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Spatial conflict resolution in marine spatial plans and permitting procedures for offshore wind energy: an analysis of measures adopted in Denmark, England and the Netherlands

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As activities in the North Sea are steadily increasing in both size and number, spatial conflicts are becoming increasingly inevitable. Marine Spatial Planning is widely adopted as an area-based planning approach to manage competing claims for maritime space, but spatial conflicts are also managed through permitting procedures for maritime activities. To explore how Denmark, England and the Netherlands resolve, minimize or mitigate spatial conflicts, this paper identifies what conflict resolution measures are adopted in marine spatial plans and permitting procedures, and analyzes how national institutional capacities shape their deployment. Collected data includes marine spatial plans and permitting documents as well as interviews with involved policy- and decision-makers. The findings demonstrate a common set of guiding principles for conflict resolution in their marine spatial plans across countries, including spatial reservation, multi- or co-use, ecosystem-based planning, and financial compensation. Within permitting procedures, a wide variety of spatial, physical-technical, logistic, and financial conflict resolution measures are adopted to minimize or mitigate spatial conflicts on project-specific levels. However, large differences exist in the degree to which decision-makers prescribe what conflicts must be addressed in what manner during project development. A lack of ecological and spatial knowledge and fragmented governmental responsibilities hinder decision-makers' freedom to deviate from established types of conflict resolution measures. Overall, this paper presents valuable insights on how conflicts are addressed across the North Sea region as well as how institutional capacities, and institutional space in particular, shape the adoption of conflict resolution measures.

KEYWORDS

marine spatial planning, spatial conflict, North Sea, conflict resolution, permitting procedures, institutional capacities

1 Introduction

Spatial competition in European waters is increasing rapidly, primarily driven by the expansion of renewable energy infrastructure. Particularly in the North Sea, political ambitions to achieve 300 GW of offshore wind energy (OWE) by 2050 ([Ostend Declaration of Energy Ministers on The North Seas as Europe's Green Power Plant, 2023](#)) present an unprecedented, tenfold increase of the installed capacity compared to early 2023 ([WindEurope, 2023](#)). The additional aim for offshore energy system integration ([Frederiksen et al., 2022](#)) is set to instigate a range of other infrastructure developments, such as energy hubs or islands, offshore energy storage, offshore hydrogen production, meshed grids, or interconnector cables ([Wiegner et al., 2024](#)). However, pursuing these high ambitions takes place within one of the world's busiest sea basins. The North Sea is home to a wide variety of activities with clearly designated spatial claims, such as such as oil and gas operations, shipping routes, marine protected areas, or military zones, but also more dynamic activities including fisheries and ecosystem protection. This increasing spatial competition necessitates appropriate governance frameworks to find physical space for offshore energy technologies in already one of the busiest offshore areas globally ([Kusters et al., 2023](#)). Furthermore, the long development trajectories of offshore (energy) infrastructure – up to 10 years from plan to construction – more broadly indicate the importance of a strategic and integrated management of the inevitable trade-offs between spatial claims of maritime activities on the long-term.

Marine Spatial Planning (MSP) is widely promoted as an area-based and integrated planning approach to manage existing and new claims for maritime space and, as such, manage “current and potential conflicting uses” ([Douvere, 2008](#), p. 766; [Jay et al., 2013](#)). MSP, therefore, means to provide the governance framework for balancing various offshore interest and values within which the pursuit of high ambitions for upscaling OWE takes place. Early MSP studies suggest that having a marine spatial plan in place will lessen spatial conflicts (see e.g. [Calado et al., 2010](#); [Tuda et al., 2014](#)). But, portraying the plan itself as a panacea for conflict resolution is too simplistic. Rather, we argue that conflict resolution occurs not only through plan formulation, but also in long-term plan implementation through project-specific permitting procedures. Hence, examining the functioning of conflict resolution in MSP processes and permitting procedures requires a reflection of both substantive elements – i.e., what types of measures are adopted both in plans and through permitting requirements ([Van Den Burg et al., 2022](#)) – and institutional elements – i.e., how and why certain measures are and can be deployed ([Alexander, 2020](#); [ICES, 2020](#)).

To date, researchers have identified and researched a variety of adopted and promising measures for conflict resolution. While doing so, recent studies also highlight the need for such measures if the high ambitions for OWE upscaling are to occur in a context of a wide variety of other offshore interests and values. For example, [Spijkerboer \(2021\)](#); [de Koning et al. \(2021\)](#) and [Hatenboer et al. \(2023\)](#) examine the Dutch North Sea Agreement and Dialogues, which serve as a platform to anticipate upon future spatial conflicts

and establish conflict resolution measures to prioritize activities on the Dutch North Sea. Further, zoning solutions, such as co-location, multi-use of space or spatial decision-support tools help optimize the spatial configuration of maritime space both across sea-basins as well as on project-specific scales ([Christie et al., 2014](#); [Yates et al., 2015](#); [Pinarbaşı et al., 2017](#); [Boussarie et al., 2023](#)). Last, a broad array of scholars – from ecologists to engineers – explore project-specific, often technical, solutions for minimizing conflicts or mitigating their effects, again often targeting OWE projects by e.g. placing artificial reefs in offshore windfarms for environmental protection ([Degraer et al., 2020](#)) or curtailing offshore windfarms during bird migration events to reduce collision risks ([Brabant et al., 2021](#)). Whereas these studies offer valuable insights into individual conflict resolution measures, they do not involve a wider reflection on the types and totality of measures actually available for policy- and decision-makers, and how they contribute to a more integrated and strategic management of spatial conflicts. Especially given the plans for more internationally connected offshore energy systems on the North Sea ([ENTSO-E, 2024](#); [North Seas Energy Cooperation, 2023](#); [Ostend Declaration of Energy Ministers on The North Seas as Europe's Green Power Plant, 2023](#)), it is key to better understand the variety of adopted measures across the sea basin. Furthermore, to be able to develop effective approaches for addressing spatial conflicts across borders it is important to evaluate the role of the institutional context shaping how and why certain measures can and are deployed ([Alexander, 2020](#); [ICES, 2020](#)).

Therefore, this paper answers the research question: How can and are spatial conflicts resolved, minimized or mitigated within marine spatial plans and permitting procedures for offshore wind energy? To do so, we first identify which (types of) conflict resolution measures are available. Second, we explore how the institutional context influences the adoption of the identified measures. A multiple case-study approach is adopted, in which the marine spatial plans and OWE permitting procedures of Denmark, England and the Netherlands are examined. The focus on spatial conflict emerging from OWE developments is justified given its significantly expanding spatial demands and corresponding contribution to spatial conflict ([Guşatu et al., 2022](#)). The results first compile a comprehensive overview of types of conflict resolution measures available in North Sea countries, enabling us to deepen our academic understanding of approaches to spatial conflict management in marine governance. Second, the results show how and why available measures are being adopted given the specific institutional capacities in the cases studied. Combined, the findings enable us to discuss how different governance frameworks support a strategic and integrated management of spatial conflict.

2 Theoretical background

Conflict resolution repeatedly emerges in definitions and descriptions of MSP. [Ehler and Douvere, 2009](#), p. 24) influential definition states that MSP “analyzes and allocates space in a way that minimizes conflicts among human activities [...] and nature,

and, where possible, maximizes compatibilities among sectors". Therein, they call for a *strategic* and *integrated* plan-based MSP practice for managing marine spaces, and as such, spatial conflicts or synergies (Ehler and Douvère, 2009). Strategic and integrated refer, respectively, to a long-term and cross-sectoral approach. More recently, Ramírez-Monsalve and van Tatenhove (2020) describe MSP as a framework for arbitrating between conflicting claims for maritime space. Van Den Burg et al. (2022) add to this that conflict resolution occurs both through the planning process as well as through the implementation of a plan once in place. The above underlines that, ever since its conceptual beginnings, resolving spatial conflict has been a central element of MSP. It further marks two central insights for studying conflict resolution in MSP, the implications of which for data analysis for this study are discussed in greater detail in the following paragraphs.

First, resolving spatial conflicts in MSP does not only occur in the formulation of a marine spatial plan and corresponding strategic priorities, but rather, also takes place through permitting procedures on a project-specific level (ICES, 2017; Alexander, 2020; Van Den Burg et al., 2022). On both levels, conflict resolution measures can be adopted, which are formal instruments for policy- and decision-makers to make trade-offs or find synergies between conflicting maritime activities. To illustrate, financial support structures can be established in the marine spatial plan to compensate fisheries for the negative effects of closing fishing grounds for renewable energy infrastructure. On a project-specific level, permitting procedures may stipulate project developers to adjust construction timelines based on seasonal bird trek patterns.

