Ocean-based Negative Emission Technologies

OCEAN NETs

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Author(s)	Lina Röschel & Barbara Neumann
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Abstract:
This deliverable provides a summary of a two-day expert workshop conducted in hybrid format. The workshop's primary objective was aimed towards identifying future opportunities within the global ocean governance regime to strengthen governance of ocean-based NETs in a comprehensive manner. The workshop was organised by the Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS) as part of the work of Task 2.2 of the OceanNETs project. This deliverable follows a first online workshop (see Deliverable 2.3) that identified challenges within the current governance framework for ocean-based NETs. The second workshop consisted of breakout groups and plenary discussions designed to explore scenarios that reflect on identified governance challenges within the current and potential future global ocean governance regimes. Participants were asked to reflect on the concept of „good governance" and develop responses to the scenarios presented through specific prompts. They were encouraged to actively contribute to discussions that aimed to advance our understanding of the future governance of ocean-based NETs.

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List of abbreviations, acronyms and definitions

ABMT	Area-based management tool
ABNJ	Areas beyond national jurisdiction
BBNJ	Biodiversity beyond national jurisdiction
CBD	Convention on Biological Diversity
CDR	Carbon dioxide removal
COP	Conference of the Parties
CO_2	Carbon dioxide
DSM	Deep-seabed mining
EEZ	Exclusive economic zone
EIA	Environmental impact assessment
EU	European Union
GDP	Gross domestic product
GEF	Global Environmental Facility
GHG	Greenhouse gas
IGO	Intergovernmental Organizations
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature
LC/LP	London Convention and Protocol on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
MPA	Marine protected area
MSP	Marine spatial planning
NET	Negative emissions technology
NGO	Non-governmental organization
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
RFMO	Regional fisheries management organizations
RIFS	Research Institute for Sustainability – Helmholtz Centre Potsdam
SDG	Sustainable Development Goal
SEA	Strategic environmental assessment
STB	Scientific and Technical Body
UNEA	United Nations Environment Assembly
UNFCCC	United Nations Framework Convention on Climate Change
WP	Work Package

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1. Introduction

1.1 Context

OceanNETs is a European Union project funded by the Commission's Horizon 2020 program under the topic of Negative emissions and land-use based mitigation assessment (LC-CLA-02-2019), coordinated by GEOMAR Helmholtz Centre for Ocean Research Kiel (GEOMAR), Germany.

OceanNETs responds to the societal need to rapidly provide a scientifically rigorous and comprehensive assessment of negative emission technologies (NETs). The project focuses on analysing and quantifying the environmental, social, and political feasibility and impacts of ocean-based NETs. OceanNETs will close fundamental knowledge gaps on specific ocean-based NETs and provide more in-depth investigations of NETs that have already been suggested to have a high carbon dioxide removal (CDR) potential, levels of sustainability, or potential co-benefits. It will identify to what extent, and how, ocean-based NETs can play a role in keeping climate change within the limits set by the Paris Agreement.

1.2 Purpose and scope of the deliverable

OceanNETs work package 2 (WP2) "Governance, policy and international law" addresses the public and governance responses to ocean-based NETs. Task 2.2 of WP2 specifically focuses on the global ocean governance framework surrounding ocean-based NETs and investigates responses, challenges, and opportunities on the regional to international level for governing ocean-based NETs. The work involves identifying key barriers and synergies for ocean-based NETs within current and possible future ocean governance regimes and deriving recommendations for "good governance" of ocean-based NETs. The results of a governance framework analysis on ocean-based Negative Emission Technologies (NETs), conducted by Röschel and Neumann (2023), lay the groundwork for recognizing the primary regional and global challenges in ocean governance. This analysis was carried out within the initial eighteen months of Task 2.2's research program. It aims to establish a foundation for achieving comprehensive and effective governance of the proposed technologies.

The results from this workshop will feed into the further research process of Task 2.2 which ultimately aims to develop insights for EU and global policy makers on how governance could respond to persisting challenges identified for both ocean-based NETs and the governance framework in place. Task 2.2 hereby sets a focus on the global ocean governance framework and the related challenges, gaps and opportunities towards governance of ocean-based NETs.

1.3 Relation to other deliverables

The second workshop of Task 2.2 directly builds upon the challenges for good governance discussed within the first workshop held in May 2022. The results of the Task 2.2 workshop 2 will feed directly into Task 2.2's Deliverable 2.5 "Report on regional and global governance challenges and opportunities for emerging ocean-based NETs" as well as Deliverable 2.6 "Policy brief identifying challenges and opportunities for emerging ocean-based NETs in regional and global ocean governance frameworks" that will be tailored to EU and global policymakers. Furthermore, the identified knowledge and expertise from the second workshop will deliver input for further research conducted in Task 2.2, including the preparation and conducting of expert interviews and a survey.

2. Future Governance of Ocean-based Negative Emissions Technologies (NETs): A Scenario Workshop

2.1 Introduction

Pathways published by the Intergovernmental Panel on Climate Change for the timely achievement of climate targets set under the Paris Agreement, especially the 1.5°C goal, demonstrate a potential need to remove excess carbon dioxide (CO_2) from the atmosphere in the future and create so-called "negative emissions". A range of technological options that aim to enhance the natural function of the earth's ecosystems to sequester and store additional carbon has been proposed for the purpose of carbon dioxide removal, including through ocean-based negative emissions technologies (NETs). Task 2.2 integrates desk-based research with a transdisciplinary approach, incorporating two dialogue workshops with key stakeholders / experts within the research process. The goal is to co-create a deliberative knowledge base on the current governance framework and to formulate recommendations towards a "good governance" of NETs in the ocean. The task commenced with a literature review and expert survey on the eight ocean-based NETs considered in the project to determine potential effects on the ocean's biogeochemical condition and linked impacts on coastal and marine ecosystem services. This knowledge laid the groundwork for determining the direct and indirect ocean-related governance dimension of the technologies (for more details, see Röschel and Neumann, 2023).

Results from this research on the global ocean governance framework relevant to ocean-based NETs have pointed to a range of governance challenges. These challenges encompass issues associated with the transboundary nature of the ocean, potential impacts of ocean-based NETs on the condition of the ocean, leading to potential side effects on ecosystem function and services. Additionally, a wide range of unknowns and uncertainties are associated with the deployment of NETs, particularly under the future impacts of climate change. The fragmented approaches and frameworks in place to govern the global ocean further complicate comprehensive governance of these emerging technologies. In the first dialogue workshop, held on 4th May 2022, participants discussed these challenges to governance, the results of which are presented within Deliverable 2.3. The second dialogue workshop, which is reported in this deliverable, was held on 30th November and 1st December 2023 at the Research Institute for Sustainability – Helmholtz Centre Potsdam. Invited participants took part in a prepared scenario exercise to discuss future "good governance" of ocean-based NETs (see Textbox 1 on good governance). This workshop was held in a hybrid format and included interactive elements to foster dialogue and a joint discussion. It convened over 30 international experts spanning diverse fields related to marine carbon dioxide removal and ocean governance. The objective was to facilitate the exchange and compilation of a wide range of knowledge and perspectives. The results of workshop 2 will feed into a policy brief guiding EU and global policy makers in the future deployment of ocean-based negative emission technologies.

Textbox 1: What is 'good governance' of ocean-based NETs?

Generally, a broader perspective of ocean governance is adopted for the work of Task 2.2. This perspective aims to bring together legal aspects of regulating human activities in the ocean for environmental protection and conservation (Singh and Jaeckel, 2018; Singh and Ort, 2020) with concepts of environmental governance as described by Pattberg and Widerberg (2015), understanding global environmental governance as the system of institutions, actors, processes and governing instruments that are needed to appropriately address environmental issues.

The notion of "good governance" goes back to a report published in 1989 by the World Bank[1] that describes the approach to governance as "a public service that is efficient, a judicial system that is reliable, and an administration that is accountable to its public" for the main objective of overcoming economic crisis. Since, the idea of good governance has been often reiterated for different purposes, most frequently in application of national or supranational agencies for the achievement of sustainable development[2]. In addition, agencies such as the United Nations Development Programme[3] and the Council of Europe[4] have each published a list of 'good governance principles' which highlight the main factors that determine governance as 'good', and which can help to assess the effectiveness of good governance for the identified desirable outcome.

The previously proposed definitions and principles for "good governance" were intended for specific topics and governance levels. Stemming from development policy and taken up by public policy, the concept of good governance reiterates principles such as efficiency, effectiveness, coherence, accountability, transparency, rule of law, participation, human rights, and sustainability[5][6]. From the perspective of the ocean and the marine environment, conclusions for what could constitute a "good governance" approach to the future deployment of marine CDR / NETs can be drawn along these principles and in consideration of the unique challenges that the introduction of such new uses within the ocean realm poses. An examination of the impacts of ocean-based NETs on the ocean's condition and its connected ecosystem services has revealed that each of the assessed technologies carries the potential for secondary effects on the marine environment and the human society dependent on it. While the deployment of ocean-based NETs will likely be unable to exclusively generate positive outcomes for the environment and society, a good governance approach to the deployment of the technologies might ensure the best possible outcome across global goals. It can aid in identifying parameters to achieve the "best possible outcome" in deploying these technologies. In doing so, it involves a deeper consideration of the distinctive characteristics of the marine environment and ocean governance. Recognizing their central role in both the climate system and for humanity, this contemplation is crucial for effective decision-making.

Generally, we adopt a broader perspective on ocean governance that attempts to bring together legal aspects of regulating human activities in the ocean for environmental protection and conservation[7][8] with concepts of environmental governance as described, e.g., by Pattberg and Widerberg (2015)[9]. In summary, we understand ocean governance as a system of regulations, rules and principles, institutions, actors, processes and governing instruments required to address environmental issues.

[1] *Sub-Sahara Africa: From Crisis to Sustainable Growth – A Long-Term Perspective Study (link)*
[2] Khandakar Qudrat-I Elahi, (2009),"UNDP on good governance", International Journal of Social Economics, Vol. 36 Iss 12 pp. 1167 - 1180
[3] UNDP 2011: Towards Human Resilience: Sustaining MDG Progress in an Age of Economic Uncertainty. Chapter 8 "Governance Principles, Institutional Capacity and Quality": 268-290 pp.
https://www.undp.org/sites/g/files/zskgke326/files/publications/Towards_SustainingMDGProgress_Cover_TOC.pdf
[4] Council of Europe (2007) Resolution 239 (2007) European Strategy of Innovation and Good Governance at Local Level endorsed at Valencia Ministerial Conference 2007 https://rm.coe.int/1680746d1d
[5] Nanda, V.P. (2006). The "Good Governance" concept revisited. *The ANNALS of the American Academy ofPolitical and Social Science* 603(1), 269–283.
[6] Rose, M., and Newig, J. (2023). "Umwelt-Governance und Partizipation," in *Handbuch Umweltsoziologie,* eds. M. Sonnberger, A. Bleicher & M. Groß. (Wiesbaden: Springer Fachmedien Wiesbaden), 1-16.
[7] Singh, P., and Jaeckel, A. (2018). "Future Prospects of Marine Environmental Governance."), 621-633.
[8] Singh, P.A., and Ort, M. (2020). "Law and Policy Dimensions of Ocean Governance," in *YOUMARES 9 - The Oceans: Our Research, Our Future,* eds. J. S., V. Liebich & M. Bode-Dalby. Springer).
[9] Pattberg, P., and Widerberg, O. (2015). "Global environmental governance," in *Encyclopedia of Global Environmental Governance and Politics,* eds. P. Pattberg & F. Zelli. (Cheltenham, UK: Edward Elgar Publishing), 28-35.

