



Delft University of Technology

## Navigating the North Sea Dilemmas

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# Navigating the North Sea Dilemmas

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# Navigating the North Sea Dilemmas

## Prologue

Wind energy is often faced with social opposition due to its impacts on landscape aesthetics and local identity. Offshore wind parks have been criticised due to their ecological impacts; bird mortality and impact on other species are among the often-listed negative impacts. There is a public demand to reflect on these impacts ethically. This brought Topsector Energy, through its Mission-Driven Innovation Programs (MMIPs) to the conclusion to open a call for formulating an ethical framework for assessing future wind parks, particularly considering their impacts on birds and other species. In October 2023, we successfully responded to this call by proposing a framework for mapping ethical dilemmas that arise in the development of offshore wind parks. This is an important first step towards systematic assessment of such wind parks.

Upon drafting the research proposal, our first observation was that we should broaden the lens of such ethical analysis. While ecological issues are certainly among the important ethical issues, a comprehensive ethical analysis needs to account for other important issues, such as energy security, affordability and justice. The flip side of this argument is that the North Sea ecosystem is impacted by various existing and future activities, including those related to energy transition like gas extraction, deep-sea mining, as well as fishing and other future activities. Indeed, the construction of wind farms is an additional challenge to limited space and brings ethical questions about how environmental benefits and burdens are weighted. However, an ethical analysis cannot only be narrowly focused on the wind parks.

A more fruitful approach would focus on how to preserve the biodiversity of the North Sea, considering the variety of different activities. This could help to assess the ethical desirability of each activity in relation to others, considering the cumulative effects of such activities. In this report, we provide the basic building blocks for such comprehensive ethical analysis in the future, in terms of relevant values at stake.

## Key findings and recommendations

- The ethics of offshore wind development in the North Sea must account for a broad set of ethical issues that go further than concerns regarding Dutch energy transition to include considerations of the cumulative impacts on the resilience of the North Sea and its ecosystems.
- The focus of ethical analysis should be shifted to the desirability of different activities in the North Sea, placing the North Sea and resilience of its ecosystems at the heart of the ethical scrutiny.
- Values provide important insights for understanding ethical issues and conflicts associated with the cumulative impacts on the North Sea and resilience of its ecosystems.
- Values could help (re)design Dutch Energy transition and institutions governing it.

## Abstract

In this report, we present a framework for mapping the ethical dilemmas that arise in the development of offshore wind parks in the North Sea. The development of new technologies, such as offshore wind parks, gives rise to ethical dilemmas. These dilemmas can be characterised in terms of conflicts between relevant values, which we identified through a review of the literature on the ethics of technology and through consultation with stakeholders. With the input of stakeholders, these values have then been systematically categorised so they can be interpreted in terms of ethical dilemmas.

Our analysis of the input from the stakeholder workshop reveals a deep concern for balancing the Dutch energy transition with the ecological preservation of the North Sea and its ecosystems. When identifying values, stakeholders noted that it is important that the energy transition is not considered in isolation from other pressures on the North Sea. This includes other significant energy-related developments, such as gas exploration and deep-sea mining in the North Sea. Stakeholders observed that the current EU regulations are not adequately addressing these cumulative pressures caused by wind farms, other activities in the North Sea, and the impact of climate change. Therefore, stakeholders believe that EU-level and Dutch-level regulations should reflect these complexities in a more ethically informed manner.

Our reflections also highlight the need for adaptive policies and institutions that would better reflect the complexities of cumulative pressures on the North Sea in a more ethically informed manner, accounting for evolving knowledge and values; the moral responsibilities not only of the Netherlands but also of other countries impacting the North Sea; and the long-term sustainability of energy infrastructure development. At its core, the output of the stakeholder workshop is not limited to the exploration of offshore wind energy but expands to questioning how to ensure that the Dutch energy transition contributes to climate goals without disproportionately harming the North Sea or creating new, unforeseen environmental and societal challenges. In other words, based on our analysis of the insights from the workshop, we can confirm that the question is broader than environmental concerns regarding, for instance, bird mortality. The executed study shows the necessity of understanding the relations between spatial, temporal, and environmental challenges. From this perspective, ethical issues exceed an isolated focus on the ecological impacts of offshore wind energy to signify the importance of ethical scrutiny of cumulative and interrelated effects of Dutch energy transition development on the North Sea. Our recommendations expand on a proposed integrated values-oriented research agenda for the Dutch energy transition.

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# 1. Introduction

The North Sea's ecosystems are under pressure from a range of human activities. Decades of unsustainable fishing has led to depleted fish populations (Greenstreet & Rogers, 2006) as well as harms to seabirds, mammals and seabed ecosystems (Gislason, 1994). The offshore oil and gas industry harmed biodiversity on the seabed (Chen et al., 2024) and caused far-reaching pollution of marine habitats, with oil found in the tissue of multiple fish species (Parker et al., 1990). In the 21<sup>st</sup> century, pressures on North Sea ecosystems are growing due to global warming (Moullec et al., 2021; Weinert et al., 2021) and ocean acidification (Guinotte & Fabry, 2008), caused by the burning of fossil fuels.

