

Sustainable Ocean Summit 2017

Full Report

May 2018

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The Sustainable Ocean Summit 2017 convened in Halifax, Canada, November 29 to December 1.

The World Ocean Council would like to thank [Kathryn \(Kes\) Morton](#) and the team of Ocean Ambassadors for their on-site support and diligence in note-taking during conference sessions. The writing of this report has been possible thanks to them.

This report was written by [Julia Tasse](#) and [Caroline Abid](#), and reviewed and edited by [Jane Hei Tung Chu](#) and [Melissa Ryan](#). The World Ocean Council will like to thank them in particular.

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Sustainable Ocean Summit 2017 Full Report

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## Table of Contents

<b>EXECUTIVE SUMMARY</b>	<b>4</b>
GENERAL HIGHLIGHTS	4
THEMATIC OUTCOMES	5
SOS 2017 ATTENDEES	7
<b>DAY 1</b>	<b>8</b>
1.A OPENING PLENARY SESSION: BLUE SKY THINKING FOR A BLUE OCEAN AND BLUE ECONOMY	8
1.B OCEAN EXECUTIVE FORUM: THE SIGNATURE SOS PANEL OF CEOs FROM ACROSS THE SECTORS	10
1.C OCEAN INDUSTRY PROJECTIONS AND THE FUTURE OF THE OCEAN ECONOMY	12
1.1 AQUACULTURE: ADVANCING SUSTAINABLE AQUACULTURE IN A MULTI-USE OCEAN	14
1.2 MARITIME CLUSTERS: INNOVATION AND COLLABORATION FOR OCEAN SUSTAINABLE DEVELOPMENT	15
1.3 WOC YOUNG OCEAN PROFESSIONALS (YOP) AND MIT SOLVE - IDENTIFYING INNOVATION CHALLENGES FOR OCEAN SUSTAINABILITY	16
<b>DAY 2</b>	<b>17</b>
2.D THE DIGITAL OCEAN, BIG OCEAN DATA AND OCEAN CLOUD COMPUTING: THE FUTURE OF OCEAN SUSTAINABLE DEVELOPMENT	17
2.1 COASTAL INFRASTRUCTURE, EXTREME WEATHER EVENTS, GREEN INFRASTRUCTURE, AND BLUE CARBON – ADVANCING ADAPTATION ESPECIALLY FOR SMALL ISLAND STATES AND LEAST DEVELOPED COUNTRIES	19
2.2 BIOFOULING AND INVASIVE SPECIES: ADDRESSING THE THREAT THROUGH INDUSTRY COLLABORATION	21
2.3 SYNERGIES IN SHIPPING AND SUSTAINABILITY: INTERNATIONAL COLLABORATION ON GREEN SHIPPING PROGRAMS AND INFRASTRUCTURE	23
2.4 OCEAN ENERGY: SCALING UP LOW CARBON ENERGY SOURCES FROM THE SEA, WITH A VIEW TOWARDS SIDS AND LDCS	24
2.5. THE LAW OF THE SEAS NEW LEGALLY BINDING INSTRUMENT ON BIODIVERSITY IN AREAS BEYOND NATIONAL JURISDICTION (BBNJ): WHAT WILL IT MEAN FOR OCEAN INDUSTRIES	26
2.6 ARCTIC SUSTAINABLE DEVELOPMENT – VESSEL TRAFFIC AND MARITIME INFRASTRUCTURE PROJECTS AND SCENARIOS	28
2.7 OCEAN NETS: CO2 SEQUESTRATION VIA OCEAN-BASED NEGATIVE EMISSIONS TECHNOLOGIES (NETs)	30
2.8 SOCIAL LICENSE FOR THE BLUE ECONOMY: WHAT IT IS AND HOW COMPANIES CAN ACHIEVE IT?	32
<b>DAY 3</b>	<b>34</b>
3.1 MARINE SOUND: TACKLING A GLOBAL PROBLEM THROUGH SCIENCE BASED INDUSTRY LEADERSHIP AND MULTI STAKEHOLDER COLLABORATION	34
3.2 FROM LOCAL ENTERPRISE AND SUSTAINABILITY PRACTICES TO GLOBAL SEAFOOD MARKETS: REAL SOLUTIONS FOR FISHERY SUSTAINABILITY, GHOST GEAR AND TRACEABILITY IN A MULTIPLE USE OCEAN	36
3.E OCEAN INVESTMENT PLATFORM: FINANCING OCEAN SUSTAINABLE DEVELOPMENT	38
3.3 SHIP STRIKES AND MARINE MAMMALS – PRACTICAL SOLUTIONS FOR OCEAN INDUSTRIES	39
3.4 SMART OCEAN-SMART INDUSTRIES: ADVANCING OCEAN INDUSTRY DATA COLLECTION, INCLUDING ON OCEAN ACIDIFICATION AND BATHYMETRY	40
3.5 DARK SHIPS: ADVANCING OCEAN GOVERNANCE AND MARITIME SECURITY BY IMPROVING DETECTION OF ILLEGAL OR SUSPICIOUS VESSEL ACTIVITIES	42
3.6 ADDRESSING CROSS-SECTORAL CONFLICTS AND DEVELOPING SYNERGIES: OFFSHORE WIND ENERGY AND FISHERIES	44
<b>CONCLUSION</b>	<b>47</b>

## Executive Summary

The World Ocean Council (WOC) Sustainable Ocean Summit (SOS) has become the premier forum for advancing industry leadership, ocean sustainable development, science and stewardship. Following the success of the SOS in Rotterdam (2016), Singapore (2015), Washington D.C. (2013) and Belfast (2010), in 2017 the SOS convened in Halifax, Canada, from November 29 to December 1.