2.2 Workshop organisation

The workshop was planned and held as a two-day hybrid event from 30 November 2023 until 1 December 2023, on location in Potsdam, Germany at the Research Institute for Sustainability – Helmholtz Centre Potsdam, and online via the video conferencing platform Zoom. The event was publicised via the organizer's website[10], though the dominant approach to participant recruitment was undertaken via pre-selection and direct personalised email invitations. Invitation emails included attachments of an official email invitation that outlined the workshop's concept, aims and funding details, a preliminary agenda, a data consent sheet to collect informed consent for participating and contributing their knowledge to research (see section 2.2.3 Ethics) as well as an information leaflet for invited experts. The information leaflet included details on the location and venue, directions, accommodation options, weather conditions, public transportation and contact information. Suggestions from invitees for further participants or substitutes, in cases where the initially invited experts were unable to attend, were largely accepted. This introduced a snowball component to the overall purposive sampling approach (see section 2.2.1). Registration for the workshop was possible via the online event-software Eveeno, by which participants gave their personal information (Name, Institution, Email) and could agree to their details being published on a participants list to be shared among attendees and a strict data privacy notice, in line with the EU's data privacy standards.

Registered individuals for in-person attendance received an email with extended informative material a week prior to the workshop that included a participants list, an updated workshop agenda (see Table 1 below) and a data consent form (see 2.4 Ethics). Registered individuals for online attendance received the same documents, as well as background material on the topic of ocean-based NETs and their break-out group scenario materials, which in-person participants received in paper form on the morning of day 1 of the workshop and during the break-out group sessions. Following the workshop, all participants received an email containing presentation slides from speakers and an invitation to actively engage in subsequent outputs resulting from the workshop.

Table 1: Workshop agenda

Day 1, Thursday, 30 November 2023

Time (CET)	Program Elements
09:30 – 10:00	Arrival of participants, welcome coffee
10:00 – 10:20	Introduction to the workshop and housekeeping *Barbara Neumann, Research group lead "Ocean Governance", Research Institute for Sustainability – Helmholtz-Centre Potsdam*
10:20 – 10:30	Welcome Note *Mark Lawrence, Scientific director of the Research Institute for Sustainability – Helmholtz-Centre Potsdam*
10:30 – 10:45	Activation exercise
10:45 – 11:05	Introduction to ocean-based negative emissions technologies (NETs) *David Keller, Senior scientist and coordinator of the OceanNETs project, GEOMAR Helmholtz Centre for Ocean Research*

[10] https://www.rifs-potsdam.de/en/events/future-governance-ocean-based-negative-emissions-technologies

11:05 – 11:20	The international legal framework applicable to ocean-based NETs *Robert Steenkamp, Researcher in public international law at the Chair in International Law of the Sea and International Environmental Law, Public International Law and Public Law, University of Hamburg*
11:20 – 11:40	Ocean governance and ocean-based NETs *Lina Röschel, Ocean Governance Research Group, Research Institute for Sustainability – Helmholtz-Centre Potsdam*
11:40 – 12:00	Q&A in the plenary
12:00 – 13:00	Good governance of ocean-based NETs: Small break-out group discussion
13:00 – 14:00	Lunch, catered
14:00 – 15:00	"Spotlights" in the plenary: A series of impulse talks
15:00[11] – 17:00	Future governance of ocean-based NETs: Break-out group scenario exercise part I
17:00 – 17:20	Intervention: Reflections on governance of ocean-based NETs from a Marine Conservation perspective *Karen Kienberger and Melissa Abderrahim, International Union for Conservation of Nature (IUCN)*
17:20 – 17:30	Closing remarks day 1
17:30 – 20:00	Visit to a traditional Potsdamer Christmas market and joint dinner[12]

Day 2, Friday, 1 December 2023

Time (CET)	Program Elements
08:30 – 09:00	Arrival of participants, morning coffee
09:00 – 09:15	Welcome and agenda for day 2
09:15 – 09:45	The role of the ocean in climate policy *Miranda Böttcher, Research cluster "Climate Policy and Politics, Research Division EU/Europe", German Institute for International and Security Affairs (SWP)*
09:45 – 10:15	How to govern (marine) CDR? A critique of current assessment frameworks and a proposal for an alternative approach. *Christian Baatz, Research group lead "Climate Ethics, Sustainability and Global Justice, Department of Philosophy, University of Kiel*
10:15 – 12:00	Future governance of ocean-based NETs: Break-out group scenario exercise part II
12:00 – 13:00	Lunch, catered
13:00 – 14:00	Reporting back from break-out groups in the plenary
14:00 – 15:00	Plenary discussion: The Future of Ocean Governance and Ocean-based NETs – designing anticipatory governance
15:00 – 15:30	Coffee break
15:30 – 16:15	Revisiting good governance
16:15 – 16:30	Closing remarks

[11] Integrated coffee break
[12] Dinner at "Lemongrass", Benkertstraße 21, 14467 Potsdam

2.2.1 Participant selection

Participants were selected purposively (Babbie, 2013) on the basis of expertise required to discuss specific aspects of future governance of ocean-based NETs, as elaborated through the background research with regard to e.g., governance challenges, and the concept of "good governance". The aim of the workshop was to engage a wide range of expertise and differentiated views on the topic of ocean-based NETs and their future governance from different angles. Consequently, workshop participants were selected based on their expertise in 1) ocean governance, 2) governance of ocean-based CDR and 3) identified challenges related to governance of ocean-based CDR. These challenges include environmental/ecological, socio-political and economic, and ethical/justice aspects. For each of these categories, initially six representatives were invited to ensure representation for each of the three in-person breakout groups. Furthermore, policy experts from the identified explicit, implicit and indirect global governance framework surrounding ocean-based NETs (see Röschel and Neumann, 2023) and Figure 1 were invited, as well as EU-level and German national policy makers to give insight to transposition of governance

In a first step, the identification of expertise within the OceanNETs consortium aimed to enhance synergies across the project. Consortium members from Core theme 1, "Society and NETs," and Core Theme 2 "The earth system response to NETs," were specifically targeted. This approach was grounded in the diverse perspectives present within the project consortium. A total of 10 colleagues were contacted, of which eight registered. Accordingly, the OceanNETs project partners offered expertise ranging from economic insights, regulatory stakeholder views, legal aspects, societal perception and scientific knowledge on the technologies themselves.

Beyond the knowledge present in the OceanNETs consortium, the goal was to elicit external expertise specifically linking the global ocean governance framework to ocean-based NETs to determine what good governance of the technologies within that governance framework would require. The following fields were found relevant for the discussion:

- Governance of the ocean
- Marine geoengineering governance
- Governance challenges related to environment/ecology & ocean-technology interaction
- Governance challenges related to ethics and justice
- Policy: global level, regional level, EU-level and German national level

Participants were targeted primarily on the basis of their expertise, not their identification with a specific stakeholder group. Names of experts were collected through internet search and from names that had emerged during the preparatory research. Distribution across stakeholder groups was considered as secondary criterion; these include:

- Policy-and decision making (governments, IGOs)
- Science, academia
- Civil society organisations

Finally, a total of eight researchers from the Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS) ocean governance research group supported in the facilitation of the workshop. These researchers are experts in various aspects of ocean governance.

The workshop was initially planned for September, however, due to a low response rate and high number of declines, the project team in coordination with the project officer made the decision to

move to workshop to a later time. After inquiring the availability of invitees that had indicated interest in the workshop, a second date was set for the end of November. The new date engaged significantly more invitees to participate.

Individualised invitations were sent out to each identified expert to increase engagement (68% response rate). Altogether, 99 experts were invited to the workshop, of which 37% registered to participate. Difficulties were particularly encountered in reaching policy stakeholders, of 29 invitations sent only 3 attended the workshop (one national, two EU-level). Notably, almost none of the globally or regionally invited policy experts even responded to the invitation. This experience potentially showcased the unfamiliarity of policy makers with the topic and further highlighted the necessity of the work in Task 2.2, specifically the upcoming policy brief (D2.6).

The workshop engaged 37 participants (including speakers and excluding the facilitation team) throughout, with 25 in-person attendees and 12 online, though there was some online participant fluctuation between programme elements.

Table 2: Distribution of fields expertise and stakeholder groups in workshop participants

Representation/Distribution of participants	**#**	**%**
Field of expertise of external participants		
Policy/decision-makers/NGOs	7	18%
Ocean governance	10	27%
Governance of NETs	6	16%
Governance challenges related to socio-political and economic aspects of ocean-based NETs	5	13%
Governance challenges related to the environment/ecology & ocean-technology interaction	4	10%
Governance challenges related to ethics and justice	6	16%
OceanNETs consortium representation		
Participants part of the OceanNETs project consortium	8	22%
Participants not involved in the OceanNETs project	29	78%
Gender balance		
Policy-and decision making (governments, IGOs)	3	8%
Science, academia	30	81%
Civil society organisations	4	11%

In terms of gender-balance, the workshop was split exactly 50/50, also among the facilitation team. The gender balance was similar across all pre-defined fields of expertise. A strong majority of all workshop participants arrived from the Global North, though a balance for better global representation was initiated through the invitation process.

2.2.2 Workshop Format

The workshop was prepared, hosted and moderated by the Task 2.2 project team, Lina Röschel and Barbara Neumann. The agenda included a mix of presentations, plenary discussions and break-out group discussions. Throughout the entire workshop, Chatham House Rules were applied, ensuring that participants' information (including name or affiliation) would not be disclosed in connection with specific comments. This approach aimed to foster open and uninhibited discussions, particularly given the widely debated and often controversial nature of the topic. The presentations and discussions were thus not recorded except for written notes taken by the facilitation team, and workshop outcomes have been pseudonymised. Hence, a participants list will also not be made publicly available.