In this context, the clean energy transition appears as a necessary part of efforts to alleviate pressures on North Sea ecosystems. Producing energy from renewable sources will mitigate global warming and ocean acidification while simultaneously removing the need for further oil and gas extraction. A central part of the Netherlands' plans for the transition to clean energy is a large expansion of offshore energy generation in the North Sea. As outlined in *Missieprogramma 1: Hernieuwbare Elektriciteit op Zee*, the Netherlands needs to expand its offshore energy capacity from 4.7 GW in 2023 to 70 GW in 2050 to meet its goal of decarbonising energy systems. Scaling up offshore wind energy thus constitutes a core part of the Netherlands plans for reaching net zero by 2050 and meeting its commitments under the Paris Agreement and Dutch Climate Act (Matthijssen et al., 2018).

The *Missieprogramma* also sets out an aspiration to directly enhance the condition of marine ecosystems in the process of scaling up offshore energy, with a commitment to "improve the condition of underwater nature by at least 50%." This could be achieved through offshore energy infrastructure serving as artificial reefs (Degraer et al., 2020; Werner et al., 2024) and through the deployment of specific technologies designed to enhance marine ecosystems (Pardo et al., 2023).

Nevertheless, scaling up offshore energy is not without its trade-offs. Wind energy projects sometimes face social opposition (Verhoeven et al., 2022) and, in some contexts, have undesired side-effects, such as negative impacts on landscape aesthetics, local identity (Devine-Wright & Howes, 2010), bird mortality (Fox & Peterson, 2019; Van Kooten et al., 2019), and some ecosystem services (Hastik et al., 2015). In the Dutch context, there are also challenges due to spatial crowding (Overlegorgaan Fysieke Leefomgeving, 2020) and competing uses of the sea, such as shipping and fisheries (Steins et al., 2021). It is therefore necessary to study the potential for ethical dilemmas to arise in the context of the Netherlands' plans to scale up offshore energy.

This report aims to provide a structured framework for mapping ethical dilemmas arising in the development of offshore wind parks, particularly in the context of socio-technical and ecological complexities. While existing studies have explored the spatial and environmental challenges of the North Sea, they have largely overlooked the ethical

implications. Critical ethical issues arise from the ecological impacts of offshore wind energy, especially regarding endangered species and the cumulative effects of large-scale wind farms (Goodale & Milman, 2016). However, ethical issues are not limited by direct risks to birds and other species, as North Sea ecosystems are impacted by various industrial activities, including those related to energy transition like gas extraction and deep-sea mining (Matthijsen et al., 2018). Additionally, the construction of wind farms poses challenges due to limited space and how environmental benefits and burdens are distributed in combination with impacts from other energy transition activities.

Understanding ethical challenges as a nexus of socio-technical and ecological complexities is crucial for balancing the urgent need to mitigate climate change through the energy transition with potential risks that such wind farms might bring about. This report refers to such complexities, amounting to ethical dilemmas as “values.” In the next section, we elaborate on what the concept of value means and how a value-based approach could be important in better understanding the complexities. One important aspect here is normative uncertainties, or situations in which there are different ethically defensible ways of interpreting values. This occurs in complex societal discussions and certainly with respect to offshore wind parks. In this report, we try to make some of these normative uncertainties visible.

To examine the interrelated dynamics between societal, environmental, and technological factors, we propose a framework for mapping ethical dilemmas in the context of scaling up offshore wind energy. To establish this framework, we ran a stakeholder engagement workshop in which we gathered preliminary insights on what are the ethical dilemmas arising from offshore energy expansion in the North Sea.

The target audience for this report is a diverse range of stakeholders involved in the sustainable development of offshore energy in the North Sea. This includes industry players such as the wind energy sector, the maritime industry, sand mining companies, and defence organisations, all of which have an interest in mitigating the ecological impacts of their activities. Additionally, governmental bodies responsible for regulatory oversight and environmental protection are key stakeholders. These groups are integral to developing innovative solutions addressing the ecological and socio-technical challenges of scaling offshore renewable energy while protecting the North Sea’s environment. Collaboration between these stakeholders is essential to ensuring ecological preservation and sustainable practices in the North Sea, and this report is intended to facilitate such cross-sectoral collaboration.

## 2. Project Approach

### 2.1 A Framework for Mapping Ethical Dilemmas

Developing, implementing, and maintaining sustainable energy technologies, such as wind parks, requires numerous ethical decisions (Oosterlaken, 2015). For this, the Responsible Research and Innovation (RRI) approach can account for the ethical and social risks of new technologies (Von Schomberg, 2013). This approach entails that when a large-scale technological innovation is at stake, designers, engineers, and policymakers should consider, anticipate and, to the extent possible, navigate ethical dilemmas at stake (Van den Hoven, 2013). In the context of scaling up wind parks, a salient ethical dilemma is that, on the one hand, a fast and large-scale switch to renewable energy is crucial for combating climate change. On the other hand, wind parks pose threats to societal and economic activities, ecosystems, and non-human animals (Nolt, 2011; Donaldson & Kymlica, 2013; Tokarski & Gammon, 2017). There are indeed other ethical dilemmas that could play a role. An ethical assessment framework should account for different dilemmas in order to draw a full picture of the proposed technology (i.e. wind farms) against the backdrop of critical societal and ethical issues at stake.