The SOS 2017 theme **“The Ocean Sustainable Development Goal (SDG 14): Business Leadership and Business Opportunities”** was addressed in a unique global business conference program. The SOS provided **a timely, global platform for leadership companies and organizations to advance Corporate Ocean Responsibility**, and the implementation of ocean business community solutions to ocean sustainable development challenges.

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### General Highlights

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The [Sustainable Ocean Summit](#) gathered ocean industry leaders and international experts for dialogue on the future of responsible ocean business. Over the course of three days, speakers and participants shared insights into ocean sustainable development, opportunities and challenges for the next 15 years, and examined actions required to make progress towards achieving SDG 14 targets. The concept of “Blue Sky Thinking” was engaged (creative thinking unfettered by convention and reality).

From an **economic** point of view, the ocean industry is developing rapidly, and is forecasted to continue on an upward trajectory for the next 15 years. Technology and innovation will be key contributors to the sustainability of this development. The SOS highlighted the need for relevant data to improve ocean monitoring and understanding, and to foster ocean business efficiency. Ocean businesses have a role to play in addressing the world’s most pressing current issues (food safety for a growing population, energy needs, air quality, etc.) Among the solutions discussed were ocean energy, aquaculture, seabed mining, floating cities, low-carbon shipping, and sustainable fishing. Most of these industries will require funding for research and development, in particular in the leveraging of technology for more reliable and profitable models.

From a **social** point of view, involvement of all stakeholders, especially local communities, in business sustainability initiatives will be crucial.

**Environmentally** speaking, the ocean business community is making positive impacts with projects relating to renewable energy, carbon capture, negative emissions technologies, carbon savings via usage of alternative fuels, better waste management, and public awareness of the impact on marine wildlife.

For all these themes, **the benefits of business alliances (or clusters) and cross-sector collaboration** were brought to the foreground. Such alliances enable the creation of common research programs, facilitate funding, empower industries to advocate for regulatory changes, and generalize knowledge and best practices.

The WOC, as a global cross-sectoral alliance aimed at facilitating Corporate Ocean Responsibility, represents the ideal platform to develop these collaborations. For industries engaged in the development of emerging solutions, the WOC Ocean Investment Platform aims at facilitating the search for appropriate funding. The SOS also represents a good opportunity for innovative companies to gain visibility within the ocean business community. For further information on the establishment of efficient clusters, please access the [WOC White Paper on Ocean/Maritime Clusters](#) on the WOC website.



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## Thematic Outcomes

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Outcomes of conference sessions relating to SDG 14 sub-targets are presented below.

### Ocean Knowledge, Research and Technology

Increasing transmission capabilities and the need for real-time data have led to an upsurge in the connector market and improvements in satellite and drone data collection systems. While access to comprehensive and relevant data is essential for research, data sharing has raised concerns over cost, confidentiality and mutual reliance. Establishing precise project goals will be essential to choosing pertinent and granular data for use.

Through its Smart Ocean-Smart Industries program, the WOC is working to ensure that industry data collection and sharing is efficiently coordinated, and subsequently integrated into national and international public science programs in a cost-effective manner.

### Food Security: Sustainable Fishing and Aquaculture

Aquaculture, in particular open-ocean aquaculture, plays an essential role in meeting growing demands for protein. Although research, education and technologies in aquaculture development have made significant progress over the last few years, the vast potential of the industry has yet to be fully realized. Key barriers include complex permit processes, poor public perception and a lack of funding. Innovative technologies and adequate monitoring systems will be crucial to circumventing much of the existing environmental impacts.

Players in the fishing industry are also making stronger commitments to responsible fisheries management, by reason of their heavy dependence on the sustainability of ocean resources. While certification and traceability have become valuable tools for guaranteeing the sustainable production of seafood, they will need to be developed beyond certification paperwork and mere compliance, towards social license and ethical trade. Sustainable fishing also implies the reduction of ghost – abandoned – gears.

### Climate Change and Ocean Acidification

There is urgency for coastal infrastructure, both natural and artificial, to adapt to climate and other pertinent risks. Restoring green infrastructures such as mangroves can bring vast environmental and social benefits. These ecosystems have huge CO<sub>2</sub> storage capacities, host diverse ecosystems, provide sources of food and income for coastal communities, and have direct impact on the quantum of damage and losses suffered through natural disasters. However, financing such restorations projects remains challenging.

Additionally, the ocean itself can be used for CO<sub>2</sub> sequestration via ocean-based negative emissions technologies (NETs). NETs are still under development, but the potential risks involved in implementing them are comparable to risks involved in any business operation. Cost-benefit analyses will need to be performed for each NET, with precise evaluations of potential environmental impact. Workable technical, regulatory and financial structures will need to be developed. NETs business models have yet to be established, but will depend on potential economic incentives such as government subsidies and carbon tax systems.

## Marine Pollution

Two types of pollution were spotlighted: biofouling and marine sound.

The adoption of eco-friendly technical solutions for biofouling has been limited thus far, and requires stronger regulations and further public exposure. The WOC is a partner of the [Glofouling project](#), which focuses on identifying common standards and solutions to biofouling. The involvement of the paint industry will be key to the research of such solutions. The [SOS 2018, to be held in Hong Kong on November 14–16](#), will feature a session on the issue.

Reducing or limiting man-made marine sounds will require coordination among industries and other stakeholders. Likewise, funding for peer-reviewed research will allow for better understanding of the effects of underwater noise on biological organisms and animal behavior. The WOC Marine Sound Working Group is working to facilitate inter-governmental efforts and cross-sector collaboration.