Initially, the workshop was planned exclusively as an in-person event due to the nature of the scenario exercise, as research shows that creative thinking is best done 'offline' (Brucks and Levav, 2022). Online participation was made available upon request, as representatives of the European Commission and some other experts were unable to attend in-person and this participation was deemed highly relevant. A hybrid concept was developed concurrently for the full duration of the workshop.

2.2.3 Ethics

In line with the OceanNETs Deliverable 10.1 on ethics of informed consent procedures to be implemented for interactions with humans, workshop participants received and signed a data consent form (see Annex). The data consent form informed participants on how their contributions during the workshop would inform OceanNETs Task 2.2 research and how their personal data shared with the organizers would be treated. The data consent form included general information on the OceanNETs project, Task 2.2 and the workshop context and goals, information about why participants were contacted, the workshop proceedings, the kind of data to be collected, what would happen with the data and how confidentiality would be ensured. Participants were also provided a contact point from the project team for any questions with regards to their personal data. In the Annex of the data consent sheet, participants were provided with definitions on "personal data" and "processing" as well as contact information on the data protection officer of the organizing institution and more information on the type and purpose of data processing.

2.3 Workshop Proceedings

2.3.1 Day 1, 30th November 2023

Introductory session

The workshop was kicked off by a general introduction to the workshop's content and aim by the Task 2.2 lead Barbara Neumann, RIFS, which included housekeeping remarks such as the keeping of Chatham House Rules. This initial introduction was followed by a welcome note by the director of the hosting research institute RIFS, Mark Lawrence. This welcome note linked the workshop's topic to the proceedings of the 28th Conference of the Parties (COP28) to the United Nations

Framework Convention for Climate Change (UNFCCC) that also commenced on 30 November 2023 and further highlighted the interlinkages between the ocean and climate system. A short activation exercise was conducted in the following, both for the in-person participants and the online community, with the aim to provide participants with a first overview of who is in the room and the expertise participants brought to the workshop.

Three introductory talks from researchers of the OceanNETs project consortium followed, giving insights on 1) state-of-the-art of ocean-based NETs, 2) the international legal framework applicable to ocean-based NETs and 3) ocean governance of ocean-based NETs (see Table 1). These three talks were included at the onset to set the scene for later plenary and break-out group discussions. The introductory presentations also set a knowledge baseline for the participants, whose degree of familiarity with the workshop's subject "future governance of ocean-based NETs" varied.

1) Introduction to ocean-based NETs – David Keller, GEOMAR Helmholtz Centre for Ocean Research Kiel

The presentation introduced current scientific research on ocean-based negative emissions technologies to highlight, among others, knowledge gaps and challenges, including possible side effects. Technologies briefly detailed by the presentation included ocean fertilization, artificial up- and downwelling, recovery of marine ecosystems, terrestrial biomass dumping, blue carbon sink enhancement, marine biomass for biochar or bioenergy, ocean alkalinity enhancement, and direct CO_2 removal from seawater. This meant to give the participants an overview of the state-of-the-art in scientific research as well as private endeavours. It was highlighted that there is no single technology identified yet that meets all carbon sequestration needs, but that a portfolio approach to deployment is likely in the future. The presenter, David Keller, also raised that major knowledge gaps and challenges still persistent for the technologies, such as the issue of upscaling, monitoring, reporting and verification, and feasibility. He also addressed possible side effects (positive and negative) of biological, geochemical and technical Carbon Dioxide Removal (CDR). Concluding the session, David Keller provided an overview of the recent upswing in research funding and private initiatives within the rapidly expanding realm of ocean-based CDR. Furthermore, he emphasized the pressing need for proactive governance of these technologies to stay ahead of the evolving challenges in the field.

2) The international legal framework applicable to ocean-based NETs – Robert Steenkamp, University of Hamburg

The presentation gave an overview of the status quo of the international legal framework surrounding ocean-based NETs. The presentation stated that there is currently no treaty / agreement specifically dealing with ocean-based NETs, but further detailed multiple sources of international law that may be applicable to the technologies. For one, the London Protocol includes amendments that have tried to regulate "marine geoengineering". Any activity listed within its Annex 4 (namely: ocean fertilization) is not allowed without a permit, though the amendment is not yet in force as only six countries have ratified it so far. Further, Robert Steenkamp highlighted that other international legal frameworks, such as the new BBNJ Agreement and UNFCCC, are developing their own advisory opinions and that the International Tribunal for the Law of the Sea has used the term "carbon dioxide removal" recently for the first time. Finally, Robert Steenkamp commented that there is a need for law to keep in pace with ongoing scientific knowledge.

3) Ocean governance and ocean-based NETs – Lina Röschel, RIFS

The presentation introduced the direct, implicit and indirect governance framework for ocean-based NETs that was drawn from the research undertaken within OceanNETs Task 2.2 (see Figure 2 below). It highlighted the gaps in the global ocean governance framework with regards to the

technologies and the need to consider potential unintended direct and indirect impacts of the technologies on the ocean's condition and related ecosystem services. The presenter, Lina Röschel, further detailed the overarching challenges present for future governance of ocean-based technologies: incoherence of the governance framework, potential transboundary conflicts and deep uncertainty surrounding the future deployment of ocean-based NETs that could lead to policy paralysis. Furthermore, it was highlighted that the under rising severity of the impacts of climate change could lead to an urgency for policy makers to act and perhaps miss important steps necessary to achieve good governance of the technologies (such as active stakeholder engagement). Finally, it was recommended that governance should consider the particularities of the ocean environment, strengthen policy coherence across the identified governance framework, recognise potential trade-offs between global goals (e.g., the SDGs) in favour or against deployment of ocean-based NETs, and implement a foresight-oriented approach to depart from the current reactive state of governance.

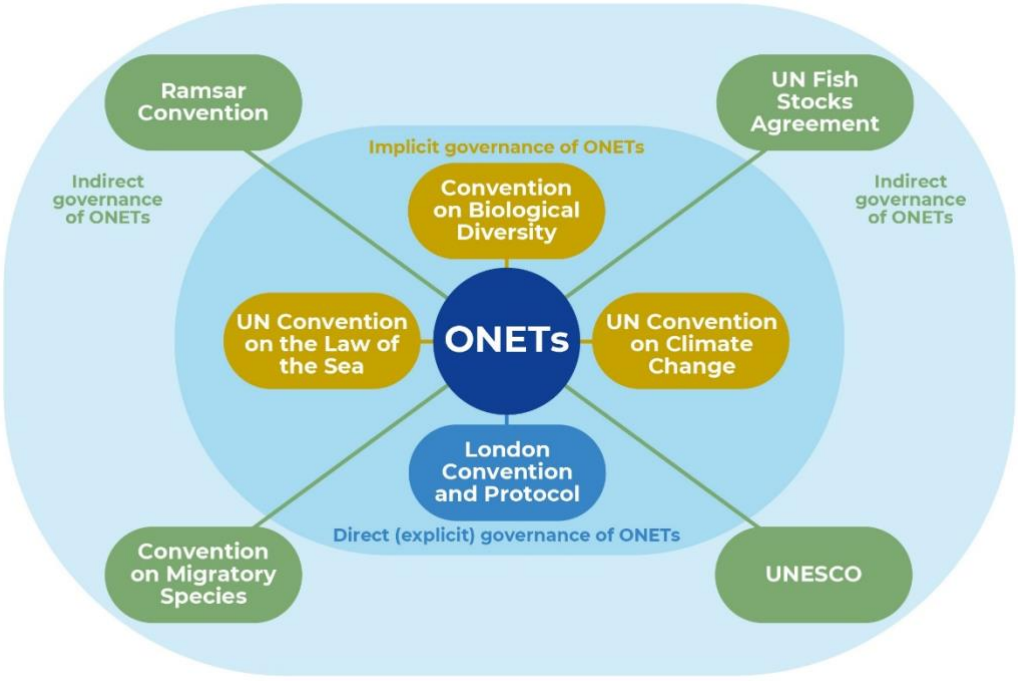

Figure 1: Ocean-based NET governance framework. The "inner" circle represents direct explicit governance of ocean-based NETs and implicit governance of potential impacts of ocean-based NETs on ocean condition and climate regulation. The "outer" circle presents indirect governance of ocean-based NETs via governance of potentially impacted marine and coastal ecosystem services. Röschel and Neumann, 2023

Good governance of ocean-based NETs: Small break-out group discussion

As a first creative exercise, participants were asked to discuss elements of "good governance" that, based on their expertise, should form the basis for discussions around governance of ocean-based NETs going forward. After a brief introduction to the origin and concept of "good governance" by Barbara Neumann, the workshop participants were attributed 20 minutes to discuss the key components/ principles of good governance most essential for governing future deployment of ocean-based NETs in small break-out groups of three individuals per group, as well as one online group. The groups were subsequently asked to write down a limited number (3-5) of principals on

index cards and present these to the plenary. The index cards were collected and pinned to a pinboard visible to the room (see Figure 1). The pinboard was intended as a "guiding light" for the following discussions and functioned as a living document to which new ideas could be added during the course of the workshop. Identified principles for good governance included the following, which were categorized into topical groups by the exercise facilitator in the following:

Modes / principles of governance

- Precautionary governance
- Anticipatory governance
- Adaptability / flexibility in governance
- Iterative governance
- Dependable and adaptive

Tools and mechanisms

- International cooperation / coordination
- Accountability / MRV at project and aggregate level
- Coherence and stewardship
- Strong monitoring of life cycles, certification schemes
- Clear liability assignment for long-term impacts, burdens and benefits
- Clearing house mechanisms for ocean-based NET projects
- Effective implementation and ongoing enforcement of monitoring

Figure 2: Collection of 'good governance' principles collected in the first mini-breakout group discussions

Science/knowledge, data capacities

- Information and data sharing
- Capacity building and technology transfer
- Honoring of thresholds between scientific research and deployment
- Promoting a joint understanding and knowledge integration
- Best-available knowledge- and science-informed decision-making

Transparency and participation

- Just and transparent participation
- Stakeholder participation at early stages
- Inclusive and incorruptible participation
- Access to information

Equity, justice and fairness

- Equity and inclusiveness
- Reciprocity, social justice

"Spotlights" in the plenary: A series of impulse talks

As the first agenda item for the afternoon of Day 1, six pre-selected speakers from the plenary (in-person and online; names not provided here due to agreed Chatham House rules) were invited to give five-minute 'spotlight' talks to highlight the expertise in the room, and allow for admissions

of further perspectives (e.g., socio-economic). They added complexities to the topic of governing ocean-based NETs that gave further depth to later discussions. These content impulses covered the following aspects:

1. Social acceptance of ocean-based NETs – Christine Merk, Institute for the World Economy / OceanNETs WP 3

   Christine Merk presented results from research on social acceptance of ocean-based NETs conducted as part of the OceanNETs project. It was determined that marine biomass sinking and alkalinity enhancement were the least preferred amongst participants of a large-scale social acceptance survey in comparison to ocean fertilization, blue carbon, and artificial upwelling. The survey further highlighted that the general public feel that anything that is added to the ocean would be problematic and is considered as pollution. Anything that is perceived as a natural approach was received better by participants of the survey than more technological approaches.