The methodological approach followed in this project is as follows:

1. The development of new technologies, such as offshore wind parks, gives rise to ethical dilemmas;
2. These dilemmas can be characterised in terms of conflicts between relevant values, identified through a review of the literature on the ethics of technology and through consultation of stakeholders;
3. With the input of stakeholders, these values will then be systematically categorised so they can be interpreted in terms of ethical dilemmas;
4. With this grounded characterisation of the ethical dilemmas, we can come to design criteria, including technical design recommendations, institutional design, and future research.

This sequence of methodological steps is graphically represented in Figure 1.

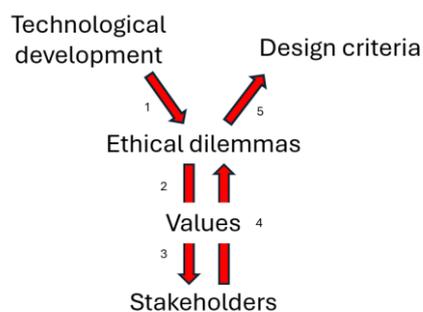


Figure 1. Methodological outline of the project

The role of stakeholder input in our methodology aligns with the starting point of RRI and other related approaches to exploring ways of navigating ethical dilemmas by collecting input through stakeholder engagement (Von Schomberg, 2013). For this, a range of methodological questions need to be posed, such as: Who are the relevant stakeholders? What is the best way to represent them? What are the relevant values in general and in each particular context? How are these values balanced in a situation of conflict, and how ought they to be balanced? Answering these questions becomes even more challenging when the ambition is to scale up wind projects, as this requires a long-term perspective which brings along considerations regarding future risks and potential uncertainties (Taebi, Kwakkel, Kermisch, 2020).

Ethical dilemmas can be represented as conflicts between relevant values or an internal conflict in one value (i.e. conceptions of values) (Melnyk, 2022). With the latter, we mean that people might have different understandings of the same value – e.g. what ‘sustainability’ means is subject to widespread debate. The implication of this is that we need to identify the values at stake in offshore wind development and subsequently identify how ethical dilemmas arise due to conflicts between different values, or between different concepts of the same value. This approach connects to previous work conducted by team members, which focused on the role of public values in the design of technologies (Taebi et al., 2014), with the aim of increasing their social acceptance and ethical acceptability. This value-focused approach to RRI has been successfully applied to study and navigate a broad range of topics in the energy sector, including shale gas (Dignum et al., 2016), nuclear energy (Taebi & Kloosterman, 2015), biofuels (Van de Poel, 2017), wind energy (Oosterlaken, 2015; Künneke et al., 2015), smart grids (Ligtvoet et al., 2015) and natural gas infrastructures (Mouter et al., 2018). Most of these studies have focused on values like public safety, security, transparency and trust between stakeholders, as well as issues of distributive and procedural justice. Issues of justice arise both with respect to present people (“intragenerational justice”) or with respect to future people (“intergenerational justice”).

Current research, therefore, mainly focuses on what is called anthropocentric or human-centred ethics. In this project, we broaden these anthropocentric ethical concerns with non-anthropocentric concerns associated with concerns beyond human interest (e.g., Nolt, 2011). The development, maintenance, and replacement will have an impact on the ecosystem of the North Sea. At the same time, offshore wind farms may also support new marine habitats for some species (Galparsoro et al., 2022). Could positive ecological impacts (at least partly) counterbalance adverse outcomes? Or, if offshore wind park developments turn out to put destabilising pressure on ecosystems, threaten vulnerable species, or violate habitat directives, should these projects be discontinued despite their urgent need?

## 2.2 Design for Sustainability

To deal with these issues, we take inspiration from the Design for Sustainability approach developed by Van de Poel (2017). This approach highlights the need to account for the

triangular nature of value relations between intergenerational justice, intragenerational justice, and care for nature in the design of sociotechnical systems (*Figure 2*), as all three dimensions contribute to the notion of sustainability. This approach is, therefore, an integrated approach that emphasises the complex interplay of multilevel concerns that are important for understanding the value of sustainability. It allows for the identification and categorisation of the range of values that are considered to be relevant in the case of large-scale offshore wind farm development. By then plotting stakeholder values within the diagram, (possible) conflicts between values become apparent.



*Figure 2. Design for Sustainability framework (Van de Poel, 2017).*

### 2.3 Stakeholder Engagement Workshop

We organised a four-hour stakeholder engagement workshop to gain empirical insights into relevant values and ethical dilemmas regarding offshore wind energy. In this, a stakeholder can be seen as any person, a citizen or entity who can influence or inform the options for action within the project design and/or the eventual consequences of the options taken or anyone who may suffer or profit from these consequences. Thus, direct and indirect stakeholders can be identified and placed differently within the continuum of high-influence actors who have the power of decision-making and impacted groups or entities.