## Conservation and Ecosystem-Based Management

More and more green shipping initiatives are being implemented and supported by environmental certifications. Despite hefty investment costs, the reduction of greenhouse gas emissions has implied higher fuel efficiency and hence lower operation costs. Transparency and collaboration can help spread best practices and share costs of research. Moreover, as laid out during the session on Green Shipping, environmental performance is often related to ship safety.

While the Arctic is expected to witness increasing shipping activity over the next few years, much preparatory work remains to be done. These comprises further data collection, improvement of local infrastructures, development of microbusinesses, expansion of emergency response capacities, and definition of low impact shipping corridors to minimize impacts on wildlife. It is essential to include all stakeholders, especially indigenous communities, in the consultation and implementation processes. The WOC is a partner of three European projects that help connect Arctic stakeholders willing to engage in the sustainable development of the Arctic: [EU-PolarNet](#), [Blue-Action](#) and [ARICE](#).

## Economic Benefits to Small Island Developing States and Least Developed Countries

By 2050, ocean energy extraction could represent double the current electricity production. Financial and technological barriers still must be overcome. Current uses of ocean energy sources include water desalinization systems, electricity for remote communities and aquaculture. Important questions to answer before implementing an ocean energy project include the viability and safety of the infrastructure, as well as its co-existence with other marine space users. It is essential to involve local communities in these discussions.

## Ocean Governance

The SOS 2017 addressed various aspects of ocean governance, covered new topics such as the social license to operate, and continued updating the ocean business community about the BBNJ negotiation process at the UN. The SOS session on Social License examined numerous sectors of the blue economy. Sectors must collaborate harmoniously in a multi-use ocean and respect traditional owners of the resources. The social license to operate is brought on by transparent and inclusive engagements on the part of all ocean

industries. It involves collaboration with local stakeholders and transparency regarding the potential environmental impacts of economic activities.

A new legally binding instrument on Biodiversity in Areas Beyond National Jurisdiction (BBNJ) will complement the United Nations Convention on the Law of the Sea (UNCLOS). It aims to implement a cross-sectoral system of ocean governance for a sustainable use of marine resources. The process started in 2004 with an open-ended Informal Working Group and continued in June 2015 with the implementation of a Preparatory Committee (PrepCom). With the conclusion of PrepCom meetings in July 2017, official negotiation processes have been initiated. As negotiations proceed, the focus of BBNJ will shift towards economic stakeholders and cross-sectoral industry engagement. The WOC can play a part in connecting and representing the opinions of businesses at upcoming BBNJ negotiations.

### Financing Ocean Sustainable Development

The WOC develops the Ocean Investment Platform to attract dedicated capital for the oceans, experienced professionals and create a large network. The goal of this platform is to connect investors and companies addressing ocean-related challenges profitably and with positive social and environmental impacts. The WOC plans to further develop this initiative with different investors. For example, sovereign wealth funds could invest in projects that need long-term commitments. Creative investment opportunities such as pension funds could be leveraged as well.

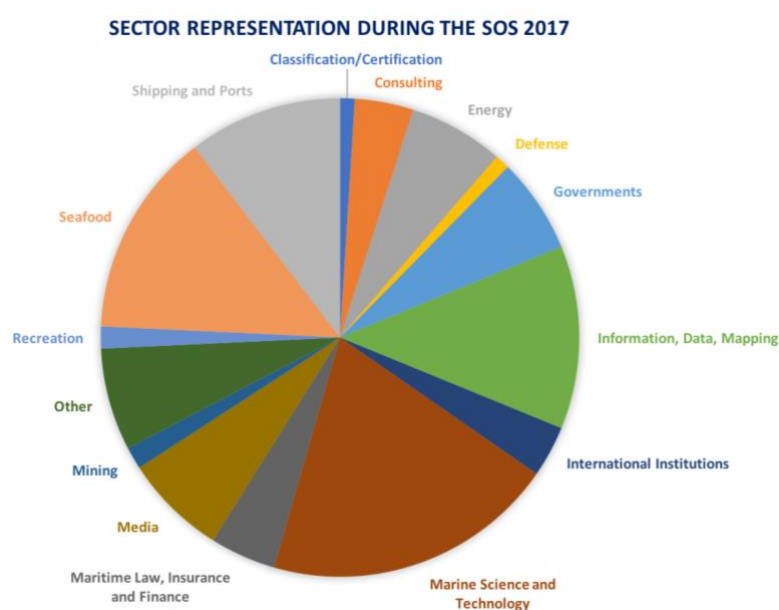
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### SOS 2017 Attendees

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Over the course of the three days, SOS 2017 attendees explored a range of cross-sectoral topics, strategies and solutions through workshops, plenary and parallel sessions. The working format helped identify clear, realistic pathways to **successfully achieving shared objectives for sustainable ocean use**.

The SOS 2017 brought together a wide range of industries involved in the use of marine space and marine resources. The different sectors represented can be seen in the Graph 1, below.



*Graph 1. Sector Representation of the SOS 2017 Attendees*

Attendees were primarily high-ranking executives and senior sustainability officers from the Ocean Business Community. Representatives of international organizations, government agencies, and academic research institutions were also in attendance. More than 220 participants represented 22 countries from all continents (with America hosting the largest representation, followed by Europe, Asia and Oceania, and Africa).

# Day 1

## 1. A. Opening Plenary Session: Blue Sky Thinking for a Blue Ocean and Blue Economy

### Framing questions

- What kind of far sighted (blue sky) thinking is needed to develop and achieve a global vision for ocean sustainable development that balances the needs for ocean economic goods and services, the need to maintain a healthy, productive ocean and the challenges of overall planetary sustainability?
- What is the role of ocean business community leadership and collaboration in developing and achieving this vision?
- What should other stakeholders be doing to foster and facilitate industry's long-term role in ocean sustainable development?