Generally, conflict resolution measures on plan- and project-levels encompass distinct temporal and spatial scopes. Where measures on a plan-level may offer more long-term guidance for larger geographical areas – e.g., an entire Exclusive Economic Zone (EEZ) or sea basin – project-level measures provide more short-term and site-specific support. Ideally, conflict resolution measures on plan-levels align with and are translated to project-specific guidance. Namely, clear support in the marine spatial plan can streamline decision-making processes and speed up permit procedures for specific projects (Schaefer and Barale, 2011). When the marine spatial plan offers a predefined structure for assessing and approving offshore developments or activities – e.g. through designating specific zones for multi-use within offshore windfarms or earmarking certain activities to be prioritized over others – it clarifies the objectives and trade-offs made at the EEZ or sea basin-level for both permitting authorities and developers. However, there is limited understanding of whether and how these plan-level measures for conflict resolution are also reflected in activity-specific permitting procedures.

Second, spatial conflicts may not always be completely resolved through MSP, but rather can be managed in various ways. Specifically, three strategies for addressing spatial conflict are distinguished: relocate, minimize conflict, or mitigate its negative effects (based on Kyriazi, 2018; Guşatu et al., 2022). Relocating conflicting maritime activities essentially takes away the root of the conflict – i.e. the spatial overlap. This may involve proactively moving one of the conflicting uses to alternative locations or a more passive relocation resulting from exclusion that prompts activities

to shift elsewhere. When relocation is no viable solution, conflict resolution strategies may instead aim to minimize the conflict by addressing the spatial overlap itself or, alternatively, mitigate the effects of the conflict by addressing the non-spatial consequences. To illustrate, a minimization strategy may involve bundling infrastructure, reducing intensity of use from conflicting activity through financial compensation for missed revenues, or curtailing conflicting activities during sensitive periods such as bird trek. Mitigation strategies may include compensatory measures to limit environmental effects of constructing offshore infrastructure, or shared insurances and responsibility for potential damages of multiple activities in one area. These examples show that conflict resolution is not only about addressing the root of the conflict – i.e. the spatial overlap – but may also be directed at minimizing or mitigating the physical-technical, financial-administrative, or logistic dimensions of a spatial conflict.

The approach to spatial conflict resolution is influenced by the institutional context (Stepanova and Bruckmeier, 2013; ICES, 2017; Spijkerboer et al., 2020). Specifically, institutional capacities of policy- and decision-making authorities shape the uptake of various conflict resolution measures. Institutional capacities broadly refer to the availability of established systems of policy instruments, procedures, techniques, ideas and values, but also how these features work in practice (Domorenok et al., 2021). It is about the competence of organizations (Healey, 1998) or, in this case, whether policy and decision-makers have and can mobilize the knowledge, willingness and resources necessary to deploy the conflict resolution measures as they see fit to make trade-offs or find synergies between conflicting spatial claims. This comprises both formal rules and regulations, such as laws, explicit divisions of responsibilities and policies, as well as informal norms, traditions and habits (Rodríguez-Pose, 2020). Trygg and Wenander (2022) identify three dimensions of institutional capacities – i.e. knowledge resources, relational resources and mobilization capacity – to which a fourth dimension of institutional space is added in this study (see Oteman et al., 2014).

Knowledge resources capture the formal, informal and tacit knowledge relevant to specific planning contexts (Healey, 2004) as well as policy- and decision-makers' frames of reference and how these are shared between actors (De Magalhães et al., 2002). Relational resources comprise the stakeholders involved in planning processes, the networks that link these actors together, enable their collaboration, and the power relations among them (Healey, 2004; Trygg and Wenander, 2022). Knowledge and relational resources are then positioned as necessary preconditions to build up mobilization capacity (Isaksson and Hagbert, 2020). Essentially, mobilization capacities concern the ability of actors to use knowledge and networks to adopt certain conflict resolution measures. Therein, Trygg and Wenander (2022) omit any notion of how matters of financial support or legal guidance influence the degree actors are able to mobilize these knowledge or relational resources. Nevertheless, as shown by e.g., Grotenbreg and van Buuren (2018) and Skill et al. (2024), the influence of financial or legal elements on the capacity to mobilize knowledge and relational resources cannot be overlooked.

Further, having sufficient institutional capacities is about more than being able to mobilize knowledge and relational resources

within existing financial means and regulatory frameworks. Namely, particularly in times of increasing spatial competition with many unknown future spatial conflicts, policy- and decision-makers can benefit from a certain flexibility in deploying conflict resolution measures. Hence, we turn to the concept of institutional space to examine this freedom of policy- and decision-makers to strategically mobilize resources and adopt available conflict resolution measures when circumstances call for it. Taking from [Spijkerboer's \(2022\)](#) work on offshore energy transitions and MSP, institutional space is defined as the discretionary freedom of actors within established formal and informal norms or procedures ([Oteman et al., 2014](#)). We hypothesize that the institutional space shapes and is shaped by the mobilization capacities of policy- and decision-makers to address conflicts in novel ways and deviate from established types of conflict resolution measures. For instance, [Spijkerboer \(2022\)](#) demonstrates that existing formal responsibilities (i.e. relational resources) can constrain the institutional space and make it difficult for actors to claim this space. Conversely, [Dorado \(2005\)](#) asserts that a certain degree of institutionalization – i.e., when some institutional guidance exists within the institutional space – also supports actors' capacity to these strategically leverage and mobilize resources. This example indicates that complete freedom for policy- and decision-makers may also manifest as an undesirable institutional void. Interestingly, [Spijkerboer \(2022\)](#) further posits that institutional space is more easily shaped when solutions are sought at higher levels of abstraction compared to specifics of project designs. Hence, institutional space may be especially valuable for establishing conflict resolution measures during long-term plan formulation, rather than for addressing project-specific conflicts. This paper will further explore this dynamic.

In sum, this paper hypothesizes that the adoption of spatial conflict resolution measures depends on the available measures as well as the institutional capacity that enables or constrains the freedom to mobilize resources and deploy those measures.

3 Methods

A qualitative multiple case-study approach is adopted to examine the uptake of various types of conflict resolution strategies adopted in MSP processes in Denmark, England and the Netherlands. Studying multiple cases enables comparisons and helps gain a nuanced understanding of conflict resolution in MSP by considering the role of the specific national context ([Yin, 2017](#)). All national cases are located in the North Sea region. The region is among the busiest seas globally and will only see an increase in spatial conflicts considering the recent political ambitions on OWE and offshore energy system integration ([Frederiksen et al., 2022](#); [Ostend Declaration of Energy Ministers on The North Seas as Europe's Green Power Plant, 2023](#)). Namely, the expected growth of the 2023 capacity of 30 GW to 300 GW of OWE by 2050 ([WindEurope, 2023](#)), will only exacerbate the already apparent spatial conflicts. Strict requirements for case selection within the North Sea region include the availability of policy documents, presence of dedicated OWE permitting procedure, publication language (English or Dutch) and published in the last five years. This led to the selection of Denmark, England and the Netherlands as cases to study in this article (see [Figure 1](#) and [Table 1](#)). As shown in [Figure 1](#), the English marine plan does not cover the entire English EEZ. For this paper, the North East Marine Plan was

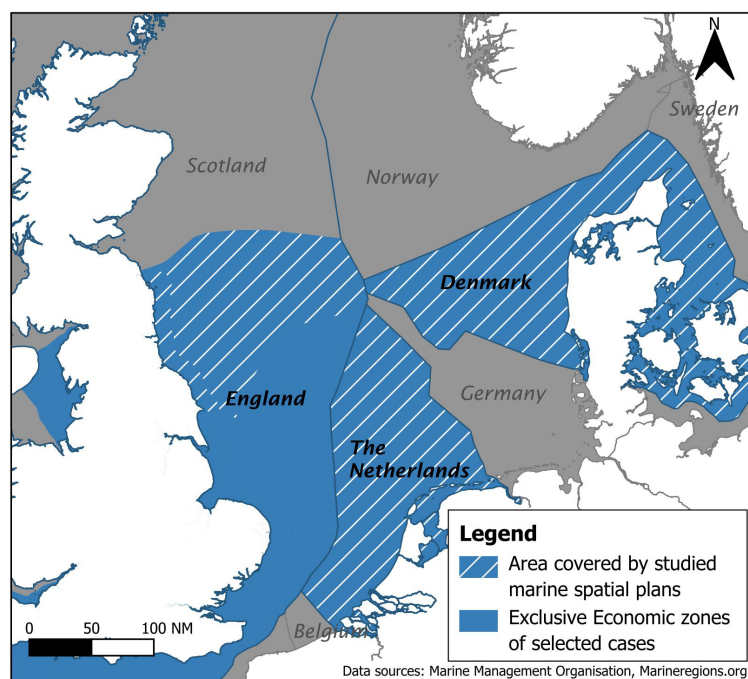


FIGURE 1
Map depicting the Exclusive Economic Zones of the countries corresponding to the selected cases.