The selection procedure was guided by four relevant stakeholder categories: impacted group, decision-makers, developers, and academics. Stakeholders represented different interest groups such as fisheries, offshore wind project innovators, representatives of ministries, representatives of the oil and gas transition industries, academics, artists representing the North Sea, and others. We intentionally included stakeholders who represent different interest groups during our selection procedure. We explicitly held diverging perspectives regarding the pathways and degrees of plausible development in offshore wind energy. We approached an extensive list of potential stakeholders, of which 17 attended the workshop.

To provide granularity in understanding the ethical dilemmas of offshore wind energy and apply the ethical framework to extract more in-depth insight, in addition to researching scholarly research about offshore wind energy, we collected and systematised empirical input by deploying the Design for Sustainability (Van de Poel, 2017). Moreover, we engaged with what can be seen as ‘moral deliberation’, asking stakeholders to articulate and reflect on values explicitly. The combination of approaches allowed us to create a broad overview of ethical dilemmas pertaining to decisions regarding scaling up offshore wind park projects in the North Sea. It provides: i) a rich and multi-faceted account of what stakeholders find important regarding these decisions; ii) discloses the tensions in what stakeholders find important; and iii) allows these findings to be set in a sound ethical background that includes both anthropocentric and non-anthropocentric considerations.

We carried out stakeholder engagement and invited stakeholder representatives of at least the following groups: wind farm developers, NGOs, ministries, TKI offshore energy, NWEA, and the North Sea Agreement secretariat. We discussed convictions, perspectives, values, and value conflicts during the workshop. Three explorative questions facilitated the workshop discussion:

*Q1 What ethical dilemmas come to mind regarding offshore wind energy development in the North Sea?*

*Q2 What values are at stake in these dilemmas?*

*Q3 Are there conflicts, values, or issues that have not yet been addressed? (Is there anything you feel is missing?)*

Team members then analysed the transcripts from the workshop and classified participants’ remarks according to (a) which overarching values their contributions appealed to and (b) which conflicts and/or dilemmas between different values their contributions explicitly identified. Although there are many ways of understanding values in academic scholarship (Steinert, 2023), in this project, we derived an understanding of values based on input from the stakeholder engagement meeting. We took a bottom-up approach with an open-ended perspective on values identified and endorsed by stakeholders. This way, in this report’s analysis and results section, we present our interpretation of values identified during the stakeholder engagement meeting.

To navigate the ethical dilemmas and normative discussion, we engaged in moral deliberation based on the emotional deliberation method developed by team member Udo Pesch and colleague Sabine Roeser (Roeser & Pesch, 2016). This approach aims to elicit various values underlying stakeholders’ opinions and arguments regarding a controversial technological development to map both “inter-value” and “intra-value” conflicts. The approach involves (a) explicitly calling on stakeholders to identify the values they think are relevant to the issue and (b) analysing the text of stakeholders’ contributions to identify evaluative priorities latent in their claims and arguments.

The first advantage of this method is that it takes the positions of all stakeholders and citizens seriously, which is an essential component of responsible decision-making and often facilitates public acceptance of decisions (Pesch et al., 2017). Second, the approach may reveal new approaches to the project's design, which could avoid or lessen the conflict between different values (Van den Hoven et al., 2012). At the same time, it is acknowledged that there will be cases in which the approach illuminates the moral weight of competing considerations but fails to provide a clear way forward; in such cases, we will turn back to other tools for approaching value conflicts (Melnik, 2022).

We consider this method particularly helpful in combination with the Design for Values approach applied to discussions on the development of wind parks in the North Sea, as such development has given rise to social contestation, with some parties, such as fishermen and tourist representatives, being deeply dissatisfied with current decision-making processes (Geukes et al., 2021).

## 2.4 Data Management

During the workshop, our research team took notes that resulted in the input for this report. All personal information of participants of the workshop was anonymised, and data was collected, handled, processed and stored according to GDPR. Every stakeholder signed an informed consent form after being informed about confidentiality, data collection and storage. The data management approach to this study was reviewed and approved by the Human Research Ethics Committee (HREC) at TU Delft.

## 3. Analysis and Results

### 3.1 Ethical Dilemmas Identified by Stakeholders

In order to engage in a discussion about relevant values, we first mapped ethical dilemmas that are important in scaling up offshore wind development. When identifying ethical dilemmas, the complexity of the issues of climate mitigation and renewable energy transition and the importance of the continuous dialogue regarding the benefits and challenges of offshore wind energy with the costs of environmental impact came to the forefront. The discussion in the stakeholder workshop on ethical dilemmas related to offshore wind energy touches on several environmental concerns and broader implications for sustainability and ecological balance. Following our ethical assessment framework, the ethical dilemmas that stakeholders identify relate to care for nature, intragenerational justice, and intergenerational justice and emerge at the crossroads between these.