### Speakers/Panel

Chair – Paul Holthus, Chief Executive Officer, World Ocean Council  
 Ken Paul, Director of Fisheries and Integrated Resources, Atlantic Policy Congress of First Nations Chiefs Secretariat  
 James Michel, former President, Seychelles  
 Serge Segura, Ambassador for the Oceans, France  
 Wendy Watson Wright, Chief Executive Officer, Ocean Frontier Institute  
 Cristiana Paşca Palmer, Executive Secretary, Convention on Biological Diversity (CBD)  
 Vinay Patwardhan, Chief Operating Officer, Tai Chong Cheang (TCC) Steamship Co. (H.K.) Limited

### Commentators

Peter Hinchliffe, Secretary General, International Chamber of Shipping  
 Jim Cannon, Chief Executive Officer, Sustainable Fisheries Partnership

### Discussions

**Henk van Muijen, IHC Mining, WOC Board Chairman**, opened the SOS 2017 with welcome words and reaffirmed the importance of strengthening the dialogue between the ocean community and other stakeholders. **Paul Holthus, World Ocean Council CEO** and chair of the session, introduced the panelists and presented the concept of Blue Sky Thinking.

**Ken Paul, Atlantic Policy Congress of First Nations Chiefs Secretariat**, welcomed SOS 2017 attendees on behalf of the Mi'kmaq people. Following his presentation on the Aboriginal People and their status to be legally defined within the Canadian constitution through a specific initiative by PM Justin Trudeau, he emphasized their rights on the governance of the ocean and the need for the business community to partner with First Nation communities before setting up local business initiatives. He gave 94 recommendations including specific advice on corporate education and equitable employment opportunities.

**James Michel, former President, Seychelles**, called for an international governance structure on the ocean to be developed to overcome the unsustainable use of oceans. He stated that the UNCLOS framework is not sufficient, and advocated for an agenda within the leadership of the WOC, based on constructive collaboration and mutual understanding. Common projects would be implemented with a social license. He highlighted several areas of effort to focus on: waste management, sustainable fishing, and tidal and wave energy. He closed his address by sharing his deep belief that businesses cannot prosper if sustainability is not at the core of their practices.

**Serge Segura, Ambassador for the Oceans, France**, introduced the differences in perception he has as a diplomat and as a citizen. As a citizen, he can state that all the solutions are on the table, and that we need to implement processes to make use of them. As a diplomat, he has seen that 2017 has been a key year for the ocean with two important diplomatic processes. The first was the well-attended meeting on SDG 14, was held in New York City in June 2017, which involved not only public authorities but the ocean community at large. Mr. Segura maintained that the business community has not contributed enough, and called for common business action at the second SDG 14 meeting in 2020. The second process worked on adding a treaty to the UN Convention of the Law of the Sea, to protect Biodiversity in Areas Beyond National Jurisdiction (BBNJ). International maritime zones are key to global trade, and Mr. Segura called for a more active involvement of the private sector in the negotiations process.

**Wendy Watson Wright, Ocean Frontier Institute**, presented the Ocean Frontier Institute and outlined the need for interdisciplinary research. The idea of Blue Sky Thinking raises innovative concepts and new questions, such as the upgrading of fishery byproducts, waste management, real-time data management and Ocean Literacy.



She highlighted the need to include youth in data management, technological innovation, and governance. Change is required, and we must do things differently based on the question of “why” and with collaborative and collective approaches.

For **Cristiana Pasça Palmer, Convention on Biological Diversity (CBD)**, mindsets are changing: we used to believe that environmental sustainability cannot be consonant with business growth, but this trade-off is not relevant anymore. Conservation now makes perfect business sense. Economic growth and environmental sustainability are intrinsically linked. She presented the Convention on Biological Diversity and introduced the Business Committee role in the process. Maritime industry industries have many opportunities to improve their processes while protecting ecosystem services and ecological infrastructures. The business community should engage in innovation planning that calls for the expertise and leadership of each sector. She closed her address by sharing her hope that the summit in Egypt in October 2018 (focusing on mining, infrastructure, energy, and health) will see businesses become biodiversity champions and seize this conference as an opportunity.

**Vinay Patwardhan, TCC**, presented the Reduce, Reverse and Recover solution for Fuel Total Combustion and Emission Remediation. Even though ocean transport is the most economical way of transportation, it is also the most inefficient due to low-grade fuel, high viscosity, high flash, impurities, etc. Through a change in the type of fuel used in ships (from traditional engines to plasma ignition), TCC reached an increased efficiency in combustion and a reduction in hydrocarbon and impurities emissions. Mr. Patwardhan promoted a common place for improved excellence, and encouraged engine-makers to anticipate and go beyond IMO regulations in adopting different technologies.

**Peter Hinchliffe, International Chamber of Shipping**, outlined the need for global industry leadership and a cross-sectoral approach. He agreed that fact that maritime sectors, such as the shipping industry, play a political role due to their importance in the global economy, and that business players must be part of international negotiations and conversations. He shared the need for states and public authorities to cooperate more broadly with the industry to fight climate change.

**Jim Cannon, Sustainable Fisheries Partnership**, started his comment by reminding the audience of the importance of diesel engines in the raise of fishing rates, leading to overfishing. Nonetheless, there is a recent change towards a more sustainable use of the seas. He explained that the need for cross-sectoral engagements are often hindered by certain sectors’ fear of losing some of their exclusive zones, which leads to complex local agreements and no concrete engagement on the global scale. An international multi-sectoral approach requires comprehensive data collection, as well as collaboration, regulation and leadership at the state level.