2. The logic of exploring complexities with Life Cycle Assessments and key conclusions as example of impacts to consider, Jose-Maria Valenzuela, Oxford University

   This spotlight talk by Jose Maria Valenzuela introduced Life Cycle Assessments in ocean alkalinity enhancement and ocean liming which were conducted, also as parts of the OceanNETs project, to map out, amongst others, where materials are coming from, e.g. lime stone mines, and further assess the environmental impact of the process for deriving materials. Furthermore, it was determined that the energy footprint from producing lime for instance is very high. The speaker highlighted that when approaching the topic, it needs to be considered where the materials for activities come from, which countries will accept these operations, and what the time span of opening new lime mines according to national environmental regulations is like. Ocean liming would require a scaling up of the lime industry to double or triple its current size in Europe.

3. The challenges of measurement, reporting and verification, Nadine Mengis, GEOMAR Helmholtz Centre for Ocean Research

   Nadine Mengis emphasized the aspect of ecosystem connectivity in the ocean due to the continuum of the marine space, as well as the spatial-temporal disconnect of when and where material is introduced into the ocean and when and where the effects can be measured in the open ocean, which makes monitoring (and assessment of down-stream effects) difficult. It was stated that reporting requires the establishment of a baseline, which is difficult without long-term, comprehensive datasets or an elaborate modeling approach. To apply the correct bassline it is important to distinguish if carbon sequestration in the ocean should be enhanced to allow for continued emissions in the future or if carbon sequestration should be enhanced to reduce carbon in the atmosphere below current levels. Moreover, verification of the effects of ocean-based NETs proves difficult due to the uncertainty of the long-term storage of the carbon which may necessitate a focus on sequestration rather than capture in this regard.

4. Human rights considerations for marine CDR, Elisa Morgera, One Ocean Hub, University of Strathclyde Law School

   In 2022, the UN General Assembly recognized that a clean and healthy environment is a human right. The speaker further established that every basic human right is inherently dependent on a healthy environment, which needs to be considered when discussing technologies with potential negative impacts on biodiversity. This talk raised questions with regards to who should be consulted before deployment of ocean-based NETs and who should have a voice in the decision-making process. The speaker urged that human rights

give a critical standard for good governance and that by integrating a human rights-based approach, policy coherence could be better achieved.

5. Ocean-based CDR and the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, Romany Webb, Sabin Center for Climate Change Law, Columbia Law School

   The Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, was adopted in June of 2023 and could have positive implications for inclusivity and participation, depending how countries will implement the Treaty, as this spotlight talk discussed. The Treaty sets forth area-based management tools (ABMTs) such as marine protected areas, which could be used to direct potentially harmful activities away from vulnerable areas. Furthermore, the Treaty puts forth provisions to deal with environmental impact assessments, which are comprehensive especially compared to other international regimes. Geoengineering is currently not included on the list of activities that necessitate an environmental impact assessment, which means that an activity would have to be screened for harmful impacts on the environment and then potentially require an environmental impact assessment.

6. The EU's perspective on the topic of ocean-based NETs – considerations, questions, concerns to be included in the workshop and beyond, Larissa Lorinczi, European Commission, Research and Innovation

   This presentation gave policy context to ocean-based NETs in the EU, highlighting a range of EU policies (European Green Deal, Nature Restoration Law, etc.) and international commitments of the EU (Paris Agreement, International Ocean Governance Agenda, etc.) relevant to the topic at hand. The talk further gave insights on knowledge gaps, such as in reference to underlying dynamics of tipping elements and their irreversibility that need to be considered for decision making in the context of ocean-based NETs, and highlighted activities from the EU-level that aim at closing these knowledge gaps.

Future governance of ocean-based NETs: Break-out group scenario exercise part I

This session started out in the plenary, with introductory remarks by Lina Röschel on the aims of the scenario exercise. Break-out groups were tasked with developing innovative governance responses to emerging deployment of ocean-based NETs in different contexts. The aim was to broaden the range of challenges considered in the ocean and for ocean-based NET governance discussions. Furthermore, break-out groups were asked to explore environmental, social and economic interactions underlying the potential deployment of the technologies and their implications for governance. Lina Röschel then "transported" the group twelve years into the future by describing some key attributes of the world in 2035 [13]. These included the following:

[13] This "Future World 2035" description was based on the following literature:
DCDC (2010). "Global Strategic Trends - Out to 2040", (ed.) C.a.D.C. Development. (UK: UK Ministry of Defence,). ibid., IPCC (2019). "Summary for Policymakers," in *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, eds. H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama & N.M. Weyer.), Parson, E.A., and Reynolds, J.L. (2021). Solar geoengineering governance: Insights from a scenario exercise. *Futures* 132. doi: 10.1016/j.futures.2021.102805, Rikani, A., Otto, C., Levermann, A., and Schewe, J. (2023). More people too poor to move: divergent effects of

- Geopolitics in the year 2035 are largely similar to those today;
- Global emission trends are moderately positive but vary greatly between countries;
- Climate change impacts are worse than anticipated in 2023;
- Ocean-based NETs research has advanced greatly and some technologies are (scientifically) ready for deployment;
- Coastal blue carbon as a nature-based climate solution is not an option in 2035 as the ecosystems have deteriorated under climate change impacts over the past 12 years;
- There is scientific agreement on the necessity of the technologies and public acceptance is growing;
- Policy lags behind research for ocean-based NETs and discussions on the topic of marine geoengineering are being had as part of the London Convention and Protocol, but also in other conventions such as UNFCCC, BBNJ, and CBD.

Workshop participants were assigned to one of four breakout group, with around eight participants in each group as well as one moderator and one note taker provided by the organizing institution. The three in-person groups were hand-selected based on expertise (see section 2.2.1 Participant Selection), in an effort to achieve good distribution of expertise across the groups and alignment with the individual scenarios (for the in-person groups). Each of the in-person groups included a "negative emissions technology expert" able to answer specific questions on how the technologies function and interfere with the ocean environment, as well as a "legal expert" able to provide insights on the international legal framework for ocean-based NETs, if needed. These three groups were facilitated by members of the Ocean Governance research group at RIFS which had received preparation through documents and a pre-test of the planned exercise in advance of the workshop. Online participants automatically made up one group from those participants that had registered for online participation. This group was facilitated by Lina Röschel.

After participants joined their preselected break-out groups, moderators facilitated a round of introductions in the group before handing out a dossier with material. This dossier contained a scenario text central to the following discussion, a layman's description of the technology utilized in the scenario (provided by OceanNETs colleagues from WP3) as well as additional material, such as a geographical map of the region portrayed in the scenario or background information on a specific governance framework in relation to marine geoengineering (i.e., the Convention on Biological Diversity for Scenario 3). The participants were given enough time to read through the materials before entering a discussion.

Each scenario provided the respective break-out group with a unique set of future conditions and events that would pose a challenge for the future global governance of ocean-based NETs (see description below). The four scenarios were developed by the organizing Task 2.2 team. The set-up was based on Parson and Reynold (2021) and it included future challenges to governance stemming from an extensive literature review process, as well as observations from the last Meeting of Parties to the London Convention and Protocol 2023. Furthermore, the governance setting (e.g. Convention or Framework) for each break-out group was determined from the previous work in Task 2.2, i.e. the extended governance framework, (see Figure 2 in Röschel and

climate change on global migration patterns. *Environmental Research Letters* 18(2), 024006. doi: 10.1088/1748-9326/aca6fe.

Neumann, 2023). Each break-out group was given the role of "advisory group" to their respective governance setting, e.g. "Ad-hoc Advisory Group on Ocean-based CDR to the UN Climate Change Conference". The participants were given a set of questions to guide the discussion:

1. Identify the main challenges / issues the scenario presents (e.g., potential impact on the environment, unequal power dynamics);
2. Identify all stakeholders within your scenario. What are their roles? Categorize them if helpful (e.g., winners/losers; initiators/impacted; Global North/South);
3. What is the role of governance in this scenario?

The ultimate task was to give a response to the challenges presented in the scenarios in the form of advice, specifically 3-5 recommendations, to the representatives of the respective governance body. Participants were also encouraged to integrate the previously identified components of "good governance" into their recommendations. They were further informed that in Part II of the break-out exercise on Day 2 they would receive a prompt with new information to their scenario. Finally, participants were advised that they would be asked to present their governance response / recommendations to the plenary in the afternoon session of Day 2.

The following provides a short summary of each of the four scenarios (each 1-2 pages in length in the materials provided to the participants):

Scenario 1 – Big Ocean States

In this scenario, a coalition of low-lying islands States vulnerable to sea-level rise announces that, due to the severe and rising impacts of climate change on their livelihoods, they demand the development of a global CDR deployment programme, specifically focusing on ocean-based climate solutions. The coalition also announces unanimous endorsement of a pilot-scale ocean CDR deployment activity of Country Q, specifically for biomass dumping. These activities will be maintained at the current minimal level for the next two years, awaiting the development of a global policy response. If adequate international support for an effective deployment program is not achieved by then, Country Q will proceed to significantly ramp up their program as planned, nonetheless. Parties to the United Nations Framework Convention on Climate Change (COP40) are divided in their reactions to the provocation and call for the establishment of an "Advisory Group on Ocean-based CDR" to advise them on the best course of action.

Scenario 2 – Back to basics *(online)*

In this scenario, companies present new proposals for ocean fertilization pilot studies as a "back-to-basics" approach. Ocean fertilization once again gains momentum, although there are few official reports of ongoing activities. At the most recent Meeting of the Parties to the London Convention and Protocol, it is publicized that iron fertilization activities have been detected within the Exclusive Economic Zone (EEZ) of a coastal nation ('Country A') adjacent to the Barents Sea. The iron was introduced into the Barents Sea via the research vessel *Delphina III*, a research ship donated by a private non-profit foundation. Country A claims the addition of iron was aimed at combating the rapid decline in catches of small-scale fisheries, with the goal of providing an economic boost to the vulnerable community. A neighbouring coastal state ("Country B") expresses their concern over such activities in the shared waters and demands their immediate termination. The Parties to the LC/LP decide to appoint a task force to examine this specific case and formulate recommendations and actionable tasks to strengthen the governance framework.