The most recurrently discussed ethical dilemma was the dilemma between **climate mitigation efforts and environmental impacts**. Workshop participants emphasised that the concern about offshore wind farms could displace marine life and disrupt natural habitats, raising the question of whether human intervention should prioritise renewable energy development over ecological preservation. This ethical dilemma was raised several times during the stakeholder engagement process; however, stakeholders suggested that this should not be seen as a dilemma as it is not isolated from other socio-technical (other pressures from technological activities) and environmental concerns (impacts of climate change). Another critical concern was raised regarding the impact of offshore wind farms on bird populations. Stakeholders weighed concerns regarding bird mortality from offshore wind farms against the broader impact of climate change on bird population decline. Stakeholders referred to this challenge to showcase the complexity of balancing short-term ecological disruptions with long-term environmental benefits from mitigating climate change. Some participants suggested that the debate over whether offshore wind energy should take precedence over other uses of the North Sea, like fishing or ecosystem preservation, reflects a broader tension between environmental protection and energy needs and how to weigh the different ecological impacts with each other (warming sea waters vs. wind parks, etc.). There is also an underlying question of how much ecological harm society is willing to accept to achieve renewable energy targets. This question was raised by stakeholders multiple times in a thought-provoking manner.

The **precautionary principle** was discussed several times, especially in relation to how wind energy development might prioritise climate goals at the expense of protecting marine biodiversity. Some participants mentioned the inconsistent application of this principle, which was applied rigorously for some activities like fishing but less so for energy development. In relation to that, it was also emphasised that the urgency of the current situation is framed inconsistently when compared to the COVID-19 pandemic times, for instance, highlighting differences in how crises are addressed. Furthermore,

participants noted the gaps in knowledge about the North Sea's ecology and the importance of reflecting uncertainties. They questioned how decision-makers can responsibly balance current needs with future uncertainties regarding the long-term ecological consequences of offshore wind farms. This aligns with the concept of "lock-ins," where policies made with limited knowledge today could have irreversible negative impacts on ecosystems in the future.

Other ethical dilemmas were raised regarding **long-term versus short-term** benefits and burdens on the **global and local** levels. Workshop participants expressed concern about the ecological effects of offshore wind energy in the North Sea and the environmental and human costs associated with sourcing the materials required for wind turbines from regions like China and the DRC. This highlights the global nature of environmental challenges and the need for holistic, lifecycle-based wind energy assessments. Participants voiced concern about the long-term ecological costs of offshore wind farms, including recycling challenges for materials like turbine blades and the need to balance energy efficiency with resource use. This highlights the tension between technological innovation and environmental sustainability.

Furthermore, the workshop participants also discussed the inherent trade-offs in environmental policy. One example is comparing the ecological impact of wind energy and traditional energy sources like fossil fuels. Offshore wind energy, while seen as necessary for mitigating climate change, raises ethical questions about its impact on marine ecosystems and global resource use. The dialogue also emphasised the emergence of sustainability, noting how ecological responsibility and environmental concern have evolved over the past decades. The discussions reflect a desire to avoid repeating past mistakes, like those made during earlier industrial developments (e.g., chemical waste dumping in the North Sea).

During the discussions regarding ethical dilemmas, stakeholders were explicit that no opinions are black or white and that there should be more room to deliberate regarding ethically plausible approaches to scaling up offshore wind energy and plausible conditions under which this approach would meet criteria for social acceptance and ethical acceptability. Although a limited number of stakeholders participated in the workshop, based on their input, it is possible to indicate a broad acknowledgement of ethical dilemmas that are currently not satisfactorily covered in institutional decision-making patterns. The input generated by stakeholders provided a basis for the next step, where stakeholders were invited to zoom in on specific values and value considerations relevant to the decision-making. Therefore, this input contextualises our analysis of values relevant to scaling up offshore wind energy in the North Sea.

### 3.2 Relevant Values

After discussing various ethical dilemmas, we set up a context for further explorative questions about relevant values. Stakeholders explicitly identified a wide range of values in the context of scaling up offshore wind energy in the North Sea. Values were typically presented within evaluative statements regarding the question of what is important or meaningful (see Table 1). Specific values were described through deliberation, including

sustainability, equity, resilience, and frugality. Some of these values were mentioned in the context of value conflicts, where these conflicts helped stakeholders elicit these values. A critical remark is that stakeholders relate differently to different conceptualisations of values; in our analysis, we commit to open interpretations of values and thus did not bring our scholarly definition of values. Participants recognised that balancing these values in decision-making is complex, especially when addressing large-scale dilemmas such as climate change and biodiversity loss. While some participants emphasised prioritising climate action, others argue for a more nuanced approach considering broader ecological and social consequences.