TABLE 1 Background information about the analyzed case studies that guided data collection.

	Denmark	England	The Netherlands
<i>Marine Spatial Plan (year)</i>	Maritime Spatial Plan (2021)	North East Inshore and North East Offshore Marine Plan (2021)	National Water Program 2022-2027 (2022)
<i>MSP authority</i>	Danish Maritime Authority	Marine Management Organisation	Ministry of Infrastructure and Water Management
<i>OWE permitting authority</i>	Danish Energy Agency	Marine Management Organisation, the Crown Estate, Planning Inspectorate	Netherlands Enterprise Agency, <i>Rijkswaterstaat</i>

studied, since only this English marine plan met the previously mentioned requirements for case selection. Remaining North Sea countries – i.e. Sweden, Belgium, Norway, Germany, France and Scotland – did not meet these criteria upon initiating this study¹.

Collected data includes (1) publicly available policy and permitting and (2) semi-structured interviews with primarily governmental professionals involved in the MSP processes or permitting procedures of the respective countries corroborated with one interview with an internationally active OWE developer. First, documents were collected, including the country's marine spatial plans and those related to permitting procedures documents (see [Appendix A, Table A1](#) for a full overview). Here, permitting procedures refer to those in place for developing OWE infrastructures in a nation's EEZ². Second, semi-structured interviews were conducted with marine spatial planners and permitting officials (see [Appendix A, Table A2](#) for an overview of the interviews). Themes and sub-themes discussed with these groups are included in [Appendix A, Table A3](#). An additional interview with a representative from the OWE industry helped validate and nuance insights from governmental actors. The interviews were transcribed and sent to the interviewees for crosschecking.

Data analysis was done in two rounds of coding using qualitative data analysis software Atlas.ti, based on the codebook presented in [Table 2](#) (and based on the theoretical framework developed in [Section 2](#)). The first round of coding focused on identifying conflict resolution measures and segments of text concerning the institutional capacities. In the second round of coding, the identified conflict resolution measures were further categorized according to their level of guidance (i.e., plan- or project-level) and strategy to address conflict (i.e., relocate, minimize or mitigate). Similarly, the coded segments on institutional capacities were explored to apply sub-codes (i.e., knowledge resources, relational resources, mobilization capacities and institutional space).

The results section refers to documents as [country]-Doc# (e.g., DK-Doc1) and to interviews as [country]-Int# (e.g., NL-Int1).

¹ Due to the absence of a dedicated OWE permit procedure (Sweden) or corresponding documents (Belgium, Norway), publication language (Germany, France), or the age of existing plans (Scotland).

² Numerous permits can be needed to develop offshore renewable energy infrastructures depending on the national context, such as those related to environmental pressures, spatial claim, construction, operation etc.

These references align with the overviews included in [Tables A1 and A2](#) of [Appendix A](#).

4 Results

Various relocation, minimization and mitigation measures are identified in Danish, English and Dutch marine spatial plans (see [Table 3](#)). Although all three plans anticipate conflicts by establishing some form of spatial reservation, available measures are mostly concentrated on minimizing them or mitigating their effects. For example, all plans promote multi- or co-use of maritime space and adhere to an ecosystem-based planning approach. Financial compensation mechanisms are scarce; i.e., only in the Netherlands an overarching fund for investments in transitions in energy, nature and food on its North Sea exists. More explicit differences emerge in the translation of these plan-level conflict resolution measures into project-level conflict resolution measures (as presented in [Sections 4.1, 4.2 and 4.3](#) as well as [Tables 4–6](#)). In [Section 4.4](#), we explore how the corresponding institutional capacities shape their uptake (also see [Table 7](#)).

4.1 Relocating activities

Relocating conflicting maritime activities through spatial reservation – i.e. resolving the spatial overlap – is a central tenet behind MSP processes. Although relocation measures are primarily adopted within marine spatial plans, the following paragraphs also shows how these are translated within OWE permitting procedures (see [Table 4](#)). Across cases, passive relocation strategies prevail. That means, by reserving space for specific activities, activities other than those designated in specific areas are excluded and prompted to shift elsewhere.

The Danish plan allocates broad development zones for a variety of uses, meaning that the designated activities may only be developed within these delineated zones [DK-Doc6; DK-Int2; see [Appendix B, Figure B1](#) for a map outlining these zones]. As such, the plan provides a first strategic guidance and mentions that area-specific restrictions can emerge from sectoral legislation. To illustrate, the plan itself does not forbid fishing in marine protected areas, but environmental legislation restricts fishing in areas allocated as 'nature and environmental protection areas' [DK-Doc6]. Similarly, the Dutch plan also reserves zones for specific activities, albeit in a more detailed manner. For instance, OWE areas are designed to fit specific amounts of GW [NL-Doc3] and, as

TABLE 2 Codebook used as analytical guidance during data analysis to examine conflict resolution measures and the institutional context shaping their uptake.

Code	Description	Sub-code	Description
Conflict resolution measures			
<i>Level of guidance</i>	Conflict resolution offers guidance on different planning levels, targeting divergent temporal and spatial scopes.	Plan-level	Long-term perspective for large geographical areas. Involves an overall direction of planning, considering multiple sectors, stakeholders and/or ecosystems.
		Project- or activity-level	Short-term and site- or project-specific measures. Narrow spatial scope which involves detailed planning and management of individual zones.
<i>Strategy to address conflict</i>	Measures can adopt various strategies to avoid or resolve the conflict.	Relocate	Spatial relocation of (one of) the conflicting spatial claims to avoid the conflict before it emerges or to resolve when two sea uses lay a spatial claim to a certain area.
		Minimize conflict	Reduce the conflict by decreasing the spatial and/or temporal overlap or by finding synergies between conflicting spatial claims.
		Mitigate effects	Compensating for or reducing the negative effects of the spatial conflict.
Institutional context			
<i>Institutional capacity</i>	The capacity of policy- and decision-makers and their ability to mobilize the resources they need to adopt conflict resolution measures.	Knowledge resources	Types of knowledge used by planners on what should be done, why it should be done and how it should be done.
		Relational resources	The stakeholders involved in planning processes, the structures of and between the networks, as well as the power relations between these actors.
		Mobilization capacities	The use of knowledge and relational resources to act, challenge current conditions and facilitate change within existing financial means and regulatory frameworks
		Institutional space	The room to maneuver and discretionary freedom of actors within established norms or procedures.

such, directly displace conflicting activities. Where the broad spatial reservations in the Danish plan do not automatically mean that the designated space will be utilized in the future, the allocated OWE zones in the Dutch plan come with a detailed timeline for development and definitively displace existing activities on the short-term. In contrast, the English plan does not include any

spatial allocation or zoning [ENG-Doc8; ENG-Int1]. Rather, it implies a conditional relocation of conflicting uses by protecting areas for possible future developments of, among others, renewable energy, cables, and oil and gas “from other activities that could affect the sites ability to generate energy” [ENG-Doc8, p.32]. Spatial reservation in England does occur on sectoral levels, e.g., marine

TABLE 3 Identified conflict resolution measures in the respective marine (spatial) plans.

Measure	Strategy	Denmark	England	Netherlands
Spatial reservation	Relocate	Development zones are allocated, which exempt areas from activities other than those planned for, including renewable energy and energy islands.	Areas are safeguarded for activities relating to aggregates, aquaculture, cables, oil and gas, and renewables.	Specific plots are reserved for activities of national importance, including OWE.
Multi-/co-use	Minimize conflict	Co-existence and spaciousness principles emphasize co-use on the surface water, water column or seafloor as well as in time.	Plan establishes a policy that co-existence proposals must be supported.	Plan promotes an area-based, multi-use of space and bundling of functions.
Ecosystem-based planning	Minimize conflict & mitigate effects	Ecosystem-based approach to enable achievement of good environmental status.	Ecosystem-based approach to enable achievement of good environmental status and precautionary principle.	Ecosystem-based approach and application of precautionary principle, nature-inclusive building in infrastructure development.
Financial compensation	Mitigate effects	x	x	Transition fund for investments in energy, food or nature transition on the North Sea.