Scenario 3 – Carbon Fighters

In this scenario, a new sub-movement of extreme climate activists by the name of "Carbon Fighters" aim to offset their countries' residual emissions themselves. In a series of widely publicized disruptive actions, the Carbon Fighters encourage the concerned global youth to actively contribute to offsetting global carbon emissions via ocean liming along coasts. The "educational material" on their website showcases activists from their headquarters acquiring olivine-bearing dunite rock and dumping it off the cities' beaches into the Mediterranean. Instructions and materials are widely distributed, but unfortunately, misinformation regarding the appropriate materials is spreading rapidly. At this year's Conference of the Parties (COP28 to the Convention on Biological Diversity (CBD) the topic of geoengineering as part of the CBD's mandate to protect biodiversity is reconsidered. The Parties to the CBD have agreed to establish an "Ad-hoc Advisory Group on Climate-related Geoengineering" tasked with analyzing this specific case.

Scenario 4 – The High Seas

In this scenario, a Middle Eastern country with a high GDP ("Country X") missed its emissions reduction target and despite stating the goal of achieving net-zero emissions by 2050, the country continues to develop fossil gas and oil production. When faced with heavy criticism, Country X responds that achieving net zero by 2050 is still feasible via negative emissions production. A company by name of "LIME" proposes large-scale ocean liming in the high seas along a frequented shipping route that crosses the Atlantic Ocean. Alkaline liquids are to be "sprayed" off ships into the high seas ocean water, to enhance the carbon sequestration rate and create negative emissions. At the Conference of the Parties (COP) to the High Seas Treaty[14], NGOs raise concerns that the ocean ecosystem of the Atlantic's high seas could be negatively impacted by such activities and demands termination. Coastal countries along the designated shipping route express concerns about the undetected dumping of alkaline materials in their jurisdictional waters. Parties to the

[14] Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction

High Seas Treaty establish an "Ad-hoc Advisory Group on Ocean-based Climate Change Mitigation in the High Seas".

Intervention: Reflections on governance of ocean-based NETs from a Marine Conservation perspective closing remarks Day 1

After the break-out group session, all participants returned to the plenary. Karen Kienberger and Melissa Abderrahim from the International Union on the Conservation of Nature (IUCN) gave a reflective talk on the ocean's biogeochemical processes, climate-driven multi-stressors to the ocean environment and the ocean's climate-mitigating properties (e.g., blue carbon ecosystems). IUCN's position on ocean-based NETS considered that it would be critical to avoid overshooting the temperature targets of the Paris Agreement and that it is important that ocean-based NETs don't reduce global ambitions to decrease GHG emissions.

Closing remarks Day 1

Barbara Neumann gave a few closing remarks to the online and in-person participants and briefly highlighted key agenda items for Day 2. After closing, the in-person attendees were invited to a visit to the Christmas Market in the Potsdamer "historic center" and to a vegetarian/vegan dinner.

2.3.2 Day 2, 1st December 2023

Welcome and agenda for day 2

The second workshop day kicked off with a brief recap of day 1 proceedings, in which Barbara Neumann summarized the presentations, spotlight impulses, the good governance and scenario exercises. Furthermore, Barbara Neumann introduced the agenda for Day 2, which commenced with two presentations.

The role of the ocean in climate policy – Miranda Böttcher, German Institute for International and Security Affairs (SWP)

The talk outlined how the ocean is perceived as the "blue new frontier" in international climate policy in terms of the ocean's properties as global carbon sink. Over the past years, there has been an increase in awareness of perceived risks to the marine environment as well as its climate mitigating properties, though the ocean has yet to be directly addressed in UNFCCC negotiation tracks. In the EU, the role of the ocean in climate policy is largely undefined. There is a disagreement about ocean-related wording to be included in the EU carbon removal certification framework ("marine ecosystem/environment" vs. "ocean reservoir"), which potentially reflects the tensions between restoration of marine ecosystems and deliberate expansion of carbon drawdown. In addition, there remains a disconnect between climate and marine policy processes in the EU.

How to govern (marine) CDR? A critique of current assessment frameworks and a proposal for an alternative approach – Christian Baatz, University of Kiel

In this presentation, Christian Baatz critiqued current political decision-making surrounding ocean-based NETs and the underlying gaps to an ethical approach. He proposed the development of an assessment framework to support decision-makers that includes structured main questions according to how society should seek answers based on shared values and what is feasible in terms of the technologies. The need to be clear in the terminology of what is desirable and what can be

done in terms of ocean-based CDR was highlighted. Main questions to be included to build criteria that will allow for political feasibility include:

- Is suitable infrastructure & tech available? Does the environment allow it?
- Is implementation politically possible?
- Is implementation legally allowed?
- How effective is the technology in reducing climate change?
- What are costs/benefits of implementation?
- Are benefits/burdens distributed in fair way? Is CDR fairly governed?
- What impact on natural world does CDR have in addition to how this affects humans?

Group photo

Before the second part of the break-out group exercise commenced, a group photo was taken both of the online and in-person participants.

Figure 3: Group photo of in-person participants outside of the "Villa" at Research Institute for Sustainability (RIFS) - Helmholtz Centre Potsdam

Future governance of ocean-based NETs: Break-out group scenario exercise part II

For the second part of the break-out group scenario exercise, participants were asked to return to the break-out groups from Exercise Part I on workshop day 1. Each break-out group received an envelope containing a prompt; online participants received an email in the morning of day 2 that included their scenario prompt. The prompt presented a new occurrence or an alternative perspective to the original scenario in the form of a reporting medium (social media article, news alert, a newsletter article, information via an informant). The break-out groups were asked to use this prompt to reflect on the key recommendations drafted yesterday and to continue the discussion.

Table 3: Additional challenges of "Prompts" received on Day 2 of the Scenario Exercise

Scenario	Key components of the challenge
Scenario 1 – Big Ocean States	• Conflict between island states and Country Q over equity regarding the potential sale of generated carbon credits. • Concerns over potential negative environmental impacts from ocean-based NET on island states' waters and livelihoods
Scenario 2 – Back to basics	• Primary aim of activity is climate change mitigation after all, not boosting local fisheries' economy • Expeditions have received private funding via carbon crediting system that has questionable goals
Scenario 3 – Carbon Fighters	• A well-funded independent environmental campaigning network utilizes privately owned vessels to dump larger quantities of alkaline materials into EEZs of multiple coastal states • Materials were dumped into areas surrounding offshore wind farms to avoid added impact on marine biodiversity (networks opinion)
Scenario 4 – The High Seas	• Country X's shipping route for spraying alkaline liquids passes through a high-seas marine protected area network proposed by OSPAR countries. The countries requests restrictions on these activities as scientific monitoring is not suitable for detecting potential impacts. • Country X responds that OSPAR countries undermine climate action and (wrongfully) victimizes itself as a developing nation

Reporting back from break-out groups in the plenary

In the following, a combined summary of notes taken during the breakout sessions by the facilitation team and reporting back of the scenario groups in the plenary is provided.

Scenario 1 – Big Ocean States

The discussion determined the balancing of vulnerable states' needs with the global mandate to protect the marine environment, a central issue of the provided scenario. The right to take action against climate change in terms of a human right to a clean, healthy and sustainable environment was discussed in the realm of trade-offs between global sustainability goals. Assuming that the Big Ocean States had no other options (in terms of capacity) than supporting Country Q in order to make a significant contribution to offsetting global carbon emissions, then this could put their actions into context in light of their existential exposure to climate change.

The break-out group reasoned that low-lying islands have a strong attachment to the ocean, so that an ocean-based approach to climate mitigation seemed a natural right related to their experiences

with the ecosystem and their claim to it. Further, these states do not have the land mass available to make terrestrial CDR approaches feasible at a significant scale. The discrepancies between technological capacity between countries was highlighted, as the Big Ocean States depend on Country Q for not only deployment but also scientific know-how and technological equipment. The discussion highlighted the need for empowering climate vulnerable individuals and nations to be in charge of their own climate solutions to break up persisting dependencies. Though the issue of climate change is an existential issue to these nations rather than the Global North, in this scenario a developed country takes charge of climate mitigation measures in an untransparent manner. The discussion touched upon historic responsibilities of developing states, loss and damages, and the need for developed countries to pay reparations to those highly vulnerable to and impacted by climate change.

In this scenario, the demanded two-year timeframe for governance response was a central point to the discussions, drawing parallels to the two-year ultimatum for a policy decision on deep-seabed mining (DSM) issued by the island nation Nauru in 2021. The issue of governance scale was discussed, as in comparison to the DSM this scenario takes place within Country Q's EEZ, and if the NET activity is practiced within Country Q's own maritime zone, a multilateral response may not be required, but rather a regional one. The possibility of requiring some sort of legal guarantee (enforceable under international law) that County Q would have to lodge/create into a fund -- if it insists on going ahead with unilateral deployment despite the risks -- that is to be used for future claims in case harm occurs was proposed as possible governance instrument.

Country Q framed the NET of biomass sinking as 'nature-based solution' and therefore deemed an environmental impact assessment unnecessary. The UNEA definition of nature-based solutions as "*actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits*" is general enough to possibly include biomass dumping as applied in this scenario. The break-out group discussed if a certification standard for to-be-dumped seaweed would be useful, to identify the trade-offs (also in terms of other uses for seaweed) and benefits. It was discussed if such biomass would be considered a resource or waste by-product and if in the year 2035 seaweed for purpose of climate change mitigation would compete with other uses such as food production and bioenergy.

The break-out group agreed that the role of governance included ensuring transparency of all ocean-based NET actions in terms of science, funding and scaling up plans, issuing a code of conduct as a regulatory starting point to kick off a comprehensive governance process, risk management, enforcement of regulations and accountability in terms of scaling up and offsetting of impacts. The break-out group specifically advised the responsible agency to demand an environmental impact assessment from Country Q if the necessary scale or risk threshold was met under international and national law, not just in its own waters but in transboundary waters. They advised to ask Country Q to provide information on internal decision-making processes for categorizing research and deployment, to determine why a permit and environmental impact assessment was not deemed necessary. It was advised to appoint a UN representative to monitor/oversee the activities with a view to informing future governance development and that a public awareness campaign for ocean-based NETs should be established.

Finally, the group also reflected on how a country (like Country Q in this case), which has a certain plan/ambition in mind, might resort to certain green/blue-washing "tactics" to get support from others, such as by appealing to their desperation. For example, in this case, the participants of the break-out convinced that Country Q was not fully committed to solving the climate crisis but may be driven by other motives (such as perpetuating the use of fossil fuels, allowing business as usual,

and the like). That led the break-out group to the arms-length/full disclosure and "good faith" principle.