*Table 10. Relevant values and value conflicts identified during the stakeholder workshop*

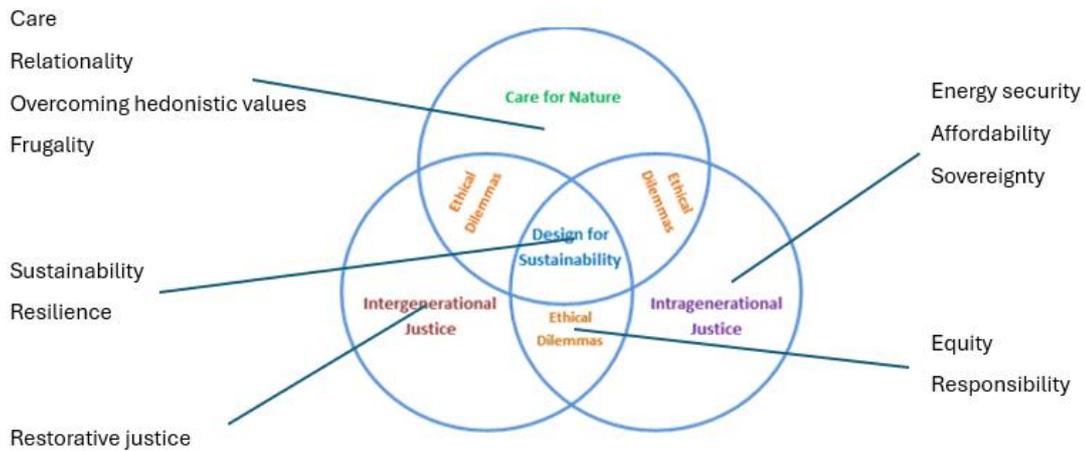
Value	Context
<b>Sustainability</b>	Sustainability was a central value discussed in relation to the broader goal of renewable energy and climate change mitigation. However, it raised ethical concerns when balanced against other values such as equity, affordability, and biodiversity. Sustainability was portrayed as a double-edged sword: while crucial for addressing the climate crisis, its implementation often requires trade-offs, particularly when it negatively impacts affordability and equity or when the focus on sustainability leads to harming biodiversity.
<b>Energy Security</b>	Security, particularly energy security, was discussed as a value that must be balanced with sustainability. Participants expressed concern over the energy transition's potential to create new security risks domestically (e.g., ensuring reliable energy access) and internationally. The tension between securing energy resources and ensuring sustainable production was a core ethical dilemma.
<b>Distributive justice</b>	Justice was considered both within the current generation (intragenerational justice) and across generations (intergenerational justice). It appeared in the context of ensuring that the benefits and burdens of environmental interventions, such as renewable energy projects, are distributed fairly. Equity was intertwined with the discussion of sustainability, as there was concern that prioritising sustainability over other values could exacerbate inequalities and marginalise specific populations.
<b>Affordability</b>	Affordability was a significant concern when discussing renewable energy interventions. The discussions underscored that if sustainability measures, such as wind energy, compromise affordability, they risk undermining public support, leading to further ethical dilemmas between short-term economic concerns and long-term environmental goals. The challenge was to ensure that sustainability is economically accessible to all.
<b>Care (nature)</b>	Care for nature was highlighted as a moral imperative in the discussions, emphasising the need to not only care for human well-being but also to extend this care to the broader ecosystem. The tension between caring for the environment and pursuing human-centric development (e.g., energy production) exemplified the difficulty of balancing ecological protection with economic and social goals. Care as a value also intersected with discussions about responsibility toward future generations.

<b>Overcoming hedonistic values</b>	Hedonistic values were discussed critically in relation to consumerist lifestyles and their contribution to environmental degradation. Participants recognised that many individuals prioritise comfort and convenience (e.g., using energy-intensive technology) at the expense of sustainability, creating value conflicts between personal lifestyle choices and broader environmental responsibilities. These values were seen as obstacles to achieving a more sustainable society.
<b>Care and relationality</b>	Connectedness was examined through the lens of globalised lifestyles (e.g., digital connectedness) and their environmental implications. There was an ethical tension between the benefits of global connectivity (e.g., communication, travel) and its environmental cost (e.g., energy consumption, carbon footprint). Balancing the value of connectedness with sustainability was presented as a complex issue.
<b>Sovereignty</b>	Sovereignty was discussed in relation to national and local self-determination, particularly in strategic decisions about energy production and consumption. There were concerns about the loss of autonomy in favour of globalised economic and environmental systems and the ethical implications of relying on foreign energy sources.
<b>Resilience</b>	Resilience was valued as a key consideration for designing environmental interventions that can adapt to future uncertainties, such as climate change or energy shortages. Participants emphasised the importance of ensuring that offshore energy systems are resilient enough to withstand shocks and remain functional in the long term. This value was linked to sustainability and security, reflecting the desire for robust and adaptable solutions.
<b>Frugality</b>	Frugality was suggested as a response to consumerist excesses and environmental degradation. It was discussed in relation to reducing consumption and living more simply as a way to support sustainability efforts. Frugality was positioned as a counterbalance to hedonistic values, advocating for restraint in resource use to protect future ecological and social welfare.
<b>Responsibility</b>	Responsibility was discussed in the context of both individual and collective obligations toward the environment and future generations. It was linked to caring for nature, ensuring equity, and supporting sustainable development. Participants stressed the need to take responsibility for human activities' environmental and social impacts, particularly in the context of large-scale energy transitions and ecological interventions.