### Key takeaways from the presentations and Q&A

<b>Economic</b>	The earlier perceived differences between environmental sustainability and business profitability are increasingly diminishing. CBD’s conference in Egypt and the commencement of negotiations on a new international legal instrument on Biodiversity Beyond National Jurisdiction in 2018 represent upcoming opportunities for ocean industries to get involved.
<b>Social</b>	Involvement of local communities in business sustainability initiatives is crucial. The link between international organizations and the business sector needs to be tightened.
<b>Environmental</b>	A global cross-sectoral approach to deal with sustainability concerns in the ocean space is representative of the nature of the ocean space as an ecological whole. There can be no sustainability if the problems of the oceans are engaged in a piecemeal approach.
<b>What does it mean for the World Ocean Council?</b>	The WOC provides a structure for multi-stakeholder collaboration, through its network, the Sustainable Ocean Summit and other projects and platforms. It helps businesses become more invested in the negotiations process. It will continue to represent their opinions during the upcoming BBNJ negotiations. Businesses are invited to contact the WOC Secretariat to participate in these processes.

## 1.B. Ocean Executive Forum: The Signature SOS Panel of CEOs from Across the Sectors

### Framing questions

- What is the ocean industry CEO perspective on ocean economic activity for the next 15 years?
- What opportunities and risks do ocean industry CEOs think that these scenarios create for each sector for the next 15 years? For the ocean economy and ocean business community overall? For the ocean itself?
- How do CEOs view the Sustainable Development Goals (SDGs) in relation to projected ocean economic activity and future risks and opportunities?

### Speakers/Panel

Chair – Christine Valentin, Chief Operating Officer, World Ocean Council  
*Oil and Gas:* Mike Utsler, Chief Operations Officer, Woodside Energy  
*Fisheries:* Ian Smith, Chief Executive Officer, Clearwater Seafoods  
*Shipping:* Ben Christian, Vice President – Marine Services, TOTE Services  
*Ship Registries:* Scott Bergeron, Chief Executive Officer, Liberian International Ship and Corporate Registry  
*Ocean Energy:* Reenst Lesemann, Chief Executive Officer, Columbia Power Technologies  
*Indigenous Corporations:* Bernd Christmas, Chief Executive Officer, Gitpo STORMS  
*Aquaculture:* Donna Lanzetta, Chief Executive Officer, Manna Fish Farms  
*Ports:* Karen Oldfield, President and Chief Executive Officer, Halifax Port Authority  
*Ocean Data/Technology:* Joe Turner, Chief Executive Officer, Exocetus Autonomous Systems

### Discussions

**Christine Valentin, World Ocean Council**, expressed her hope that this roundtable will foster collaboration between sectors through the sharing of needs and opportunities.

**Mike Utsler, Woodside Energy**, stated that energy demand is expected to grow by 30% over the next 25 years. More than a third of fossil fuel energy comes from the ocean. Two forms of energy will grow over the next 25 years to meet global energy needs efficiently and sustainably: alternative energies (harnessing the power of the oceans) and natural gas. In particular, using liquefied natural gas (LNG) to power vessels represents a solution to reduce the release of greenhouse gases and meet IMO 2020 targets for sulfur and NOx discharges.

**Ian Smith, Clearwater Seafoods**, described the fishing industry as an evolving industry with unprecedented growth. The challenge lies in decreasing its footprint while increasing activities' quality and safety, which requires improving the understanding and monitoring of the oceans. He presented the "Ocean Supercluster Initiative," a Canadian collaborative, multisector partnership between ocean industries and academic institutions, tech industries and government. The goal is to identify common research needs and coordinate efforts to accelerate the development of innovative and cost-effective technologies to address the broad ocean economy challenges.

**Ben Christian, TOTE Services**, explained that shifting to Liquid Natural Gas on some of their vessels is part of TOTE Services' sustainability strategy. The greatest benefit has been an improvement in local air quality (NOx and SOx reduction). This strategy is also a way to anticipate more stringent regulations and to be in line with customers' growing demand for sustainable services.

**Scott Bergeron, Liberian International Ship and Corporate Registry**, indicated that the flag state of Liberia is the second largest registry in the world. He predicted that the global shipping fleet will continue to grow to meet the demand, as will regulatory initiatives. This growth will benefit the biggest flag states: the ten largest flag states have 70% of the vessels registered. He presented some of the challenges of the shipping industry: compliance with complex and changing regulations, the move towards carbon-free shipping, and an increase in safety and labor force protection. Five opportunities for the shipping industry, as generated by the SDGs, were presented in a report by the Norwegian Shipowners' Association: (1) Act on the Paris agreement; (2) Build sustainable communities; (3) Protect life in the oceans; (4) Create a sustainable future of the ocean economy, and (5) Promote responsible practices.

**Reenst Lesemann, Columbia Power Technologies**, presented on the development of ocean energy. This includes fixed and floating offshore wind energy, tidal energy, and wave energy, which is approaching the pilot stage. He detailed the many potential applications: production of electricity and clean water for island communities, supply of clean energy for the oil and gas business (exploration, platforms, monitoring), reduction of aquaculture's dependence on diesel, and reduction of battery dependence, and monitoring of energy needs for oceanographic research. Risks remain regarding power cables and electromagnetic fields in water, but large studies are

underway to mitigate them. Ocean energy will require the development of investments and improvement of technology to become more economical.