Scenario 2 – Back to basics *(online)*

In this Scenario, "Country A" dumped iron into their EEZ with the claimed intention to enhance the countries' local fishery yields. In this regard, themes of equity and inclusiveness were dominant in the discussion. The break-out group discussed how such positive side effects of ocean-based NETs for the public, also on the local level, should be considered in decision-making for ocean-based NETs and not be downplayed. The group further discussed the necessity but also the complexity of a human rights-based approach, in which humans have the right to a clean environment, linked to potential negative impacts from ocean-based NETs on the ocean environment, as well as a right to a healthy atmosphere, linked to the benefits of carbon removal, and also a right to dignity and livelihoods, such as the benefits for small-scale fisheries portrayed in this scenario. It was determined that the international governance framework is ill-equipped to take into account trade-offs and cannot make a transparent assessment of benefits and negative impacts of deploying (or not deploying) ocean-based NETs, especially when considering local needs in comparison to global needs.

Along this line of thought, the break-out group had an extensive discussion about equity and inclusiveness in decision-making around ocean-based NETs, and how this should be integrated into all processes of governance. It was discussed that while decision-making based upon scientific evidence is integral, the access to this scientific evidence needed to be considered better, specifically the use of appropriate language and communication channels. For one, all voices should be able to be heard on this issue, and secondly, all stakeholders should be able to access information relevant to them on this matter, perhaps should even be actively involved rather than just offering a forum and a platform. It was determined that only this kind of transparency in decision-making would lead to the social acceptance that many seek on the topic. In addition, it was mentioned that decision-making on this topic needs to respond to the needs of not only the current generation but those of future generations, as they will be greatly affected by related action and inaction.

The group considered how the ocean-based NET of iron fertilization gained momentum once again in this scenario. It was reflected how today this technology is considered as a more technological approach in comparison to other nature-based solutions (e.g., blue carbon), and how this risk perception might change in the future when other approaches (e.g., solar radiation management) make iron fertilization seem comparatively "natural". It was also reflected that in the case of using iron fertilization for enhancing fishing yields in addition to climate mitigation, parallels of such intersecting regimes are also present in aquaculture, where elements are added to improve productivity. In this regard, the need for the London Convention and Protocol to coordinate with other governance frameworks was discussed, to perhaps introduce a clearing house mechanism for all ocean-based NET activities, to allow for comprehensive data sharing and include strategic plans for environmental impact assessments.

Finally, there was a discussion of scale of the activity, as Country A in the scenario described their activities as scientific research while they could not be considered as such objectively. Considering cumulative impacts in the ocean environment when adding stressors and potential implications of interactions with other ocean-based NETs (or alternative industries) in the area, this was determined a significant challenge to governance, especially considering the jurisdictional differences between EEZ and high seas. The necessity of due diligence and specific safeguards in place to avoid harmful activities to the ocean environment was determined an integral component of good future governance in this scenario.

Scenario 3 – Carbon Fighters

In this scenario, an activist movement potentially endangers coastal ecosystems through distribution of information material on ocean liming and enabling of such action. The break-out group at first questioned if the Convention on Biological Diversity (CBD) would be the right governance entity in this case, as ocean dumping lies within the mandate of the London Convention and Protocol, though it was later established that the CBD is concerned with anything that impacts biodiversity, including marine geoengineering. The discussion thereby highlighted the complexity of the relevant governance framework and the different barriers to policy cohesion.

The break-out group further discussed the plurality of responsibility for the ocean liming activities (i.e., the activists, the individuals distributing potentially harmful materials, the industry providing such materials, and the companies donating funds) and thereby the difficulty of determining which stakeholder (group) is to be held accountable for any potential negative side effects of these activities on the ocean ecosystem. It was discussed that an environmental impact assessment should be mandatory (though not mandated by the CBD), and that the responsibility would lie with those carrying out a potentially harmful activity.

Another point of discussion was how the amount of dumped material would determine the level of governance, as individual action (and local effects) would be taken forward by the sub-national or national governance system, but if individual action added up to a potential regional or global impact on the ocean ecosystem (also through downstream effects), then the regional and global governance framework could respond (e.g., Barcelona Convention). It was determined that the London Convention/London Protocol does not discern the amount of material dumped and that the Convention on Biological Diversity would only respond to such activities if harm to biodiversity and ecosystems was likely.

The group discussed how the individual "extremist" activities was likely evoked by the lack of global climate action and that the associated frustration in their own and other governments created a collective helplessness in society. It was determined that the local distribution of information campaigns or an accessible educational programme would be beneficial to present the potential unintended impacts of individual ocean-based CDR actions, beyond the intended impact of carbon sequestration in the ocean. In addition, the public should be provided with alternative and harmless approaches to individual climate action while states should be reminded to reduce emissions in line with the temperature limits agreed upon in the Paris Agreement.

Scenario 4 – The High Seas

The break-out group on ocean-based NET activities in the high seas emphasized that any recommendations or suggestions for future actions should be embedded in the established legal framework governing the ocean (UNCLOS, DSM, BBNJ, IMO LC/LP, Fish Stocks Agreement, RFMOs, etc.) and recognize agreed upon principles within this framework such as the precautionary principle/approach, ecosystem-based principle, freedom of the high seas, etc. UNCLOS establishes the base legal framework and should be referred to in cases where the legal questions are not clarified through other regimes.

Several other specific recommendations were provided regarding the specific case set out in scenario four (high seas) but also more broadly.

- Ensure legal clarity: The existing legal framework for lime "dumping" includes potential gaps or ambiguity which must be addressed to identify under which legal regimes specific CDR practices are covered. There is a need for consultation with the relevant organizations e.g., UNFCCC, IMO, CBD, etc. to ensure that questions concerning CDR are addressed within the

proper forum with a legal mandate to take on questions. Within this scenario case, it was not clear if the activity would be considered dumping or discharging (two different CDR techniques) which would have legal implications as to which fora recommendations could be made or questions could be discussed – dumping should be coved under the LC/LP whereby there is potentially a legal gap when it comes to discharging. Moreover, in specific cases such as scenario 4, it is important to know which legal regimes a country belongs (i.e., ratifying State) and which flag a vessel flies to understand the legal specifications of the case.

- Environmental Impact Assessments (EIA) should be conducted by a country pursuing liming (under appropriate legal mechanism). First, the flag State needs to have the capacity (knowledge, information, resources, etc.) to properly check activity (i.e., conduct an EIA) under its control. An EIA for a CDR should include an established and agreed upon checklist: e.g., based on global EIA standards; including emergency protocols; limits using CDR to offset emissions; proximity to biodiversity areas including spatial management measures (i.e., ABMTs/MPAs).
- Along with an EIA States should submit a "management plan" for the planned activity outlining how that activity will be conducted (years not determined in discussion). Such a plan should include several elements e.g., how the activity will be scientifically monitored and reported (e.g., back to COP or STB), observational practices (on board observers, satellite), responsibilities (e.g., vessels, private companies, States, etc.) etc. Outputs of EIA should be made publicly available and allow for feedback.
- An enforcement element is also needed based on ship monitoring (satellite, observers, etc.). This could potentially mean vessel inspections in ports (e.g., checking liming material, on board operations, etc.) for participating vessels, and enabling port States to block ships from entering/leaving when they have been identified as not adhering to agreed upon rules.
- A broader study on CDR in ABNJ needs to be conducted by the Scientific and Technical Body (STB) under the BBNJ Agreement (or legally mandated body) to consider how activities planned by one 'project' (and assessed through an EIA) fit into the broader framework of CDR and other activities taking place or planned in ABNJ. The application of MSP or SEAs for such a study could be useful.
- A stakeholder consultation process should be conducted, especially with coastal states and local/indigenous communities also including a human rights evaluation. The results of the study should be made public and included in e.g., Clearing House Mechanism of the BBNJ Agreement or other information repository to ensure transparency.
- Dynamic dumping areas should be considered and created based oceanic variables and considerations for biodiversity, for example, if the ocean is getting warmer in area A where dumping is occurring there is a location B for dumping. These areas can be more easily monitored (buoys, satellite) and move location based on monitoring results.
- Broad scale scientific monitoring and review - ongoing continuous satellite monitoring of all liming activities reflecting best scientific practices should be conducted. Modeling downstream affects and location of activity and implications for biodiversity as well as any ABMTs/MPAs. Scientific review should be independent.
- A global fund could be considered to 'distribute' financial (and non-financial) benefits from such activities. Such a fund should be consistent with the (non)financial benefits gained through the activity i.e., those who earn should pay into fund. Various multiple payment methods (e.g. proportional, lumpsum, etc.) could be considered. Benefits could be distributed for e.g., monitoring, capacity development, and tech transfer. This could part of the BBNJ special fund, and/or part of the GEF, or something else (depending on legal mandates). In

regard to capacity, the fund could help to e.g., train onboard observers from e.g., Developing States.

Plenary discussion: The Future of Ocean Governance and Ocean-based NETs – Revisiting good governance

After the break-out groups presented their main discussion points and recommendations to the plenary, moderator Barbara Neumann refocused the discussion back on "good governance". The originally planned agenda items "Plenary discussion: The Future of Ocean Governance and Ocean-based NETs – designing anticipatory governance" and "Revisiting good governance" were merged into one as the previous reporting back and discussion had proven to be more comprehensive than anticipated.

Utilizing the pinboard (Figure 1) from Day 1, the group was asked to reflect on their group discussions, and based on these, what components of good governance should be added or reaffirmed. The moderator further placed the results from Day 1's exercise on "good governance" into context with discussion held at the first expert workshop in April 2022 which had aimed to explore three aspects of "good governance for ocean-based NETs": Workshop 1 (April 2022): 1) Stakeholders, roles and positions, 2) Scope and scale of governance, and 3) Information and data. Points brought up in the moderated plenary discussion were then added to the pinboard with the results of Day 1 for a summary of the overall discussion (see Figure 4).

It was discussed if the principles/components of good governance should act as criteria for guiding governance or the deployment ocean-based NET activities themselves. Further it was stated that the components of good governance should be implemented as a legal obligation rather than mere principles to operate by. The option of a Clearing House Mechanism was brought up to ensure transparency of all ongoing activities.

Another point of discussion was that in governance of ocean-based NETs, power imbalances (North/South, indigenous/colonial) need to be made aware and that governance needs to ensure that harm upon vulnerable communities is not perpetuated in governance of ocean-based NETs. It was discussed how best to include the Global South in decision-making processes, as science on ocean-based NETs is currently mostly funded in the Global North. Currently, the Global South is not included in discussions nor science, though implementation may largely impact their waters via transboundary effects. Further, these stakeholders may not be able to make use of the technologies themselves as technological know-how is not shared in a transparent manner and capacity building has not yet been undertaken. It was determined that a joint understanding and knowledge integration of the technologies needs to be promoted by governance, as well as clear guidelines on how to avoid and reduce established power imbalances in the field.