<p><b>Restorative Justice</b></p>	<p>Restorative justice was discussed as an ethical framework for addressing the historical damage caused by industries and other large-scale interventions. It was suggested that before embarking on new projects, efforts should be made to repair past environmental harm. This value also emphasises the need for fairness in how the burdens and benefits of environmental interventions are distributed, particularly concerning vulnerable communities and ecosystems.</p>
<p><b>Recognition Justice</b></p>	<p>Stakeholders indicated that historically, the North Sea has played a crucial role in the identity of fisheries, and therefore, the impact of developments in the North Sea on fishermen’s identity and the well-being of the North Sea should be better recognised. Stakeholders suggested that the ecological impact assessment should thus not be limited to the Netherlands alone, as multiple countries share the North Sea. This implies that developments in neighbouring countries should also be considered ethically relevant, and more recognition of the North Sea and groups whose identity is inextricably interwoven with it should be granted in the decision-making process. At the same time, some stakeholders raised a challenge regarding how the North Sea can be represented in such a decision-making process.</p>
<p><b>Epistemic Justice</b></p>	<p>Stakeholders emphasised the importance of questioning the standpoint from which values are assessed—whether they pertain to people, nature, or the economy. For example, questions like how important climate is in the cost of biodiversity loss should be asked more often. Furthermore, some stakeholders advocated for perspectives that extend beyond the Western viewpoint to offer a more global understanding. They emphasised concerns about the dangers of using technocratic and anthropocentric language when discussing the North Sea, which may overshadow ecological concerns.</p>

By employing the Design for Sustainability approach, we gained insights into values and value conflicts relevant to scaling up offshore wind parks in the North Sea. This approach enabled us to identify numerous values, including those that may conflict at the intersections of different compounded values essential to sustainability (Figure 3). These are values related to the care for nature, intragenerational justice, and intergenerational justice, and value conflicts between these. Executing such analysis helps us understand possible hard choices that can arise. This approach allows us to include a wide range of stakeholders and entities as potential beneficiaries or carrying the burdens of scaling up offshore wind parks. At the same time, we don’t argue that all dilemmas would be visible within this graph, but that it is a helpful approach to better understand the most prominent dilemmas in offshore wind energy development in the North Sea.

Figure 3. Values in offshore wind energy and Design for Sustainability.



### 3.3 Conclusions

Our analysis of the input from the stakeholder workshop reveals a deep concern for balancing the Dutch energy transition with the ecological preservation of the North Sea. When identifying values, stakeholders noted that it is important that the energy transition is not considered in isolation from other pressures on the North Sea. This includes other significant energy-related developments, such as gas exploration and deep-sea mining in the North Sea. Stakeholders pinpointed that the current EU regulations are not adequately addressing these cumulative pressures caused by wind farms, other activities in the North Sea, and the impact of climate change. Therefore, stakeholders believe that EU-level and Dutch-level regulations should reflect these complexities in a more ethically informed manner.

Our reflections also highlight the need for adaptive policies and institutions that would better reflect the complexities of cumulative pressures in a more ethically informed manner, accounting for evolving knowledge and values, moral responsibilities of not just the Netherlands but different countries, and the long-term sustainability of energy infrastructure development. At its core, the output of the stakeholder workshop is not limited to the exploration of offshore wind energy but expands to questioning how to ensure that the Dutch energy transition contributes to climate goals without disproportionately harming the North Sea or creating new, unforeseen environmental and societal challenges. In other words, based on our analysis of the insights from the workshop, we can confirm that the question is broader than environmental concerns regarding, for instance, bird mortality. The executed study shows the necessity of understanding the relations between spatial, temporal, and environmental challenges. From this perspective, ethical issues exceed an isolated focus on the ecological impacts of offshore wind energy to signify the importance of ethical scrutiny of cumulative and interrelated effects of Dutch energy transition development on the North Sea. Our recommendations expand on a proposed integrated values-oriented research agenda for the Dutch energy transition.

## 4. Recommendations

This report aimed to provide a structured framework for mapping the values at stake in offshore wind development in the North Sea, particularly in the context of existing socio-technical and ecological complexities. This is an important first step towards systematic assessment of offshore wind. **Further conceptual and empirical research** is recommended to draw more systematic guidance for ethical decision-making in the context of Dutch energy transition and its direct and indirect cumulative impacts on the resilience of the North Sea over time. The energy transition requires the retooling of existing socio-technical systems to align with social and environmental values, national strategic aims, and existing national and international legal frameworks. The interrelated dynamics of technological, social and environmental factors require that the energy transition is seen as a complex, multilevel socio-technical process of change that involves multiple stakeholders and that has direct and indirect impacts on the environment. As such, we recommend the development of a **broader, integrated, values-oriented research agenda** that explores the relevant technological, social, ethical, and environmental values in an integrated perspective on the Dutch energy transition of which the resilience of the North Sea is an intrinsic part. This agenda prevents conclusions being drawn based on a narrow, siloed understanding of complex and multifaceted phenomena such as the Dutch energy transition in the North Sea and places an emphasis on the well-being of the North Sea as a historical placeholder of these activities. We elaborate on points of our suggested research agenda below by proposing the following questions for future research.