**Bernd Christmas, Gitpo STORMS**, underlined the historical importance of fisheries for indigenous people and the necessity of a good collaboration between indigenous people and other ocean stakeholders. Such collaboration is rooted in the texts of the ILO Indigenous and Tribal Peoples Convention (1989) and the United Nations Declaration on the Rights of Indigenous Peoples (2007). Regarding current trade agreements, the Assembly of First Nations National Chiefs has a seat at the NAFTA table. Indigenous communities are involved in negotiations concerning products from the sea in the EU and Canada trade deal, and are pushing to have their voices heard in deals relating to the Asia-Pacific region.

**Donna Lanzetta, Manna Fish Farms**, presented the development of offshore aquaculture. Manna Fish Farms is currently engaged in talks for a permit to operate their first offshore fish farm on the East Coast. Progress for ocean aquaculture has been made in research and data collection, as well as in the establishment of funds and education programs, but challenges remain in obtaining funding, finding optimal locations for offshore farms, keeping fish fingerlings genetically identical as wild populations in case of escapes, implementing automated systems to feed remotely from the shore, choosing feed that does not contaminate the ocean, and assuring the transparency of the whole process through adequate monitoring.

**Karen Oldfield, Halifax Port Authority**, explained how the port of Halifax is an economic catalyst for the city and the whole province. One of the challenges is to berth and service the larger vessels, numbers of which have increased due to their efficiency. Halifax has the infrastructure for vessels over 10,000 TEU (twenty-foot equivalent units). The sustainability of ports can be measured through ISO 14001 and Green Marine standard certifications. Ports also have an important role to play in data collection and sharing. The port in Halifax, for example, shares traffic data so that trucks are aware of the best times to arrive, which results in less idling and less greenhouse gas emissions.

**Joe Turner, Exocetus Autonomous Systems**, claimed that customer engagement plays a part in pushing for sustainability goals by companies. Exocetus Autonomous Systems is currently competing for the Shell Ocean Discovery XPRIZE, a global competition to spur innovation in ocean exploration, with the challenge of mapping the ocean floor within ten years. It is hoped that these beautiful underwater images will help appeal and engage the public.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	The ocean industry is developing rapidly, and is forecasted to continue on an upward trajectory for the next 15 years. Technology and innovation will be key contributors to the sustainability of this development. The session highlighted the need for relevant data to improve ocean monitoring and understanding, and to foster ocean business efficiency.
<b>Social</b>	Collaboration among ocean stakeholders will be essential for success (i.e. the fishing industry to collaborate with indigenous people).
<b>Environmental</b>	Collaboration among ocean industries can bring significant environmental benefits: <ul style="list-style-type: none"> <li>- The ocean energy industry with the oil &amp; gas, aquaculture or ocean exploration sectors</li> <li>- The oil and gas sector with the shipping industry, to find innovative solutions to power vessels, among which Liquid Natural Gas</li> <li>- The ocean exploration sector with ports or the fishing sector for data collection and sharing</li> </ul>
<b>What does it mean for the World Ocean Council?</b>	Promoting collaboration among ocean industries is the key mission of the WOC. The WOC can help in collecting and sharing relevant data for the business: <a href="#">the Smart Ocean-Smart Industries Program</a> is working to ensure industry data collection and sharing is coordinated, efficient, cost-effective, and is integrated into national and international public science programs.

## 1.C. Ocean Industry Projections and the Future of the Ocean Economy

### Framing questions

- What is the future of industry activity in key ocean economic sectors?
- What are the key trends, geographies, assumptions, opportunities, and constraints for each sector in the coming 15 years, the time frame of the U.N. SDGs?
- What opportunities and risks do these scenarios create for each sector? For the ocean economy and ocean business community overall? For the ocean itself?

### Speakers/Panel

Chair – Claire Jolly, Head, Innovation Policies for Space and Oceans, Directorate for Science, Technology and Innovation, OECD

*Shipping:* Kathy Metcalf, President and Chief Executive Officer, Chamber of Shipping of America

*Seabed Mining:* Samantha Smith, Director, Blue Globe Solutions

*Submarine Cable:* Alasdair Wilkie, Chief Technology Officer, Deep Blue Cable

*Oil and Gas:* Romain Provost, General Delegate Middle East and Renewables, Evolen

*Offshore Wind Energy:* Joe Martens, Director, New York Offshore Wind Alliance

*Ocean Energy:* Annie Dallman, Vice-Chair, Ocean Energy Systems (OES), International Energy Agency (IEA)

*Fisheries:* Marc Taconet, Senior Fishery Officer, Branch Head, Statistics and Information Branch (FIAS), UN Food and Agriculture Organization (FAO)

*Aquaculture:* Melanie Siggs, Director of Strategic Engagements, Global Aquaculture Alliance (GAA)

*Human Habitation on the Ocean:* Rutger-de-Graaf van Dinther, Founder Blue 21; Rotterdam University of Applied Sciences

### Discussions

**Claire Jolly, OECD**, began the session with her presentation of OECD report “The Ocean Economy in 2030”. The report evaluates the output value of the ocean economy in 2010 at US\$1.5 trillion (measured in terms of the contribution of ocean-based industries to economic output and employment), with one third derived from the offshore oil and gas industry. This contribution of the ocean economy is expected to double between 2010 and 2030. Strong growth is expected in industries relating to marine aquaculture, offshore wind energy, fish processing, and shipbuilding and repair.

**Kathy Metcalf, Chamber of Shipping of America**, spoke about the shipping industry and its rapid development. Such development has been met with challenges including the need for streamlined regulations and requirements through IMO leadership, for lower greenhouse gas emissions, for solutions to marine debris including garbage, for a reduction in commercial shipping noise, and for protection of marine wildlife. New opportunities have been emerging from technological advances, innovative ideas for propulsion, and discussions at the UN concerning the regulation of Areas Beyond National Jurisdiction and the protection of biodiversity in the high seas.