The plenary further discussed governance design for international decision-making processes on ocean-based NETs, specifically the potential need for a global oversight body dedicated to marine geoengineering. It was determined that another institutional entity would fragment the topic and ocean governance even more, and that due to the matter of growing urgency of the topic, there may not be enough time to establish a new governance body/agreement before decisions must be made (reflecting on 20-year-timeline of the BBNJ Agreement). The group agreed that it would be more beneficial to aim for comprehensive governance by building better bridges between the institutions in place. It was also determined that a transparent and effective reporting mechanism for ocean-based NETs is needed. Finally, the group brought up whether a moratorium on marine geoengineering (based on the moratorium issued on deep-seabed mining) could be a useful

mechanism to thwart the challenges presented in the scenarios and gain time to design a foresight-oriented approach to governance of ocean-based NETs.

Figure 4: Collection of 'good governance' principles and components as captured during the Day 1 and Day 2 discussions

Closing remarks

Barbara Neumann and Lina Röschel closed the workshop thanking all participants, speakers and presenters for their active engagement and contributions during the workshop, and the facilitation team and RIFS event team for their support of the workshop. She further outlined next steps, inviting interested participants to contribute to the policy brief directed to EU and other policy makers that will be prepared by the Task 2.2 project team as part of their work programme and include results from this expert workshop. Participants were informed that they will receive a follow-up email to which they can respond and provide feedback, and state preferences for possible future engagement (e.g., active collaboration or commenting of the policy brief).

2.3.3 Feedback

The feedback received from workshop participants via email and on social media was overall positive. These are a few (anonymised) excerpts from given feedback:

"Thanks so much for organising a great workshop."

"I also wanted to highlight how well the workshop was designed (and ran), with a good balance of presentations, plenary discussions and practical activities in small groups."

"Thank you for hosting such a stimulating workshop, and for funding my travel. It was an absolute privilege to take part in this event, and contribute with other experts to discussions."

"Thanks again for the great workshop :)"

"Also, thanks again for leading a great workshop, I really enjoyed it."

"Vielen Dank für den tollen Workshop und, dass ich mit dabei sein durfte!"

"Well done! It was an interesting workshop, very well organised!"

"I learn a lot from the sessions I joined. I hope my role was useful too. Congratulations on a great workshop to you two and the rest of your team."

"It was great to spend a few days discussing future governance of ocean carbon dioxide removal at the Forschungsinstitut für Nachhaltigkeit (RIFS) in Potsdam."

"Thanks for a great workshop. I really enjoyed it and would be happy to be involved in follow-up activities."

"Thank you for the great workshop and organisation. I really enjoyed taking part a few weeks ago in Potsdam."

"I thought the format worked really well, facilitating learning and meaningful discussions amongst all the participants. I learned a lot and met some great people!"

3. Conclusion

The aim of this in-person two-day workshop was to look towards the future and identify opportunities within the global ocean governance regime to govern ocean-based NETs in a comprehensive manner. The workshop, organised by Task 2.2 as part of the OceanNETs project, followed a first workshop that identified challenges within the current governance framework for ocean-based NETs. This second workshop enabled participants to take part in both breakout groups and plenary discussions to explore scenarios that reflected on these identified governance challenges within the future global ocean governance regime. It was determined that the current explicit governance framework (LC/LP) is reactive in its policy response and perhaps not fit to deal with the potential future challenges related to deployment of ocean-based NETs. Ocean-based NETs touch upon a wide range of governance areas that need better integration for good decision-making. Workshop participants were asked to determine the most important aspects of „good governance" (e.g., transparency) vital to make governance of ocean-based NETs more cohesive and anticipatory of identified potential challenges. Participants were further asked to develop governance responses within given prompts to put these "good governance principles" into practice and interactively advance discussions on the future governance of ocean-based NETs.

The workshop discussions reiterated the previous findings that a wider approach to governance beyond the explicit regulatory setting is needed to comprehensively address the complexities ocean-based NETs pose, in terms of their intended function as a climate solution, but also the unintended potential threat they may pose to the ocean environment, as well as unintended support they may provide to local economic activities in a changing system. It was determined that governance bridges must be built and strengthened between the ocean and climate governance regimes (and beyond) to better address this multiplicity. The workshop discussions also raised new questions, for example, if the explicit governance framework in place is fit for governing the wide range of technologies proposed by science and industry (e.g., ocean alkalinization, biomass dumping). Further questions pertained to complexities related to monitoring of intended and unintended impacts of such technologies and effective enforcement of safeguards to the ocean environment, as well as a variety of ethical aspects that were raised, e.g., on human rights of the current and future generations in relation to deployment of ocean-based NETs.

A transformation of governance in terms of integration of climate topics in the ocean regime and vice versa, as well as in terms of addressing historic inequities in decision-making, but also towards intergenerational justice was highlighted. The need for a foresight-oriented approach to governance of ocean-based NETs based on sound science, implemented in coordination with other international agreements and global sustainability goals, including early-onset participatory approaches that ensure transparency as well as capacity building to include all stakeholders, set within the current governance regime to avoid further fragmentation, was a key outcome of the workshop. Next steps include a synthesis of the insights gained through the work done in OceanNETs Task 2.2 (Deliverable 2.5) and the conceptualization of a policy brief for EU policy makers to communicate recommendations for good governance of ocean-based NETs based on the results of the co-creative approach towards transformative research applied in Task 2.2.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

4. Annex

4.1 Invitation

Future Governance of Ocean-Based Negative Emissions Technologies: A Scenario Workshop

Date: 30 November – 1 December 2023

Location: Research Institute for Sustainability – Helmholtz Centre Potsdam
Berliner Str. 130, 14467 Potsdam, Germany

The deployment of ocean-based 'negative emissions technologies' (NETs) to enhance the natural function of the ocean to sequester and store carbon has been proposed to keep within temperature limits as agreed upon by the global community. While the deployment of NETs for large-scale carbon dioxide removal (CDR) holds potential also for alleviating climatic pressures on the ocean, a range of challenges have been identified, including related specifically to governance of the technologies. The aim of this in-person two-day workshop is to look towards the future and identify opportunities within the global ocean governance regime to govern ocean-based NETs in a comprehensive manner.

The workshop is organised by the Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS – *formally Institute for Advanced Sustainability Studies / IASS*) as part of the OceanNETs project and follows a first workshop that identified challenges within the current governance framework for ocean-based NETs. This second workshop will ask participants to take part in both breakout groups and plenary discussions to explore scenarios that reflect on identified governance challenges within the current and alternative global ocean governance regimes. Participants will be asked to develop „good governance" responses within given prompts and interactively advance discussions on the future governance of ocean-based NETs.

Your unique perspective on the subject is highly valued. The results of the workshop will contribute to the research within OceanNETs and inform the production of a policy brief for European policy makers. Chatham House Rule will apply during the workshop.

We hope you will be able to participate in the workshop and would kindly ask you to **please register as soon as possible**, as spaces are limited. Please note that participation is by invitation only. In case you will not be able to attend you may suggest an expert from your organisation as replacement.

Registration link: https://eveeno.com/scenarioworkshopforoceanbasednets

Limited funds for travel and accommodation are available. Please contact us for further information or if you have any remaining questions. A detailed workshop agenda and materials will follow.

Warm regards,

Lina Röschel and Barbara Neumann

Ocean Governance Research Group
Research Institute for Sustainability – Helmholtz Centre Potsdam
Web: www.rifs-potsdam.de/en/research-group/ocean-governance
Mail: Lina.Roeschel@rifs-potdam.de ; Barbara.Neumann@rifs-potsdam.de

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

4.2 Workshop agenda

Future Governance of Ocean-Based Negative Emissions Technologies: A Scenario Workshop

RIFS POTSDAM

Research Institute for Sustainability – Helmholtz Centre Potsdam

in Potsdam, Germany

Day 1, Thursday, 30 November 2023

Time (CET)	Program Elements
09:30 – 10:00	Arrival of participants, welcome coffee
10:00 – 10:20	Introduction to the workshop and housekeeping *Barbara Neumann, Research group lead "Ocean Governance", Research Institute for Sustainability – Helmholtz-Centre Potsdam*
10:20 – 10:30	Welcome Note *Mark Lawrence, Scientific director of the Research Institute for Sustainability – Helmholtz-Centre Potsdam*
10:30 – 10:45	Activation exercise
10:45 – 11:05	Introduction to ocean-based negative emissions technologies (NETs) *David Keller, Senior scientist and coordinator of the OceanNETs project, GEOMAR Helmholtz Centre for Ocean Research*
11:05 – 11:20	The international legal framework applicable to ocean-based NETs *Robert Steenkamp, Researcher in public international law at the Chair in International Law of the Sea and International Environmental Law, Public International Law and Public Law, University of Hamburg*
11:20 – 11:40	Ocean governance and ocean-based NETs *Lina Röschel, Ocean Governance Research Group, Research Institute for Sustainability – Helmholtz-Centre Potsdam*
11:40 – 12:00	Q&A in the plenary
12:00 – 13:00	Good governance of ocean-based NETs: Small break-out group discussion
13:00 – 14:00	Lunch, catered
14:00 – 15:00	"Spotlights" in the plenary: A series of impulse talks
15:00 – 17:00	Future governance of ocean-based NETs: Break-out group scenario exercise part I
17:00 – 17:20	Intervention: Reflections on governance of ocean-based NETs from a Marine Conservation perspective *Karen Kienberger and Melissa Abderrahim, International Union for Conservation of Nature (IUCN)*
17:20 – 17:30	Closing remarks day 1
17:30 – 20:00	Visit to a traditional Potsdamer Christmas market and joint dinner

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

Day 2, Friday, 1 December 2023

Time (CET)	Program Elements
08:30 – 09:00	Arrival of participants, morning coffee
09:00 – 09:15	Welcome and agenda for day 2
09:15 – 09:45	The role of the ocean in climate policy *Miranda Böttcher, Research cluster "Climate Policy and Politics, Research Division EU/Europe", German Institute for International and Security Affairs (SWP)*
09:45 – 10:15	How to govern (marine) CDR? A critique of current assessment frameworks and a proposal for an alternative approach. *Christian Baatz, Research group lead "Climate Ethics, Sustainability and Global Justice, Department of Philosophy, University of Kiel*
10:15 – 12:00	Future governance of ocean-based NETs: Break-out group scenario exercise part II
12:00 – 13:00	Lunch, catered
13:00 – 14:00	Reporting back from break-out groups in the plenary
14:00 – 15:00	Plenary discussion: The Future of Ocean Governance and Ocean-based NETs – designing anticipatory governance
15:00 – 15:30	Coffee break
15:30 – 16:15	Revisiting good governance
16:15 – 16:30	Closing remarks

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

4.4 Data Consent Form

Future Governance of Ocean-Based Negative Emissions Technologies: A Scenario Workshop

RIFS POTSDAM

30 November – 1 December 2023
Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS), Potsdam, Germany

Participant Information Sheet and Consent Form

This document provides background to the workshop "Future Governance of Ocean-Based Negative Emissions Technologies: A Scenario Workshop" which will be held from 30 November until 1 December 2023 at the Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS).

