.06.002.

Coates, D.A., Kapasakali, D.-A., Vincx, M. and Vanaverbeke, J. (2016) 'Short-term effects of fishery exclusion in offshore wind farms on macrofaunal communities in the Belgian part of the North Sea', *Fisheries Research*, 179, pp. 131–138. Available at: https://doi.org/10.1016/j.fishres.2016.02.019.

Cochrane, S.K.J., Ziegler, A., Andrews, A.J., Borgersen, G. and Bedington, M. (2024) *Fagutredning for virkning av havvind på bunnsamfunn og naturtyper: Vestavind B, Vestavind F og Sørvest F*. Tromsø: Akvaplan-niva AS. Available at: https://veiledere.nve.no/media/fpdffc4z/sku-fagutredning-naturmangfold-bunnsamfunn-og-naturtyper.pdf (Accessed: 6 May 2025).

Degraer, S., Carey, D., Coolen, J., Hutchison, Z., Kerckhof, F., Rumes, B. and Vanaverbeke, J. (2020) 'Offshore Wind Farm Artificial Reefs Affect Ecosystem Structure and Functioning: A Synthesis', *Oceanography*, 33(4), pp. 48–57. Available at: https://doi.org/10.5670/oceanog.2020.405.

Dunkley, F. and Solandt, J.-L. (2022) 'Windfarms, fishing and benthic recovery: Overlaps, risks and opportunities', *Marine Policy*, 145, p. 105262. Available at: https://doi.org/10.1016/j.marpol.2022.105262.

Eriksen, E., van der Meeren, G.I., Nilsen, B.M., von Quillfeldt, C.H. and Johnsen, H. (2021) 'Særlige verdifulle og sårbare områder (SVO) i norske havområder-Miljøverdi', (Prosjektnr: 15166). Available at: https://www.hi.no/hi/nettrapporter/rapport-fra-havforskningen-2021-26.

Finseraas, E. and Eskeland, S.S. (2024) ‘Offshore wind licensing in Norway’, in. Cheltenham, UK Northampton, MA: Edward Elgar Publishing.

Fiskebåt (2025) ‘Fiskebåts høringssvar til strategisk konsekvensutredning for Sørvest F, Vestavind B og Vestavind F’. Available at: https://www.regjeringen.no/no/dokumenter/horing-av-strategisk-konsekvensutredning-for-sorvest-f-vestavind-b-og-vestavind-f/id3077688/?uid=15f6f9b5-df53-4614-ae48-2f3c2af24e42 (Accessed: 12 August 2025).

Gill, A.B., Degraer, S., Lipsky, A., Mavraki, N., Methratta, E. and Brabant, R. (2020) ‘Setting the Context for Offshore Wind Development Effects on Fish and Fisheries’, *Oceanography*, 33(4), pp. 118–127.

Havenergilova (2010) *Lov om fornybar energiproduksjon til havs*. Available at: https://lovdata.no/pro/#document/NL/lov/2010-06-04-21?searchResultContext=2083&rowNumber=1&totalHits=239 (Accessed: 14 February 2025).

Herrera Anchustegui, I. and Soliman Hunter, T. (eds) (2024) *Offshore wind licensing*. Cheltenham, UK Northampton, MA: Edward Elgar Publishing (Elgar energy law and practice).

Hopwood, B., Mellor, M. and O’Brien, G. (2005) ‘Sustainable development: mapping different approaches’, *Sustainable Development*, 13(1), pp. 38–52. Available at: https://doi.org/10.1002/sd.244.

Jackson, K. and Bazeley, P. (2019) *Qualitative data analysis with NVivo*. 3. edition. Los Angeles London New Delhi Singapore Washington, DC Melbourne: Sage.