TABLE 4 Identified project-level conflict resolution measures with a relocation strategy.

Plan-level measure	Denmark	England	The Netherlands
Spatial reservation	<i>Spatial.</i> Area-specific restrictions apply: no fishing in MPAs, no seaweed production in shipping lanes.	<i>Spatial.</i> Specific activities are single-use only: shipping routes, exclusion zones around archeology, impacts with unacceptable risks to national defense or navigation, areas sensitive to physical effects.	<i>Spatial.</i> Specific activities are single-use only: helicopter main routes, anchoring areas for seagoing vessels, shipping routes, maintenance zones for pipelines (500m) and telecom cables (750m). Design criteria for safety distances between shipping routes and offshore windfarms.

protected areas are allocated through sectoral plans and policies. Moreover, passive relocation is embedded in sector- or project-specific requirements in permitting procedures (see [Appendix B, Table B1](#)). For example, English and Dutch documents pose restrictions stipulating that existing renewable energy developments [ENG-Doc8], shipping routes [ENG-Doc8; NL-Doc3] or maintenance zones for pipelines and telecom cables [NL-Doc4] cannot co-exist with any other uses.

One example of a more proactive relocation strategy involves the potential to appoint fishing areas as compensation for closure of fishing grounds in OWE locations, as indicated by a Dutch policymaker [NL-Int3]. This addresses concerns that fisheries (along with other dynamic activities such as tourism or small shipping) seem more likely to carry the burden of new offshore infrastructure developments. In contrast, Danish and English policymakers regard proactive relocation of fisheries as less urgent, as they still see sufficient physical space within their offshore waters to avoid currently busy areas [DK-Int2; ENG-Int2].

4.2 Minimizing conflict

Conflict minimization measures intend to decrease the spatial overlap by adapting one of the spatial claims or activities, rather than completely relocating on the conflicting activities. Multi- or co-use, and ecosystem-based planning measures aim to reduce conflicts respectively by aiming to efficiently allocate multiple uses in one area or adjust the main activity in line with spatially specific ecological parameters. [Table 5](#) presents the identified conflict resolution measures on project-levels.

All three plans emphasize multi- or co-use as a key strategy to optimize the use of maritime space and promote cooperation among marine users, thereby minimizing conflicts over resources and space. Where the Netherlands explicitly refers to multi-use [NL-Doc1; NL-Doc3], both Denmark and England allude to co-use or co-existence of marine activities [DK-Doc6; ENG-Doc2; ENG-Doc8]. To illustrate, in Denmark, co-use is brought into practice by keeping “the plan open when possible” [DK-Int1]. This enables other activities to take place until a specific area will be used for their designated purpose and allows for refinement when new knowledge or stakeholder interests arise. Although the guiding principle of co-use is not explicitly translated in project-level conflict resolution measures, the plan specifies that co-use should be understood in relation to the three-dimensional nature of the sea [DK-Doc6]. That is, activities may take place simultaneously on the surface water, water column and seafloor. Similarly, the English plan broadly states that

“proposals that optimize the use of space and incorporate opportunities for co-existence and cooperation with existing activities will be supported” [ENG-Doc8, p.21]. The plan does not designate spatial reservations for specific activities (see [Section 4.1](#)), which means that the potential for multi-use depends on who gets there first and whether it can co-exist with a secondary activity [ENG-Int1]. In this context, dynamic activities (e.g., fisheries, tourism, and shipping) are at a disadvantage. Since these typically do not require a place-specific permit, their spatial claims are not protected by existing planning or permitting frameworks. Resultantly, they seem more likely to be displaced by new permitted activities with fixed locations. On a project-level (see [Table 5](#)), co-existence of activities is operationalized as a conflict minimization measure through cable burial [ENG-Doc10] or by adapting the layout of offshore windfarms to accommodate the passage of small ships or fishing activity [ENG-Doc15]. In the Netherlands, this plan-level guiding principle is translated into a concrete assessment framework for co-use of OWE including pre-determined potential co-existing uses [NL-Doc3; see [Figure 2](#)]. Also, qualitative, non-price criteria in OWE permitting procedures stipulate investments in both floating solar within offshore windfarms [NL-Doc7] as well as ecosystem protection or improvement [NL-Doc4; NL-Doc6; see [Table 5](#)].

Comparatively most measures identified in permitting documents target the potential conflict with nature, as based on an ecosystem-based planning approach promoted in all three plans [DK-Doc6; ENG-Doc8; NL-Doc3]. These involve both minimization measures (this section) and mitigation measures (presented in [Section 4.3](#)). Ecosystem-based minimization measures target the conflict with spatially-specific ecological processes or protected areas – e.g., adjust turbine height to reduce collision risk within bird trek routes [ENG-Doc10] or minimize turbine rotations during bird and bat trek periods [NL-Doc4] – rather than the wider ecological effects which are targeted through mitigation measures. The three cases demonstrate varying applications of this ecosystem-based approach, which is further translated into permitting requirements with different levels of detail and stringency. The Danish plan follows the EU Marine Strategy Framework Directive’s definition³ [DK-Doc6], without stipulating any specific requirements upfront within permitting procedures. Rather, any requirements are based on the results of the Environmental Impact Assessment, which is commissioned by

³ That is, staying within the limits of achieving a good environmental status whilst allowing for a sustainable use of the sea’s resources and services ([Directive 2008/56/EC, 2008](#)).

TABLE 5 Identified project-level conflict resolution measures with a minimization strategy.

Plan-level measure	Denmark	England	The Netherlands
Multi-use	x	<i>Spatial.</i> Co-existence proposals must be supported, burial of cables, good design of infrastructure. Turbine exclusion zone to ensure separation on the boundary of a development area adjacent to another development area. Adapt anchoring zones or cable placement to enable co-use of fisheries.	<i>Spatial.</i> Identified activities fit for co-use with OWF: aquaculture, alternative forms of fisheries (fixed gear and aquaculture), nature restoration, energy generation from solar and tides, energy conversion, energy storage by hydrogen production. Establish shipping clearways in windfarms. Bundle cables and pipelines as much as possible. No seafloor disturbing activities near archeological value assets. <i>Logistic.</i> Share shipping services or electricity infrastructure upon multi-use of area. <i>Financial-administrative.</i> Investments in floating solar within OWF are rewarded in OWF tender procedure.
Ecosystem-based planning	x	<i>Logistic.</i> Temporal restrictions on noisy activities to protect marine mammals. Vessel traffic should avoid rafting seabirds during sensitive periods, follow agreed upon routes and minimize number of vessel movements overall. <i>Spatial.</i> Adapt lay-out of activity to minimize bird collision risk. <i>Physical-technical.</i> Adjust turbine parameters to reduce collision risk, e.g., by altering rotor height.	<i>Logistic.</i> Minimize turbine rotations per minute under specific weather conditions (during bird and bat trek periods). <i>Spatial.</i> Adapt lay-out of windfarm to minimize bird collision risk, in line with bird migration patterns of neighboring Natura2000 area. <i>Physical-technical.</i> Adjust turbine parameters to reduce collision risk, e.g., by altering rotor height.

the OWE developers who were granted the permit [DK-Int2]. Although it is clear that the Danish Energy Agency is the responsible authority to check developers' conformance to the requirements, it is not explicated how the assessment's results are translated into requirements and how detailed and prescriptive the measures are. Both the English and Dutch plans similarly refer to the EU definition, but respectively further emphasize the precautionary principle [ENG-Doc2] and incorporate a nature-inclusive approach to building new infrastructure [NL-Doc3]. The English and Dutch cases display various measures to minimize the conflict that are set and reviewed by the respective permitting authorities (see Table 5), including temporal restrictions on noisy activities during sensitive periods or specific weather conditions [ENG-Doc10; NL-Doc4] or spatial restrictions to project-layout or maintenance vessel traffic [ENG-Doc10]. Interestingly, both cases further require developers to demonstrate how they "will accelerate progress towards a net positive outcome for environment" [ENG-Doc12, p.45] or state their "contribution [...] to the ecosystem of the Dutch North Sea" [NL-Doc6, p.22]. Where the English leave it to the knowledge and creativity of the market to determine how this should be done, Dutch permitting documents more specifically stipulate that turbines must be built in nature-inclusive manner, enhance underwater nature, and promote biodiversity [NL-Doc4; NL-Doc6]. These differences in approaches are further scrutinized in Section 4.4.