**Samantha Smith, Blue Globe Solutions**, remarked that a green technology revolution implies an increased demand for metals, and that seafloor mining could be a solution. This involves extracting polymetallic nodules from the seafloor (containing manganese, nickel, copper, cobalt and other elements) under the control of the International Seabed Authority. She strongly believes that seafloor mining can contribute to the SDGs, and maintained that the process would generate less waste and less energy compared to land mining. Socio-economic impacts would have to be examined in tandem with those caused by traditional mining.

**Alasdair Wilkie, Deep Blue Cable**, explained that 99% of international data (including Internet usage and phone calls) is transmitted via cables, and that cables leave few footprints on the seabed. Challenges faced by the industry include the continuous growth in data and the difficulty of getting cables to remote, ill-equipped regions, examples being small island communities.

**Romain Provost, Evolen**, stated that the oil and gas sector will continue to play a major role in the energy industry for years to come. The industry is working on operating more safely, cleanly, and efficiently while reducing its emissions and developing renewable energy sources. Adding to these challenges are evolving costs and the continuous growth in energy demands. Offshore energy production is mainly done in shallow waters, but deep-water exploration is underway thanks to new technologies (SCADA system and underwater robotics). The Liquid Natural Gas market is developing, with the help of floating storage and Regasification Units for smaller or emerging markets.

**Joe Martens, New York Offshore Wind Alliance**, reviewed the rapid expansion of the wind energy industry, with simultaneous increases in the number of sites, the size of installations and their efficiency. The market has been driven by dramatic cost reductions and subsidies, especially in Europe and the United States. The “National Offshore Wind Strategy”, released in 2016 by the United States Department of Energy (DOE) and Department of the Interior (DOI), emphasized that the wind energy industry can boost economic development and employment, and dramatically reduce the release of CO<sub>2</sub>. The challenge lies in reducing costs and technology risks, minimizing interferences to fishing and cable industries, and evaluating and reducing the impact on marine wildlife.

**Annie Dallman, International Energy Agency**, shared her visions for the ocean energy industry in relation to tidal and currents energy, waves energy, thermal energy due to temperature gradients, and energy associated with salinity gradients. Potential carbon savings generated by this industry are huge, but challenges remain in reducing costs of best technologies, improving performances, facilitating the installation and maintenance of the equipment, and long-term reliability. Collaboration among developers is essential in addressing funding issues. The main markets for ocean energy include utility-scale electricity generation, island communities, heating, cooling, desalination and aquaculture.

**Marc Taconet, UN Food and Agriculture Organization**, claimed that fishes play a key role in food security thanks to their nutritional value. The challenges for the fishing sector include an increasing demand driven by the population growth, optimizing the use of marine resources, and rebuilding the fish stocks by reducing illegal fisheries and bycatch. Aquaculture has been playing an increasingly important role since the 1990s, and overtaking capture fisheries for food. Climate change is expected to interfere with the fish catch potential, leading to a decrease of catch in the tropics and an increase in high latitudes.

**Melanie Siggs, Global Aquaculture Alliance**, underlined the importance of aquaculture in meeting food demands by the growing population. The role of the Global Aquaculture Alliance is to achieve best practices through e-learning, building communities and creating standards. Key issues for the industry involve identifying good locations, improving animal welfare, reducing the spread of diseases and researching new ways of feeding. Open ocean aquaculture represents an opportunity to enhance the potential of fish and seafood production.

**Rutger-de-Graaf van Dinther, Blue 21**, presented the concept of floating habitats and cities as an answer to land scarcity, as well as the appeal of the land-water interface. The first floating islands are currently under development. They are designed to help meet the SDG goals with greater climate resilience than traditional cities, lower wastewater production, and lower carbon emissions (with functions for carbon removal from the air). New ecosystems will also emerge under the floating cities. He concluded his allocution with a call for partners to undertake the blue revolution.

#### Key takeaways from presentation and Q&A

<b>Economic</b>	<p>The emerging challenges of each sector were presented by the panelists. Ocean businesses are developing solutions to address some of the world’s biggest issues, such as food security for a growing population, energy needs and air quality. Among the solutions discussed were ocean energy, offshore wind energy, aquaculture, seabed mining and floating cities. Most of these solutions will require funding for research and development, in particular in the leveraging of technology for more reliable and profitable models.</p> <p>Progress in energy storage solutions would improve the development of renewables.</p> <p>Business alliances have been formed to facilitate funding, empower industries to advocate for global regulation, generalize knowledge and best practices, and inform stakeholders.</p>
<b>Social</b>	<p>The SDGs and the ocean industries are aligned; the oceans provide the capacity for the fulfillment of the SDGs.</p>
<b>Environmental</b>	<p>Solutions proposed by the ocean business sectors promise to deliver positive impacts for the environment, including carbon savings, better air quality and waste reduction.</p> <p>The protection of marine wildlife is a matter of importance for the ocean business community. Sectors are open to collaborations to evaluate their impacts and protective measures for marine wildlife.</p>



<b>What does it mean for the World Ocean Council?</b>	All the sectors represented during this session agreed on collaboration as a key means to improve their practices and foster ocean sustainable development. The WOC, as a global cross-sectoral alliance aimed at facilitating Corporate Ocean Responsibility, represents the ideal platform to develop these collaborations. For industries engaged in the development of emerging solutions, the WOC Ocean Investment Platform facilitates the search for appropriate funding. The SOS also represents a good opportunity for innovative companies to gain visibility within the ocean business community.
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## 1. 1. Aquaculture: Advancing Sustainable Aquaculture in a Multi-Use Ocean

### SDG14 • FOOD SECURITY: SUSTAINABLE FISHING AND AQUACULTURE

*“SDG 14.4 By 2020, effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing “*

*“SDG 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing”*

*“SDG 14.b Provide access of small-scale artisanal fishers to marine resources and markets”*

#### Framing questions

- How has the aquaculture industry evolved in our increasingly multi-use ocean? Where will it be in 30 years? What are the barriers to sustainable aquaculture expansion and what is needed to help expand and accelerate sustainable aquaculture?
- Can aquaculture meet future global human protein demands sustainably in an increasingly crowded, multi-use ocean and assist in implementing the SDGs?