Jasanoff, S. (2017) ‘A Field of Its Own: The Emergence of Science and Technology Studies’, in R. Frodeman (ed.) *The Oxford Handbook of Interdisciplinarity*. 2nd edn. Oxford University Press, pp. 173–187. Available at: https://doi.org/10.1093/oxfordhb/9780198733522.013.15.

de Jong, K., Steen, H., Forland, T.N., Nyquist, D., Utne-Palm, A.C., Nilssen, K.T., Albretsen, J., Falkenhaug, T., Biuw, M., Buhl-Mortensen, L. and Sivle, L.D. (2020) *Potensielle effekter av havvindanlegg på havmiljøet*. Havforskningsinstituttet. Available at: https://hdl.handle.net/11250/2719132.

Kingma, E.M., Ter Hofstede, R., Kardinaal, E., Bakker, R., Bittner, O., Van Der Weide, B. and Coolen, J.W.P. (2024) ‘Guardians of the seabed: Nature-inclusive design of scour protection in offshore wind farms enhances benthic diversity’, *Journal of Sea Research*, 199, p. 102502. Available at: https://doi.org/10.1016/j.seares.2024.102502.

Klima- og miljødepartementet (2023) ‘Naturavtalen’. Regjeringen.no. Available at: https://www.regjeringen.no/no/tema/klima-og-miljo/naturmangfold/innsiktsartikler-naturmangfold/naturavtalen/id2987476/ (Accessed: 30 July 2025).

Klima- og miljødepartementet (2025) ‘Ny lov om vern av norske havområde’. Available at: https://www.regjeringen.no/no/aktuelt/ny-lov-om-vern-av-norske-havomrade/id3109365/ (Accessed: 27 August 2025).

Kuhn, T.S. (1970) *The structure of scientific revolutions*. [2d ed., enl. Chicago: University of Chicago Press (International encyclopedia of unified science. Foundations of the unity of science, v. 2, no. 2).

Latour, B. (2007) *Reassembling the social: an introduction to Actor-Network-Theory*. 1. publ. in pbk. Oxford: Oxford Univ. Press (Clarendon lectures in management studies).

Law, J. (2008) 'Actor Network Theory and Material Semiotics', in B.S. Turner (ed.) *The New Blackwell Companion to Social Theory*. 1st edn. Wiley, pp. 141–158. Available at: https://doi.org/10.1002/9781444304992.ch7.

Lloret, J. (2025) 'Offshore wind farms and marine protected areas in European waters: Better apart than together', *Marine Pollution Bulletin*, 220, p. 118368. Available at: https://doi.org/10.1016/j.marpolbul.2025.118368.

Lloret, J., Wawrzynkowski, P., Dominguez-Carrió, C., Sardá, R., Molins, C., Gili, J.M., Sabatés, A., Vila-Subirós, J., Garcia, L., Solé, J., Berdalet, E., Turiel, A. and Olivares, A. (2023) 'Floating offshore wind farms in Mediterranean marine protected areas: a cautionary tale', *ICES Journal of Marine Science*. Edited by M. Pol, p. fsad131. Available at: https://doi.org/10.1093/icesjms/fsad131.

Maar, M., Holbach, A., Boderskov, T., Thomsen, M., Buck, B.H., Kotta, J. and Bruhn, A. (2023) 'Multi-use of offshore wind farms with low-trophic aquaculture can help achieve global sustainability goals', *Communications Earth & Environment*, 4(1), p. 447. Available at: https://doi.org/10.1038/s43247-023-01116-6.

Marres, N. (2007) 'The Issues Deserve More Credit: Pragmatist Contributions to the Study of Public Involvement in Controversy', *Social Studies of Science*, 37(5), pp. 759–780. Available at: https://doi.org/10.1177/0306312706077367.

Meld. St. 4 (2022-2023) (2023) *Anmodnings- og utredningsvedtak i stortingssesjonen 2021–2022*. Oslo: Statsministerenskontor. Available at: https://www.regjeringen.no/contentassets/5f4f6b3b47534d138f0792421e60ebd2/no/pdfs/stm202202300040000dddpdfs.pdf (Accessed: 12 August 2025).