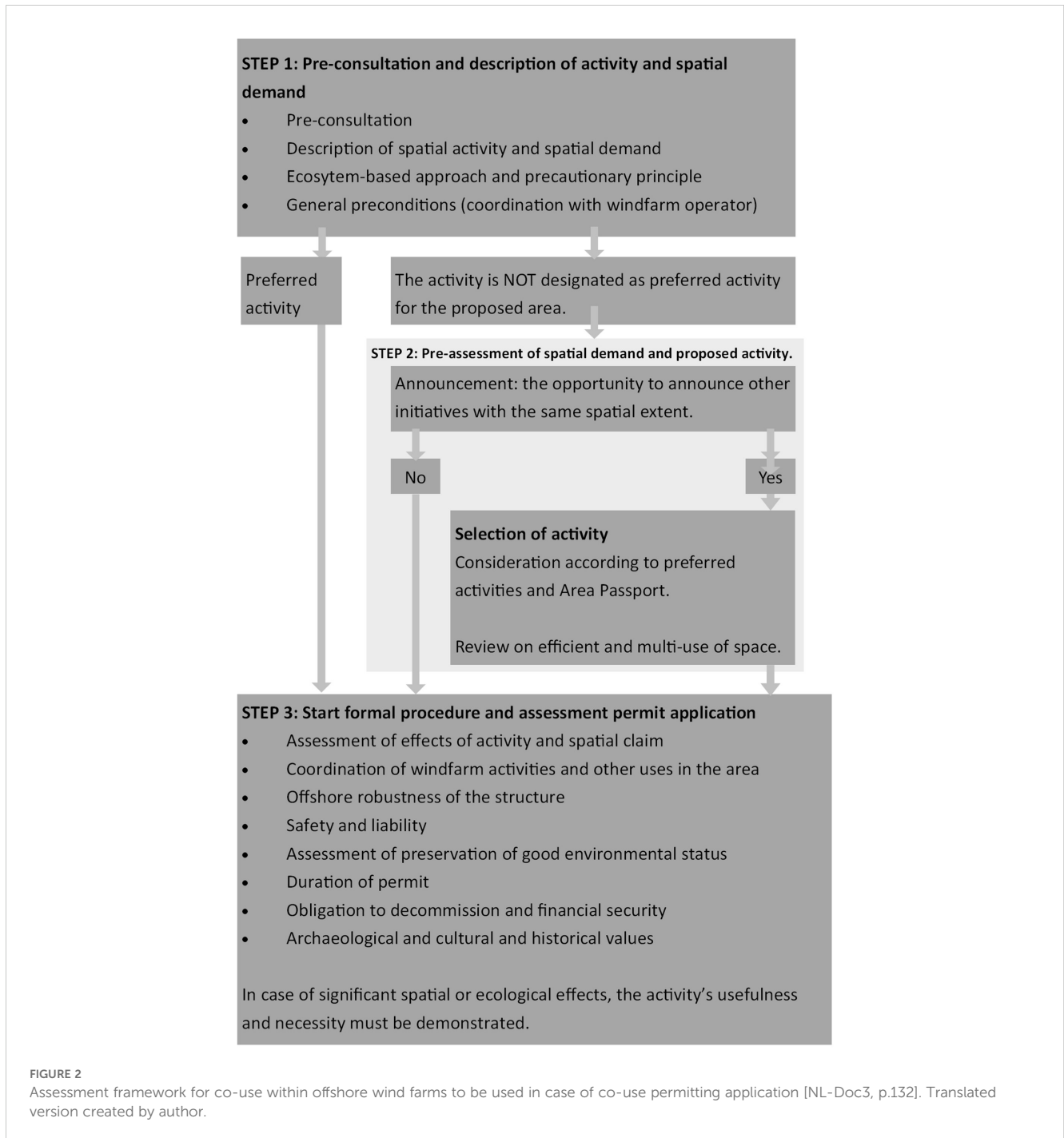
4.3 Mitigating effects of conflicts

Table 6 outlines the mitigation measures identified within OWE permitting procedures, corresponding to the plan-level measures of ecosystem-based planning and financial compensation.

Beyond conflict minimization, ecosystem-based planning also enables a mitigation or compensation of conflicts' effects, which

may range wider than the designated area for the activity. Identified mitigation measures include, among others, financial compensation for negative environmental effects [ENG-Doc11] or closure of fishing grounds due to OWE [NL-Doc1], alternative installation methods to prevent negative environmental effects of windfarm construction [ENG-Doc10; NL-Doc3], and introducing artificial reef structures to yield biodiversity benefits [ENG-Doc2; ENG-Doc12; NL-Doc4; NL-Doc5]. In contrast to the multitude of measures identified in the Dutch and English documents (see Table 6), Danish documents remain rather abstract by merely stating the need for "appropriate compensatory measures to abate the negative impacts for the [OWE] site" [DK-Doc1, p.12]. As stated in Section 4.2, further area-specific requirements and conflict resolution measures are to be determined based on results from project-specific Environmental Impact Assessments [DK-Int2], though how this occurs, their levels of detail and prescription remain unclear.

A second plan-level mitigation measure enables financial compensation. Within the Dutch North Sea Agreement a so-called 'transition fund' is established for investments related to one or multiple of the three transitions facing the North Sea, i.e. nature, energy and food [NL-Doc1]. Although this compensation mechanism can support broader North Sea investments, it also provides decision-makers the opportunity to allocate financial resources to target emerging spatial conflicts more specifically. For example, the fund may provide financial subsidies for a more sustainable fisheries sector or for downsizing the fleet when fishing grounds are closed due to new offshore windfarms [NL-Doc1]. Project-specific financial compensation measures are also identified within English OWE permitting procedures. The British Energy Act establishes a 'marine recovery fund' to mitigate negative environmental effects of OWE [ENG-Doc11]. Further, depending on the location, developers may be required to share the costs of effects on military and civil radar technologies [ENG-Doc12]. No



project-level measures for financial compensation were identified in the Danish marine spatial plan or OWE permitting procedures.

4.4 Institutional capacities

Denmark, England and the Netherlands each have different institutional capacities shaping the adoption of (various types of) conflict resolution measures (see Table 7 for an overview).

The capacity to mobilize the aforementioned available conflict resolution measures depends on the relational and knowledge

resources. Relational resources manifest differently across cases. After plan development, the Danish Maritime Authority functions as a secretariat to facilitate dialogue and decision-making among involved ministries [DK-Doc8; DK-Int1; DK-Int2]. In England, the plan itself intends to function as a communication and negotiation mechanism after a comprehensive stakeholder engagement process aimed at fostering understanding, and frontloading dialogue and conflicts [ENG-Doc8; ENG-Int1]. However, the wide variety of ministries and authorities involved in the plans and permitting procedures is recognized as a complexity in both England and the Netherlands [ENG-Int1; NL-Int2], with a Dutch permitting official

TABLE 6 Identified project-level conflict resolution strategies with a mitigation strategy.

Plan-level measure	Denmark	England	The Netherlands
Ecosystem-based planning	<i>Physical-technical.</i> Compensatory measures to abate negative impacts of offshore windfarms.	<i>Physical-technical.</i> Alternative installation methods, noise abatement technology to mitigate effects on marine mammals, acoustic deterrent devices, soft start procedures. Careful design of development and construction techniques involved; design of foundations, retain moved sediment locally; armored cables for inter-array and export cables to reduce electromagnetic field influence on fish; scour protection techniques around offshore structures. Introduction of artificial reef structures to yield biodiversity benefits and/or fishing opportunities; bidders for offshore windfarms must demonstrate their contribution to a net positive outcome for the environment. <i>Logistic.</i> Minimize aviation and navigation lighting on demand.	<i>Physical-technical.</i> Disturbance for underwater noise should be reduced at source; measures for mitigating light nuisance from offshore platforms; nature restoration within offshore windfarms. Prevent permanent physical effects in and disruptions of porpoises, seals and fish. Reduce impact on bird collision with offshore windfarms, nuisance through lighting for safety of seafarers. Create appropriate habitat for native species; establish safety zones during maintenance of cables and pipelines. <i>Logistic.</i> Noise norms during construction of offshore windfarms; noise budget during seismic research; limit porpoise disturbance days during offshore windfarm construction
Financial compensation	x	<i>Financial-administrative.</i> Marine recovery fund to mitigate negative effects of offshore wind. Military and civil radar mitigation measures for offshore windfarms, including sharing costs of funding.	<i>Financial-administrative.</i> Financial compensation when fisheries hurt by closure of fishing grounds cannot be relocated elsewhere.