### Question 1 - How can the values associated with the North Sea be mapped?

- *Addressing Q1 should focus on the resilience of the North Sea, against the backdrop of broader ethical issues, raised by all human activities accumulated over time.*

Our study reveals the importance and fruitfulness of examining the role of ethical values as a normative foundation for decision-making. We have seen from the stakeholder engagement workshop that an array of key values surfaced, and this workshop showed the stakeholders' adeptness at value-focused discussions and interest in bringing out points of tension and possible conflicts. We identified fundamental values meriting greater investigation in the context of the Dutch energy transition in the North Sea. We propose further research around the following values: sustainability, care for nature, and environmental justice in the context of the resilience of the North Sea. More research on stakeholders' standpoints regarding instrumental, intrinsic, and relational environmental values and their interplay with other relevant values (e.g., justice, equity) is needed. We advise an expansion of the concluded project by involving more stakeholders and inviting collaboration and discussion between stakeholders in the form of moral deliberation processes. Furthermore, as the challenge at stake involves balancing generational demands made on nonhuman nature, the limitations of representing nonhuman nature,

past and future generations in stakeholder engagement processes deserve much greater attention.

Thus, our recommendation for the future stakeholder engagement is to pay careful attention to the forms of representation, in particular, representation of non-human entities such as the North Sea and past and future generations.

### **Question 2 – How can normative uncertainties around ethical issues of resilience of the North Sea be addressed?**

- *Exploring Q2 could improve decision-making for the Dutch energy transition as an important activity in the North Sea.*

Navigating ethical dilemmas in the Dutch energy transition in the North Sea requires systematically exploring value conflicts evoked by technological risks. Particularly relevant are considerations regarding normative uncertainties, as when assessing the ethical plausibility of technological risks, there may be no clear-cut yes or no answer regarding the governance of technological risks (Taebi et al., 2020). In other words, in situations of value conflicts, there may be more than one morally defensible course of action, which makes navigating these conflicts problematic. Furthermore, as research in the ethics of technology shows, values are not static and may change over time, resulting in social, institutional and technological implications (Van de Poel, 2021; Van de Poel & Taebi, 2022; Melnyk, 2022). What new conceptions, or altogether novel values, are emerging, and how do these alter existing and interrelating societal, environmental, and technological dynamics? Value change is a particularly relevant challenge in the context of energy transition in general and governance of Dutch energy transition in particular (Correlje et al., 2022; Melnyk et al., 2023). Dealing with value change requires more research into governance under normative uncertainties in the context of the Dutch energy transition in the North Sea. For future research, we propose further conceptual and empirical development of the proposed integrated values-oriented agenda to explore how to navigate ethical dilemmas in a morally defensible way and under which conditions decision-makers can (and should) cope with the normative uncertainties. Stakeholder engagement is essential in these explorations; we suggest an anticipatory approach such as moral scenarios exploration for examining normative uncertainties induced by value change and value conflict in the Dutch energy transition in the North Sea. Future research into normative uncertainties should also involve ethical reflection on the long-term interplay of existing legal frameworks and underlying values at national and EU levels (e.g. the Council Directive 2009/147/EC on the conservation of wild birds) as applied to underlying values important for stakeholders in the context of the Dutch energy transition.

### **Question 3 - How should the Dutch energy transition and institutions governing it be (re)designed to support the resilience of the North Sea?**

- *Insights into Q3 could facilitate critical reflection on the existing institutional landscape so to allow for the inclusion of ecological concerns, particularly those related to the North Sea, in decision-making.*

A better understanding of the role that values play in the context of the Dutch energy transition in the North Sea is important for ethically informed decision-making regarding the scaling up and co-existence of these systems. By actively embedding these values in energy systems and the institutions governing them (Pesch 2024), the energy transition can be designed, assessed and governed in a more inclusive and responsible manner.

Building on the findings of the preceding questions, a key area of future research<sub>1</sub> will thus be to (re)design institutions with the power to shape choices regarding Dutch offshore wind that are capable of giving future generations and nonhuman lifeforms their due weight. The Design for Values approach might be used in designing these institutions placed within socio-technical systems as a means of translating general values and norms into concrete design requirements (Van de Poel, 2013) as well as conclusions about institutional design (Miller 2015).

Institutional approaches to be considered could include citizens' assemblies (Warren & Pearce, 2008); ethics review panels (Morton, 2022), analogous to those used in medical ethics; and declarations containing substantive ethical principles (Gardiner & Fragnière, 2018). It may also be the case that totally new institutional arrangements are needed in order to navigate the dilemmas identified in this report and reach ethically acceptable decisions in the context of the scaling up of offshore wind. Philosophers and political theorists have argued that ethically appropriate governance is particularly hard to achieve in contexts where many of the impacts are borne by future generations and nonhuman lifeforms (Jamieson, 1992; Gardiner, 2011). This is because future generations and nonhuman lifeforms are incapable of exerting influence through standard forms of political representation, meaning that innovative institutional arrangements are needed to ensure that the interests of these "silent stakeholders" are given ethically appropriate weight in decision-making.

The further development of this research agenda will allow for decision-making processes regarding offshore wind parks that are more inclusive and responsible. This will increase societal acceptance and ethical acceptability of the decisions that are eventually taken, effectively contributing to the ongoing progress of the energy transition.

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