Meld. St. 29 (2020-2021) (2021) *Heilskapelig nasjonal plan for bevaring av viktige områder for marin natur*. Oslo: Klima- og miljødepartementet. Available at: https://www.regjeringen.no/contentassets/cb23f1dc245f43df821fe96a53d66de6/nn-no/pdfs/stm202020210029000dddpdfs.pdf (Accessed: 12 August 2025).

Meld. St. 35 (2023-2024) (2024) *Bærekraftig bruk og bevaring av natur Norsk handlingsplan for naturmangfold*. Oslo: Klima- og miljødepartementet.

Miljødirektoratet (no date) 'Konsekvensutredning av klima og miljø'. Available at: https://www.miljodirektoratet.no/konsekvensutredninger (Accessed: 28 July 2025).

naturmangfoldloven (2009) *Nature Diversity Act*. Available at: https://lovdata.no/dokument/NL/lov/2009-06-19-100 (Accessed: 22 August 2025).

NVE (2010) 'Havvind- Forslag til utredningsområder'. NVE. Available at: https://www.regjeringen.no/globalassets/upload/oed/rapporter/havvind_ver02.pdf?id=2181946.

NVE (2012) ‘Havvind- Strategisk konsekvensutredning’. NVE. Available at: https://publikasjoner.nve.no/rapport/2012/rapport2012_47.pdf.

NVE (2025) *Om oppdraget og NVEs avgrensninger*. Available at: https://veiledere.nve.no/havvind/strategisk-konsekvensutredning-av-vindkraft-til-havs-del-2/bakgrunn-foringer-og-medvirkning/om-oppdraget-og-nves-avgrensninger/ (Accessed: 11 July 2025).

NVE (2024b) ‘Metode: Strategisk konsekvensutredning av vindkraft til havs’. Available at: https://veiledere.nve.no/havvind/strategisk-konsekvensutredning-av-vindkraft-til-havs/bakgrunn-og-metode/metode/ (Accessed: 24 March 2025).

NVE (2024a) ‘Om oppdraget: Strategisk konsekvensutredning av vindkraft til havs’. Available at: https://veiledere.nve.no/havvind/strategisk-konsekvensutredning-av-vindkraft-til-havs/bakgrunn-og-metode/om-oppdraget/ (Accessed: 24 March 2025).

NVE (2024c) ‘Sammendrag: Strategisk konsekvensutredning av vindkraft til havs’. Available at: https://veiledere.nve.no/havvind/strategisk-konsekvensutredning-av-vindkraft-til-havs/sammendrag/ (Accessed: 25 March 2025).

NVE (2024d) ‘Utredningsprogram for strategisk konsekvensutredning for Sørvest F, Vestavind B og Vestavind F’. Available at: https://veiledere.nve.no/media/oldn2bc4/utredningsprogram-soervest-f-vestavind-b-og-vestavind-f-1.pdf (Accessed: 28 July 2025).

Olje- og energidepartementet (2020) ‘Norway opens offshore areas for wind power’. Available at: https://www.regjeringen.no/en/historical-archive/solbergs-government/Ministries/oed/press-releases/2020/norway-opens-offshore-areas-for-wind-power/id2705986/ (Accessed: 14 May 2025).

Olje- og energidepartementet (2023) ‘Fastsetting av utredningsprogram for strategiske konsekvensutredninger for vindkraft til havs’. Available at: https://www.nve.no/media/16262/fastsetting-av-utredningsprogrammer-for-strategiske-konsekvensutredninger.pdf (Accessed: 11 July 2025).

Olsen, B.E. and Mortensen, B.O.G. (2024) ‘Offshore Wind Licensing in Denmark’, in *Offshore wind licensing*. Cheltenham, UK Northampton, MA: Edward Elgar Publishing (Elgar energy law and practice), pp. 84–105.

Pardo, J.C.F., Aune, M., Harman, C., Walday, M. and Skjellum, S.F. (2023) ‘A synthesis review of nature positive approaches and coexistence in the offshore wind industry’, *ICES Journal of Marine Science*. Edited by M. Gibbs, p. fsad191. Available at: https://doi.org/10.1093/icesjms/fsad191.