TABLE 7 Overview of Institutional capacities per case.

	Denmark	England	The Netherlands
<i>Knowledge resources</i>	Digital, publicly available plan [DK-Doc6] with broad zoning due to uncertainties about future developments [DK-Int1]. Ongoing research aims to clarify environmental challenges [DK-Int2]. Site-specific data for OWE permitting may only be available after tender due to time constraints [DK-Int2].	Plan functions as a communication and negotiation tool, also through digital service and Technical Annexes [ENG-Doc8]. The plan's lack of spatial explicitness stem from knowledge gaps [ENG-Int1]. Authorities identify suitable OWE sites [ENG-Doc4; ENG-Doc6; ENG-Int2], but responsibility for data gathering principally lies with developers due to the vastness of marine area [ENG-Int1].	Plan acknowledges limited knowledge of the North Sea ecosystem [NL-Doc1; NL-Doc3] and future developments, e.g., hydrogen or multi-use [NL-Int3]. Commitments to research [NL-Doc1; NL-Doc3; NL-Int3], site surveys by authorities [NL-Doc10; NL-Int2], and expert involvement [NL-Int1] support government in determining mitigation measures for environmental effects of OWE [NL-Doc3], address allocation issues [NL-Int3], and set-up innovation subsidies [NL-Doc7; NL-Doc9].
<i>Relational resources</i>	The Danish Maritime Authority acts as a secretariat to facilitate coordination [DK-Int1; DK-Int2], final decisions are made by the involved Ministers [DK-Int1]. A variety of governmental actors [DK-Doc6] is involved in the planning process [DK-Doc8].	Multitude of actors complicates planning and OWE permitting [ENG-Doc12; ENG-Int1; ENG-Int2]. Unique position of Crown Estate as non-governmental actor with statutory obligations [ENG-Int2]. Stakeholder engagement is key to planning and permitting [ENG-Int1; ENG-Int2] to foster understanding and prevent conflicts [ENG-Int1].	Fragmented responsibilities in planning and permitting [NL-Doc3; NL-Int3] lead to a delay and patchwork of conflict resolution measures in <i>Plot Decisions</i> [NL-Int2]. The Ministerial Council makes final decisions on spatial conflicts [NL-Int3]. Intensive collaboration between authorities and industry [NL-Doc3; NL-Int1; NL-Int2].
<i>Mobilization capacities</i>	The plan is increasingly seen as a political tool [DK-Int1], complicating decision-making. Continuous collaboration between authorities enables early identification and management of conflicts [DK-Int2].	The lack of spatial guidance in the Marine Plan leads to a first-come-first-serve approach [ENG-Int1], allowing users to determine preferred locations [ENG-Doc8]. Increased spatial specificity would need strong stakeholder support and robust evidence [ENG-Int1].	Conflict resolution measures land within various existing frameworks [NL-Int3], e.g., Wind at Sea Act, Plot Decisions, marine spatial plan, or the <i>Afwegingskaders</i> [NL-Doc1; NL-Doc3; NL-Doc4].
<i>Institutional space</i>	Danish authorities may not grant licenses in conflict with the plan [DK-Doc6] or sectoral legislation [DK-Doc8], but the plan can be amended [DK-Int1; DK-Int2]. Urgency in OWE roll-out resulted in minimum criteria to minimize environmental effects, without guidance on <i>how</i> to do so [DK-Int2].	Non-spatially prescriptive plan outlines policies for accounting for other activities [ENG-Doc8]. Mitigation hierarchy requires permit applicants to determine conflict resolution measures themselves [ENG-Int1]. Decision-makers may deviate from the Plan's policies if relevant considerations indicate otherwise [ENG-Doc1; ENG-Doc2; ENG-Doc8].	Plan states need for adaptive planning for new developments [NL-Doc3], but OWE planning is detailed in spatial allocation from the start [NL-Int2]. Also, need for adaptive planning conflicts with predictability needed for the early decision-making on offshore grid development [NL-Int2; NL-Int3].

stating it makes allocating OWE areas and determining corresponding development requirements almost “a form of diplomacy” [NL-Int2].

Across cases, there is equal recognition of considerable knowledge gaps on the marine environment [DK-Int1; ENG-Int1; NL-Doc3], which differently shaped the respective plans (see Table 7). In Denmark, the open nature of the plan with large area reservations – which remain free to be used for other activities until the designated activity is developed – enables decision-makers to adjust the plan based upon emerging knowledge and become more specific further down the line in permitting and project development [DK-Int1]. In contrast, English policy-makers deal with their lack of robust spatial and environmental evidence base by developing non-spatially prescriptive plans and stipulating general conditions for development [ENG-Int1], under the general premise that developers are to determine preferred locations for activities themselves [ENG-Doc8]. All involved permitting authorities (i.e. the Crown Estate, the Marine Management Organisation, and the Planning Inspectorate) must make decisions in accordance with the plan “unless relevant considerations indicate otherwise” [ENG-Doc8, p.57]. In the Netherlands, the plan’s explicit recognition of a structural lack of knowledge has led to intensified efforts towards research and monitoring programs of the marine environment [NL-Doc3]. This scarcity of knowledge resources identified across cases may not only complicate the identification of where certain spatial conflicts may occur, it simultaneously can undermine the institutional capacities to deploy conflict resolution measures due to a lack of information on their effectiveness.

Above-mentioned mobilization capacities refer to those embedded in plan development processes, nevertheless, the knowledge and relational resources also affect permitting procedures. In both Denmark and the Netherlands, OWE permits are handled through a ‘one-stop-shop-approach’ in which the permitting authorities – i.e. respectively the Danish Energy Agency and the Netherlands Enterprise Agency – issue a standardized tender procedure in which developers place bids to develop pre-designated OWE zones. In England, the Crown Estate tailors the approach for each leasing round to broader areas in which OWE may be developed [ENG-Int2]. In all three cases, the permitting authorities responsible for granting right to the seabed conduct location-specific studies to identify environmental conditions, existing spatial claims, and potential other interests. Where the Dutch use this knowledge to specifically prescribe *how* to resolve project-specific spatial conflicts in permitting requirements – e.g., wind turbines must be paused during periods of bird trek – the Danish and English take a more open approach by stating which conflicts need to be addressed rather than specifying how [DK-Int2; ENG-Int2]. As such, Danish and English decision-makers rely more heavily on the knowledge and creativity of developers to address location-specific conflicts. In the Netherlands, sectoral interests and knowledge are considered in decision-making through an extensive collaboration between authorities and industry actors [NL-Doc3; NL-Int1; NL-Int2]. Regardless, all countries have established strict political targets for OWE and legal obligations on nature protection, which restrict the freedom of developers in determining and implementing novel measures at odds with existing priorities

[INT-Int1]. This already shows that market-driven approaches to conflict resolution can offer both benefits as well as pose risks, which is further discussed in Section 5.

In all cases, it was found that governmental responsibilities for plan development and OWE permitting are fragmented between various ministries and authorities (see Table 7). To illustrate, new OWE zones in the Netherlands are appointed in the marine spatial plan by the Ministry of Infrastructure and Water Management. The Plot Decisions – which include area-specific development requirements – are handled by the Ministry of Economic Affairs and Climate who relay part of the work to executive agency *Rijkswaterstaat*. Thereafter, the Netherlands Enterprise Agency takes care of the permitting procedure. Although these formal responsibilities are clearly demarcated and transparently communicated, the fragmentation of responsibilities does create a certain administrative congestion and potential delays to the formulation of Plot Decisions [NL-Int2]. A similar picture is observed in Denmark and England (see Table 7). This demonstrates that conflict resolution measures land within a wide variety of established legal and policy frameworks. On the one hand, this suggests a degree of institutionalization, supporting decision-makers to strategically leverage and mobilize resources for the adoption of conflict resolution measures. On the other hand, this multitude of sectoral frameworks may crowd the institutional space and requires all authorities and stakeholders to be aware of and be able to navigate them.