The workshop is part of the research conducted in Task 2.2 of the overarching EU H2020 project OceanNETs and contributions made by participants during the workshop will be integrated in the research and further analysis, as outlined below. The document will outline how the data collected will be used and what is expected from participants.

Please read the document carefully and sign the consent form if you agree to the research team working with the data (information) provided by you during the workshop. The signed form shall be sent back to lina.roeschel@rifs-potsdam.de by **Friday, November 24th, 2023**. Digital signatures and return via e-mail are welcome.

General Information

Project title:	Regional and global governance for emerging ocean-based NETs (Task 2.2)
Funding:	This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 869357.
Project description:	The research task "Regional and global governance for emerging ocean-based NETs" (Task 2.2) is part of the overarching, EU-funded project "Ocean-based Negative Emission Technologies - analyzing the feasibility, risks, and cobenefits of ocean-based negative emission technologies for stabilizing the climate" (OceanNETs) which investigates whether ocean-based net emission technologies (NETs) can play a substantial and sustainable role in limiting global warming. An interdisciplinary consortium of 14 partners from six countries is working together in OceanNETs to investigate the technical, environmental, economic and social dimensions of ocean-based NETs.

The research conducted under Task 2.2 of OceanNETs aims to identify regional and global governance challenges and opportunities for ocean-based NETs. More specifically, the task combines desk-based research and expert elicitation (survey, interviews, workshops) to analyse how emerging ocean NETs correspond with existing and future ocean governance regimes and develop recommendations for a "good governance" of ocean-based NETs from a marine governance perspective. Building on each other, the research components expert elicitation and specifically the dialogue workshops aim to discuss ocean-based NETs with the broader community of experts and across related policy frameworks, map out and prioritize challenges, co-benefits and trade-offs, and develop recommendations for considering ocean NETs in ocean policy and governance.

This workshop, to be held end of November 2023, will employ a qualitative scenario building exercise to further identify how ocean-based NETS may correspond within future ocean governance regimes. The aim of this workshop is to reflect on future governance challenges for ocean-based NETs within the current and alternative governance frameworks, and to develop recommendations for „good" governance responses.

Researchers: Barbara Neumann is Task 2.2 lead (barbara.neumann@rifs-potsdam.de) and Lina Röschel the main researcher (lina.roeschel@rifs-potsdam.de), Research Institute for Sustainability – Helmholtz Centre Potsdam

Information about the workshop and data privacy

Workshop Title: Future Governance of Ocean-Based Negative Emissions Technologies - A Scenario Workshop

Date: 30 November – 01 December 2023

Location: Research Institute for Sustainability – Helmholtz Centre Potsdam
Berliner Str. 130, 14467 Potsdam, Germany

Workshop goals: The workshop follows a first workshop that identified challenges within the current governance framework for ocean-based NETs. This second workshop will ask participants to take part in both breakout groups and plenary discussions to explore scenarios that reflect on identified governance challenges within the current and alternative global ocean governance regimes. Participants will be asked to develop „good governance" responses within given prompts and interactively advance discussions on the future governance of ocean-based NETs. The overarching aim of this in-person two-day workshop is to look towards the future and identify opportunities within the global ocean governance regime to govern ocean-based NETs in a comprehensive manner.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

In the following, please find more information on why we have chosen you for participation, what the workshop will be like, what kind data we will be collecting and what we will do with the data. Participation is entirely voluntary and you are free to decline to participate.

1. Why did we contact you?

You are contacted as a potential participant for this workshop on the basis of your professional background and/or interest and activities. Participation is entirely voluntary, and you are free to decline to participate.

2. What will happen at the workshop?

We will receive around 30 experts and stakeholders from the field at a 2-day workshop held at the Research Institute for Sustainability – Helmholtz Centre Potsdam, Germany. The aim of the workshop is to discuss ocean-based NETs with the broader ocean governance community and across related policy frameworks, map out and prioritize challenges, and develop recommendations for considering ocean NETs in ocean policy and governance. You will be provided with an agenda in advance of the workshop to prepare for the workshop. The workshop itself will be a mixture of plenary discussions and focussed group work with the objective to produce tangible outcomes and contribute to a policy paper on the topic.

3. What kind of data will we collect?

No personal data is collected automatically. All information collected is your registration details that you provide when registering online for this workshop and the contributions you make during the workshop. We will take minutes for documentation purposes and to collect workshop results. These will be pseudonymised after the workshop. We ensure that all contributions and information you provide will be treated confidentially and that no information will be shared that could identify you.

As part of the online registration for the workshop you have agreed to include your name and institution on a participant list that will be shared with the other participant during the workshop for information.

4. What will we do with the data?

Your participation will provide an important step to understanding the field of inquiry.

The pseudonymised data will be used internally for discussion and analysis in the context of the research conducted under Task 2.2 of the OceanNETs project. Further, they may be exchanged with partners of the OceanNETs project consortium working on public acceptance (work package 3 of the OceanNETs parent project) to support their research through additional findings from the dialogue workshops conducted by us. We ensure that no data will be shared with third parties except in the form of pseudonymised research data and results.

Also, the pseudonymised results of the workshops will be used to generate publications addressing the scientific community (e.g. through publications in scientific journals) as well as policy-makers and the broader public (e.g. through policy briefs), and they will be presented at conferences and workshops.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

5. How will we treat the data to ensure confidentiality?

All information shared will be treated confidentially and their publication remains pseudonymous. After the workshop, all documents from the workshop will be pseudonymised to ensure that no conclusions can be drawn with respect to your identity or personal data. All digital data is stored in a digital folder on the RIFS-GFZ data server which is only accessible to project staff. Written documents will be saved in secured cupboards. To ensure good scientific practice and for possible verifications, RIFS-GFZ reserves the right to save the documents prepared for pseudonymisation in a separate digital folder on the institute's server.

We assure you that the data will not be transmitted to third parties outside the project. To the extent that this material is cited in published work, this will be done in a manner that does not identify the source or their institutional affiliations.

To safeguard good scientific practice, all data will be stored securely for a period of ten years, after which it will be deleted or shredded using appropriate document shredding services.

6. Who should you contact for questions?

If you have questions on the study, the collection, processing and disclosure of data provided by you during the study, please do not hesitate to contact Lina Röschel (lina.roeschel@rifs-potsdam.de) of the project team.

Consent

I confirm that I have read and understood the above information regarding the use of my personal data for the purpose of the project, and consent to the use of my contact information:

Signed _____

Date _____

Name (in block letters) _____

Contact information provided:

Name: _____

Affiliation: _____

Email address: _____

Telephone (country code) and number: (+___) _____

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Annex

1. Definitions

In accordance with Art. 4 No. 1 GDPR "personal data" refers to all information relating to an identified or identifiable natural person ("the person concerned"). A natural person is considered as identifiable if they can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. Other examples of identifiers include indications as to where a person is insured or resides, or how much they earn.

According to Art. 9 (1) GDPR, "special category data" are personal data that reveal a natural person's racial or ethnic origins, political opinions, religious or ideological convictions or trade union membership, as well as any genetic or biometric data that can be used to uniquely identify a natural person as well as data relating to their health or sexual orientation.

Under Article 4 (2) GDPR, "processing" refers to any operation or series of operations performed with or without the aid of automated procedures in relation to personal data such as collection, organization, storage, adaptation or modification, reading out, querying, using, disclosing through transmission, dissemination or any other form of provision, reconciliation or association, restriction, erasure or destruction.

2. Information on data processing in accordance with Art. 12 et seq. GDPR

We would like to inform you here about how we use your data in the above-named research project.

a) Contact information

a. Research Institute for Sustainability – Helmholtz Centre Potsdam
Berliner Straße 130, D-14467 Potsdam, Germany
Phone: +49 331 28822-300, Fax:+49 331 28822-310, E-Mail: info@rifs-potsdam.de

b. Name and contact details of the data protection officer
Marko Blau and Eva Grübel-Hoffmann
Telegrafenberg, 14473 Potsdam, Germany
Phone: +49 331 288 1052 , E-Mail: datenschutz@gfz-potsdam.de

c. Contact details of the supervisory authority
The country commissioner for data protection and for the right to file inspection Brandenburg,
Dagmar Hartge,
Stahnsdorfer Damm 77, Germany-14532 Kleinmachnow,
Phone: +49 33203/356-0, Email: Poststelle@LDA.Brandenburg.de

b) Processing of your personal data

Which personal data do we use and where does your data come from?

We have obtained your contact information (Name, institution, email address, telephone number) through personal recommendation or by searching for publicly available information.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

Registration details and information shared during the workshop come from you. No personal data is collected automatically. All information collected during the workshop is the contributions you make.

For what purposes and on what legal basis do we process your data?

We process your personal data in accordance with the European General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG), Germany. The purpose of the processing is the implementation of the research project OceanNETs to investigate ocean-based net emission technologies. The legal basis for the processing of this data is provided under Article 6 (1) (a) and Article 6 (1) (f) GDPR and extends to the processing of special category data.

How long will your data be stored?

All data will be stored for 10 years after the date of collection to ensure good scientific practice. After this time it will be erased.

Is there automated decision-making, including profiling?

As a responsible institute, we do not use automatic decision-making or profiling.

c) Disclosure of your data

Who gets your personal data?

Your personal data is processed by the project team at the Research Institute for Sustainability – Helmholtz Centre Potsdam and will not be transmitted to third parties outside the project. Only anonymized results will be published or transmitted to other partners of the research project.

Is your data transmitted to a third country or an international organization?

A transfer of personal data to countries outside the European Economic Area (third countries) does not take place.

Your rights

You have a right to information (Art.15 GDPR), correction (Art.16 GDPR), cancellation (Art.17 GDPR), limitation of processing (Art.18 GDPR), data transferability (Art.20 DSGVO) and objection to the data processing (Art. 21 GDPR). Please contact us if you would like to exercise these rights.

You can revoke your consent under Art. 6 (1) (a) GDPR or Art. 9 (2) (a) GDPR at any time with effect for the future. Please direct your revocation to the above-named responsible body. This does not affect the legality of the data processing carried out prior to your revocation.

Furthermore, you have the right to lodge a complaint with a supervisory authority (Art. 77 GDPR). You can find the contact details under 1c.

Potsdam, 14.11.2023

Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS)

Berliner Straße 130, D-14467 Potsdam, Germany

Phone: +49 331 28822-300, Fax:+49 331 28822-310 E-Mail: info@rifs-potsdam.de

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 869357.

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