Pelagisk forening (2025) ‘Havvind strategisk KU- Vestavind B, Vestavind F og Sørvest F Høringssvar- Pelagisk forening’. Available at: https://www.regjeringen.no/no/dokumenter/horing-av-strategisk-konsekvensutredning-for-sorvest-f-vestavind-b-og-vestavind-f/id3077688/Download/?vedleggId=c5a8079f-c2ce-4245-b5e5-ae67234ea293 (Accessed: 9 May 2025).

Prop. 72 L (2024-2025) (2025) *Lov om vern av marin natur utenfor territorialfarvannet (havvernloven)*. Klima- og miljødepartementet. Available at:

https://www.regjeringen.no/contentassets/a372331d512f40ec8cb102a4741b5e1a/no/pdfs/prp20242025007200dddpdfs.pdf (Accessed: 22 August 2025).

Purvis, B., Mao, Y. and Robinson, D. (2019) 'Three pillars of sustainability: in search of conceptual origins', *Sustainability Science*, 14(3), pp. 681–695. Available at: https://doi.org/10.1007/s11625-018-0627-5.

Reinertsen, H. and Asdal, K. (2018) 'Ikke lenger uberegnelig og uregjerlig? Visjoner om et kalkulerbart, produktivt og bærekraftig hav i politiske tekster'.

Riera, E., Mauroy, B., Francour, P. and Hubas, C. (2024) 'Establishing complexity targets to enhance artificial reef designs', *Scientific Reports*, 14(1), p. 22060. Available at: https://doi.org/10.1038/s41598-024-72227-z.

Robinson, J. (2004) 'Squaring the circle? Some thoughts on the idea of sustainable development', *Ecological Economics*, 48(4), pp. 369–384. Available at: https://doi.org/10.1016/j.ecolecon.2003.10.017.

Rosen, M.A. (2020) 'Sustainability: Concepts, Definitions, and Applications', in A. Alvarez-Risco, M.A. Rosen, S. Del-Aguila-Arcentales, and D. Marinova (eds) *Building Sustainable Cities*. Cham: Springer International Publishing, pp. 15–26. Available at: https://doi.org/10.1007/978-3-030-45533-0_2.

Schupp, M.F., Kafas, A., Buck, B.H., Krause, G., Onyango, V., Stelzenmüller, V., Davies, I. and Scott, B.E. (2021) 'Fishing within offshore wind farms in the North Sea: Stakeholder perspectives for multi-use from Scotland and Germany', *Journal of Environmental Management*, 279, p. 111762. Available at: https://doi.org/10.1016/j.jenvman.2020.111762.

Siwertsson, A., Bedington, M., Blévin, P., Gran, S., Kistenich, S., Myano, M., Majaneva, S., Noever, C., Utengen, I.Y. and Vabø, Ø.S. (2024) *Fagutredning for virkninger av havvind på naturmangfold i de frie vannmasser*. Tromsø: Akvaplan-niva AS. Available at: https://veiledere.nve.no/media/xd0fweql/sku-fagutredning-naturmangfold-frie-vannmasser.pdf (Accessed: 6 May 2025).

Statens Vegvesen (2021) 'Konsekvensanalyser'. Available at: https://www.vegvesen.no/globalassets/fag/handboker/hb-v712-konsekvensanalyser-2021.pdf (Accessed: 28 July 2025).

Stelzenmüller, V., Gimpel, A., Haslob, H., Letschert, J., Berkenhagen, J. and Brüning, S. (2021) 'Sustainable co-location solutions for offshore wind farms and fisheries need to account for socio-ecological trade-offs', *Science of The Total Environment*, 776, p. 145918. Available at: https://doi.org/10.1016/j.scitotenv.2021.145918.

Thurstan, R., O'Leary, B. and Yates, K. (2018) 'Compatibility of offshore energy installations with marine protected area', in. Available at: https://doi.org/10.4324/9781315666877-12.

Timmermans, S. and Tavory, I. (2012) 'Theory Construction in Qualitative Research: From Grounded Theory to Abductive Analysis', *Sociological theory*, 30(3), pp. 167–186.