Given the aforementioned challenges in mobilizing knowledge and relational resources, it is important to consider how this may constrain or open up institutional space and, consequently, how this space offers decision-makers room to maneuver within established norms or procedures. As theorized in Section 2, the findings show that existing legal frameworks can restrict the institutional space and influence to what extent actors are able to mobilize existing knowledge or relational resources. Naturally, all countries are bound by existing sectoral legislation, in which additional requirements for dealing with spatial conflicts are embedded [DK-Doc8; ENG-Int1; NL-Int3]. Most importantly, it is the stringency and specificity of the individual plans that has implications for the way, shape and form in which measures are and can be adopted. The following three paragraphs scrutinize how the nature of the individual plans and permitting procedures shapes the institutional space to mobilize resources and adopt conflict resolution measures.

First, the Danish marine spatial plan designates extensive development zones for, among others, renewable energy and energy islands, but the reserved areas are intentionally larger than necessary to provide spatial flexibility. This need for spatial flexibility is underscored by a Danish policymaker stating: “I do not really understand if anyone can have a plan right now that is lasting more than two years” [DK-Int1]. Although broad zoning embeds considerable spatial flexibility within designated areas, it simultaneously imposes restrictions outside these areas. Specifically, for activities permitted within designated development zones, formal amendments to the plan are required for approval outside these zones [DK-Int1; DK-Int2]. Yet, as the plan is increasingly perceived as a political instrument, one Danish policymaker

acknowledges that changes to the plan have become more time- and resource-intensive, particularly because all involved ministries and authorities must agree upon proposed changes [DK-Int1]. This suggests that institutional space is restricted on a plan-level. Contrastingly, the political momentum behind the accelerated rollout of OWE actually expanded institutional space within OWE permitting procedures, offering decision-makers considerable freedom to streamline and standardize OWE permitting [DK-Int2].

Conversely, the English marine plan lacks spatial allocation, but grants decision-makers the discretion to decide how development proposals may or may not support the vision and objectives of the plan, or whether “imperative reasons of overriding public interests” exist [ENG-Doc8]. The broad conditions established in the plan, offer permit applicants considerable institutional space to determine how they will conform to these conditions, but equally grant decision-makers considerable institutional space in assessing permit applications. However, decision-makers lack the strategic guidance needed to effectively utilize this space, rendering it almost an institutional void. Namely, the results show that the English plan provides primarily project-specific, operational guidance for developers, rather than showing how conflicting spatial claims can be or are balanced upfront in a strategic and integrated manner. Moving away from this market-driven approach towards increased strategic spatial guidance seems unlikely in the future. The missing robust evidence base was positioned as the main argument for developing the marine plan without spatial reservations [ENG-Int1]. This suggests that any new governmental spatially specific guidance in the form of conflict resolution measures would require similarly robust evidence (see Table 7).

Interestingly, the Dutch marine spatial plan introduces a broad range of conflict resolution measures for decision-makers to balance interests and make trade-offs, but simultaneously recognizes the need for flexibility to “initiate, accept and realize new and innovative developments” [NL-Doc3]. This raises the question to what extent Dutch decision-makers can realistically make use of the institutional space expressed in the plan. Interviewees suggest that the institutional space for decision-makers is partly undermined by the large share of governmental ministries, departments and authorities involved in planning and permitting [NL-Int1; NL-Int2]. Namely, the complex governmental landscape may make it difficult for both governmental and non-governmental actors to oversee and collaborate with all involved departments and authorities, and for policy-makers specifically, to find consensus in decision-making. Further, the institutional space is hindered by the limited spatial flexibility in the plan. Although the plan is posed as broad in scope [NL-Int2; NL-Int3], OWE areas are appointed for pre-specified amounts of GWs and include limited spatial flexibility. Even if new spatial conflicts are identified during project development phases – e.g. resolved by slightly changing the outer borders of a zone – these zones cannot be deviated from [NL-Int2]. This suggests that institutional space exists mainly for adopting conflict resolution measures within permitting procedures that target physical-technical, financial, or logistic dimensions, and is

limitedly shaped at more strategic plan-levels as theorized in Section 2.

Overall, the findings show the institutional space to resolve emerging conflicts in novel ways is limitedly used across cases. This is particularly visible through the following (hypothetical) scenario. When policy-makers were asked how they would handle conflicting permitting applications for offshore activities – i.e. outside of the competitive (tender) procedures for OWE – they widely acknowledged that applications would be assessed on a first-come-first-serve, case-by-case basis [DK-Int2; ENG-Int1; NL-Int1]. No strategic guidance or legal framework was mentioned, that could support them in deviating from this approach and prioritize applications that may be strategically more desirable than the first one. This indicates that institutional space alone (i.e., a lack of strategic guidance or legal framework) is insufficient for decision-makers to act differently and may even function as an institutional void paralyzing decision-making. It further underlines the importance of having capacity to mobilize knowledge and relational resources within established norms and procedures to effectively utilize this institutional space.

5 Discussion

A diverse array of conflict resolution measures are adopted in Denmark, England and the Netherlands (see Table 3-6) indicative of the respective institutional capacities (see Table 7). Reflecting upon the results, two noteworthy observations emerge regarding the adopted approaches to conflict resolution: (1) they only limitedly enable a strategic balancing of trade-offs between spatial claims of sectoral activities and (2) they are primarily tailored to minimize or mitigate conflicts within permitting procedures.

First, although MSP literature points out that plans should enable a proactive relocation of displaced activities (see e.g., Bradshaw et al., 2018; Ehler and Douvère, 2009), adopted spatial reservation measures mainly help passively displace original spatial claims in lieu of newly planned activities. The English marine plan avoids spatial allocation entirely and only offers spatial guidance through conditional relocation policies. The Danish plan designates extensive development zones that, due to their size and overlapping designations, defer conflict resolution to future planning and permitting efforts. The Dutch plan offers a detailed allocation of OWE areas for predetermined amounts of GW and alludes to the opportunity to proactively appoint fishing grounds, suggesting comparatively more capacity to resolve spatial conflicts on a strategic level.

The results reveal that these differences in measures for strategic-level conflict resolution are, at least partly, prompted by the (perceived) spatial competition in the respective marine areas. The explicit recognition of spatial congestion by Dutch policy-makers forces them to make detailed decisions on spatial allocation and resolve spatial conflicts upfront, rather than waiting for conflicts to be resolved upon later stages of project development. In contrast, Danish and English policy-makers both perceive sufficient spatial flexibility and ‘empty space’ for dynamic

activities to move to different areas in case of spatial conflicts. Earlier research corroborates this observation, showing a concentration of spatial congestion in the Southern North Sea, while Northern areas (which include parts of English and Danish EEZ's) experience comparatively less pressure (Guşatu et al., 2020). The detailed support for multi- or co-use provided in the Netherlands, in contrast to the limited direction in Denmark and England (see Section 4.2), further underscores that (perceived) spatial congestion can spur the adoption of spatial conflict resolution measures.

The above argument of (perceived) spatial congestion may also explain the adoption of the broad 'transition fund' in the Netherlands. The Dutch recognize that not all activities and corresponding spatial demands can be accommodated through a strategic-level spatial allocation. The fund aims to streamline funding for all Dutch North Sea policy (see Spijkerboer, 2021) and enables decision-makers to target spatial conflicts not covered by existing (sectoral) funds. As such, it offers decision-makers institutional space to determine whether and how to compensate those adversely affected by the trade-offs, provided its relation to the nature, energy or food transition.

Across cases, the findings show that the strategic allocation of activities in marine spatial plans is further complicated by the fragmented responsibilities among ministries and authorities as well as a lack of spatial and environmental knowledge (see results in Table 7 and further explanation in Section 4.4; also confirming earlier research by Gill et al., 2018; Spijkerboer, 2021). More importantly, these challenges within relational and knowledge resources are found to constrain the institutional space which decision-makers may deploy for translating measures from the marine spatial plan into permitting procedures. As demonstrated in Section 4, the involvement of numerous authorities in Dutch OWE planning and permitting created a patchwork of measures for OWE-related conflict resolution and is even perceived as a diplomatic effort. This is not only challenging to navigate for both decision-makers and developers, but also offers limited flexibility and adaptability (i.e. institutional space) to make institutional changes. Moreover, considerable knowledge gaps contributed to the English marine plan lacking spatial allocations. Consequently, institutional space to adopt spatially explicit measures only emerge within project development phases. The above empirically substantiates our theorized connections between mobilization capacities and the concept of institutional space (see Section 2). Specifically, the results demonstrate that difficulties in mobilizing knowledge and relational resources can constrain the institutional space of decision-makers to implement new conflict resolution measures.

Second, the findings show a wide variety of minimization or mitigation measures adopted in OWE permitting procedures of England and the Netherlands (see Tables 5 and 6). The prominence of ecosystem-based conflict resolution measures offering project-specific guidance is unsurprising given the shared legal basis protecting the marine ecosystem on an international and European level. This includes, among others, the United Nations (1991), the EU Birds and Habitats Directives (Council Directive 92/43/EEC, 1992; Directive 2009/147/EC, 2009), the Marine Strategy

Framework Directive (Directive 2008/56/EC, 2008), and the MSP Directive (Directive 2014/89/EU, 2014).

These legal frameworks led Dutch policy-makers to adopt various measures stipulating how to mitigate or minimize the spatial conflict with specific habitats or species. Conversely, English OWE permitting procedures merely stipulate which conflicts need to be addressed rather than how. Due to the time constraints and political urgency to receive OWE targets, the Danish defer decision-making on which conflicts need to be addressed until the results of the Environmental Impact Assessments become available, even though they are conducted after the first permits are granted. As presented in Section 4.4, both English and Danish decision-makers rely quite heavily on the knowledge and creativity of the sector to find appropriate ways to address conflicts. Although developers are assumed to favor economically efficient measures over more expensive ones, adopting such market-driven approaches can offer opportunities to innovate and implement novel or creative conflict resolution measures unknown to or previously deemed infeasible by decision-makers.

However, having no clear requirements on minimum minimization or mitigation efforts risks that the interests of powerful actors – e.g., the offshore renewable energy sector within MSP processes (Spijkerboer et al., 2020; Kusters et al., 2023) – become subconsciously prioritized. This risk is particularly pronounced in situations of institutional voids, with recent research emphasizing the influential role of informal institutions in the absence of strong formal guidance, such as the aforementioned power relations (Hasan and Bondy, 2024). Similarly, the findings in the Danish and English contexts indicate that in cases of substantial institutional space without strategic guidance on its utilization, market-driven approaches become more prevalent. Subsequently, a question that emerges for decision-makers is to what extent it is appropriate to rely on developers to minimize and mitigate societally relevant spatial conflicts.

Throughout this paper, we repeatedly discuss the importance of institutional space to cope with unforeseen or unprecedented spatial conflicts. In doing so, we do not mean to argue that unlimited institutional space – i.e. an institutional void – is desirable for conflict resolution, especially in the current era of energy transition and large-scale roll-out of OWE. Although Salet (2018) argues that institutional voids may offer considerable institutional space for actors to experiment, low levels of institutionalization also hinder actors' ability to act strategically and seize opportunities, which eventually may even lead to inertia (Dorado, 2005; Hasan and Bondy, 2024). Along those lines, Spijkerboer (2022) demonstrates that some degree of institutionalization is crucial for creating effective institutional space. Our findings show that challenges in capacity to mobilize resources – i.e. large knowledge gaps and fragmented responsibilities – constrain the extent to which the institutional space can effectively be utilized for, in this case, conflict resolution (Section 4.4). Interestingly, although Section 2 theorized that institutional space could be more easily perceived and pursued on higher levels of abstraction (as based on Spijkerboer, 2022), these challenges in mobilization capacities seem to particularly affect how

decision-makers could pursue institutional space on plan-levels. For example, English decision-makers refer to the limited robust spatial evidence base as the main reason for deferring the uptake of spatial conflict resolution measures to project development. Moreover, the fragmentation of governmental responsibilities, recognized in Danish and Dutch cases, created confusion on who should pursue and take ownership of this institutional space on strategic levels, particularly when dealing with various sectoral maritime activities and corresponding authorities. This highlights that pursuing effective institutional space on strategic levels requires institutional guidance, particularly on ownership and shared knowledge bases.

Future research may deepen understanding on this relationship between mobilization capacities and institutional space, particularly regarding conditions contributing to effective institutional space supporting long-term and strategic decision-making versus the conditions contributing to an institutional void or overload. In addition, the role of financial support structures and legal frameworks in mobilizing resources can be further explored (as shown by e.g., [Grotenbreg and van Buuren, 2018](#); [Skill et al., 2024](#)), since this is only minimally addressed in the current study.

6 Conclusion

Overall, this paper demonstrates that spatial conflicts in the marine environment can be and are resolved, minimized and mitigated in a multitude of manners. Most importantly, the findings illustrate that conflict resolution within MSP goes beyond establishing spatial reservations in marine spatial plans (as asserted in early MSP literature, see [Calado et al., 2010](#); [Tuda et al., 2014](#)) and also involves measures stimulating multi- or co-use, promoting ecosystem-based planning and enabling financial compensation (see [Table 3](#)). Within permitting procedures, a wide variety of spatial, physical-technical, logistic, and financial conflict resolution measures are adopted to minimize or mitigate spatial conflicts on project-specific levels (see [Tables 4-6](#)).

The findings show that the adoption of these measures can be, at least partly, explained by the countries' institutional capacities. Across cases, a lack of spatial and environmental data and fragmented governmental responsibilities constrain the effective institutional space of decision-makers to adopt conflict resolution measures. On the one hand, these difficulties in resource mobilization contributed to a more market-driven approach to conflict resolution within English and Danish permitting procedures, by stating merely which conflicts need to be addressed whilst leaving room for developers to propose how. Conversely, Dutch permitting procedures specifically prescribe how to resolve specific conflicts in line with strategic priorities. Our analysis of institutional capacities does not fully explain these differences, which may also be shaped by national planning cultures and wider governance contexts (e.g., [Berisha et al., 2021](#); [Nadin et al., 2024](#)). This offers an interesting avenue for future research, particularly since such differences are likely to affect the increasing

sea basin-wide collaboration efforts, such as the [Greater North Sea Basin Initiative \(2023\)](#) or similar endeavors in the Baltic Sea and Atlantic.

The enormous foreseen growth of offshore renewable energy infrastructures towards 2050 coupled with the EU's ambition to protect 30% of marine habitats by 2030 ([European Commission, 2021](#)) necessitates that policy- and decision-makers continuously assess and carefully consider the inevitable trade-offs between spatial claims of maritime activities. Our results illustrate that large knowledge gaps and a fragmentation of governmental responsibilities pose barriers to the institutional space for conflict resolution within MSP practice. Scientists, policymakers and infrastructure developers are already working hard to close existing knowledge gaps through academic and applied research as well as offshore pilots and experiments. We wish to highlight two additional steps to move conflict resolution within MSP practice forward. First, this study demonstrates that conflict resolution does not end with the creation of a marine spatial plan; rather, efforts to resolve spatial conflicts are currently to a large degree deferred to permitting procedures and project development. To enable decision-makers to pursue the institutional space on the strategic level of marine spatial plans, the fragmentation of responsibilities within MSP and permitting should be addressed by clarifying and appointing one governmental authority, department or ministry who takes ownership and set the course for spatial conflict resolution on a strategic level. Centralizing decision-making can smoothen conflict resolution by facilitating discussions on trade-offs between maritime activities and bring together all sectoral considerations and individual measures, allowing a more proactive approach to conflict resolution. Second, given the inherently borderless nature of the sea and the plans for more internationally connected offshore energy systems, we applaud current initiatives for intensified international collaboration (such as the Greater North Sea Basin Initiative and the North Seas Energy Cooperation) and recommend them to proactively include spatial issues in their dialogues. Therein, it is vital importance to share insights into national policies and governance frameworks across borders and sectors, to enable greater international alignment in the forthcoming era of transboundary spatial conflicts.

Regardless of whether authorities have a comprehensive set of conflict resolution measures in place for permitting procedures, marine spatial plans should be regarded as critical instruments for the strategic and integrated management of the inevitable trade-offs between spatial demands of sectoral activities over the long-term.

Data availability statement

The datasets presented in this article are not readily available because the interviews contain sensitive and identifiable information on organizational routines and practices. No consent was given by the interviewees to share. A list of analyzed documents is included in the [Supplementary Materials](#). Requests to access the datasets should be directed to j.e.h.kusters@rug.nl.

Ethics statement

The studies involving humans were approved by Research Ethics Committee of the Faculty of Spatial Sciences, University of Groningen. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JK: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. Fv: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing. CZ: Conceptualization, Methodology, Supervision, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fmars.2025.1468734/full#supplementary-material>

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