World Commission on Environment and Development (1987) ‘Our Common Future’. Available at: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf (Accessed: 14 June 2025).

Yearley, S. (2008) ‘Nature and the Environment in the Science and Technology Studies’, in *The handbook of science and technology studies*. Cambridge, MA: The MIT Press (The MIT Press Series), p. 1065.

8. Appendix

9.1 Coding framework

This section describes the coding framework that is used in NVIVO14 to analyze the document and interviews. I have clustered my findings into 5 categorizes and will describe all these here.

Ideas Sustainability:

The code "ideas of sustainability" is based on the approaches described by Hopwood, Mellor and O'Brien (2005). During the coding process, I use this code to identify areas where the textual content aligned with the perspectives of sustainable development "staus quo", "reform", or "transformation". This could i.e., be areas where the data reference NID as possible "technical innovations" that can help protect or improve the environment in some way—this relates to the"reform" approach. In this way, this code enabled me to understand which discourses of sustainability were visible in the materials.

Ideas of Nature:

The code "ideas of nature" refers to areas in the empirical material where *nature* is not treated as a passive object, but as actively constructed. The code draws on conceptual ideas of what nature is and how it is produced, as described by Asdal (2003; 2008). This engages with questions like what counts as nature, who gets to define it, or who speaks on its behalf. Specifically, I used this code to identify instances where nature was presented as something that could be "improved" or "restored" through OWFs. This includes references to areas where the establishment of OWFs aims to enhance the "biological function", "improve foraging or hiding opportunities" and so on. These framings could reflect underlying values about what nature is and what it should do. I also used this code where the SEAs specify how the guidelines define what environmental impacts are and what part of nature should be visible—specific species that are particularly valuable.

Implications or risks:

The code "Implications of risks" refers to areas where the material points to risks or implications of the establishment of OWFs for the receiving environment or nature. Specifically, it is related to risks or implications described under the "nature positive effects"

artificial reef effect, fishery exclusion, or NID. An example could be areas where the "stepping-stone" effect is brought up in association with the artificial reef effect.

Use of knowledge:

This code refers to areas where the empirical material says something about how knowledge is used to back up an effect. For instance, in the SEAs where the authors use knowledge from the Southern-North Sea to explain the artificial reef effect and how it will unfold in a Norwegian context.

Role of document:

This code was developed from the conceptual and methodological frameworks "document tools", "document work", and "document sites" as described by Asdal and Reinertsen (2022). First, inspired by document tools, where I ask questions like what these documents contribute to and enable? And what effects does it have? Secondly, in line with the concept of "document site" I ask questions like: what are the documents doing, and what is happening in them? What sort of practices may you follow in the documents? How may these practices you observe in the documents inform your research? Lastly, by drawing on document work, I ask: what practices and working methods are shaping the documents involved? What are the processes and procedures through which documents are produced, shaped, and changed? This is related to document work—see chapter 3 of Asdal and Reinertsen (2022).

9.2 Interview guide

This is the interview guide used for the expert interviews. I have edited it slightly during the process to fit the expertise of each of the interview candidates.

What is your background?	
Q1:	Tell me a bit about your background, and your research interests.
The role of documents	
Q2:	How would you formally define the role of these documents Strategic Environmental Assessment (SEAs) and Strategic Impact Assessments (SIAs)?
Q3:	In your opinion what are the roles of the SEAs—*fagutredninger for naturmangfold*—in the opening process of OWFs?
Q4:	What do think are some of the challenges in assembling/formatting/writing these documents?
Q5:	In your opinion, how will this knowledge be used in the further process?
Environmental impacts, "nature-positive effects" and de facto MPA effect	
Q6:	Can you define what is meant by "nature positive effects", "nature positive/based solutions"
Q7:	Do you think OWFs can have positive impacts on nature?
Q8:	What do you think of the representation of these effects in the SEAs?
Q9:	With background in the positive effects do you think OWFs could be categorized as *de facto* MPAs?