#### Speakers/ Panel

Chair – Donna Lanzetta, Chief Executive Officer, Manna Fish Farms  
 Jerry Schubel, President and Chief Executive Officer, Aquarium of the Pacific  
 Neil Sims, Co- Chief Executive Officer, Kampachi Farms  
 Avrim Lazar, Convener, Global Salmon Initiative  
 Mike Meeker, Chief Executive Officer, StormSafe Submersibles

### Discussions

**Jerry Schubel, Aquarium of the Pacific**, stated that aquaculture could play a crucial role in providing food for years to come. If 0.1% of the United States Exclusive Economic Zone was dedicated to aquaculture, the quantity of fish produced could be equivalent to the total wild catch of the year. Among the barriers to such an achievement are a complex permitting process and outdated public perception. The environmental impact can be reduced by new technologies (e.g. cages, diets, etc.) and aquaculture can contribute to all SDGs. Marine Spatial Planning for aquaculture, for instance, has been used to identify areas of particular biological importance and establish Marine Protected Areas.

**Neil Sims, Kampachi Farms**, explained that offshore aquaculture still needs to find a way to gain its “social license.” The science is compelling and shows that offshore aquaculture leads to less stress on fishes, fewer diseases, and better growth and survival. Nonetheless, the public still has to be convinced and become interested. Current operations of scale can be found with Salmonids in Canada and Northern Europe, and the Seabass in the Mediterranean Sea. While the Gulf of Mexico faces massive storms, wide temperature ranges and high waves, the main impediment has been regulation: operating permits are difficult to obtain, and only last for ten years.

**Avrim Lazar, Global Salmon Initiative**, claimed that the blue revolution in food production is inevitable due to the growing demand for proteins, arable land and water scarcity, and climate change. In order to sustain the blue revolution, technical and social innovations are needed. Technical innovations exist (e.g. new feeds, lasers to eliminate sea lice) but they have to be utilized on a larger scale. The Global Salmon Initiative (GSI) is a social innovation. This leadership initiative gathers industries to share solutions and improvements, and to increase transparency. All members of the GSI are committed to following the standards of the Aquaculture Stewardship Council by 2020.

**Mike Meeker, StormSafe Submersibles**, emphasized the fact that aquaculture is more efficient and more environmentally friendly than other traditional protein sources such as livestock, but that the main obstacle to development has been regulation. He maintained that the United States and Canada have not made full use of

the research they have conducted (at the Experimental Lakes Area), as they import most of the fish they consume instead of growing it. Today, advances in technology (relating to feed and cages) have allowed aquaculture to become more sustainable.

### Key takeaways from the presentations and Q&A

<b>Economic</b>	There is tremendous potential for economic growth in aquaculture (due to growing demands for protein, availability of space, advances in research, innovative technology). However, such potential has yet to be fully realized, in particular in Canada and the United States. The aquaculture industry requires clearer regulations and a more streamlined permitting process.
<b>Social</b>	Public perception has become a hindrance to the development of aquaculture. Education is key to the acceleration of this process. Pre-competitive collaboration will help solve common issues and share best practices.
<b>Environmental</b>	Aquaculture poses environmental impacts. Such impacts are being addressed, and continued efforts will be made to mitigate them. Aquaculture causes smaller adverse impact compared to conventional agriculture and livestock farming. Adequate monitoring is key to minimizing environmental impacts on aquatic conditions and the biological community.
<b>What does it mean for the World Ocean Council?</b>	The WOC can provide the structure for aquaculture pre-competitive collaboration. In particular, the Ocean Investment Platform can help aquaculture businesses connect with investors.

## 1.2 Maritime Clusters: Innovation and Collaboration for Ocean Sustainable Development

### SDG14 • OCEAN KNOWLEDGE, RESEARCH AND TECHNOLOGY

*“SDG 14.a Increase scientific knowledge, develop research capacities and transfer marine technology “*

#### Framing questions

- What are the conditions and characteristics that lead to Maritime Cluster success?
- How can Maritime Clusters best contribute to sustainable development and the SDGs?
- What are the opportunities for collaboration among Maritime Clusters in support of sustainable development - at national, regional and global scales?

#### Speakers/Panel

Chair – Eric Hansen, President, Economic Transformations Group  
 Stewart Frusher, Director, Centre for Marine Socioecology, Cross Cutting Theme Leader – Climate Change, Institute for Marine and Antarctic Studies (IMAS), University of Tasmania  
 Joshua Berger, Director of Maritime, State of Washington  
 Matt Hebb, AVP Government Relations and Economic Development, Dalhousie University

### Discussions

**Eric Hansen, Economic Transformations Group**, introduced this session by presenting the different entities that constitute a cluster: the producers and sellers of goods and services, the network of suppliers, and the providers of economic/research infrastructures. The role of clusters is to help these entities share information, work together, and identify the needs in terms of research, skills and education. The most efficient clusters are those that are able to address the three pillars: innovation, economic growth and environmental impacts. Mr. Hansen emphasized the importance of leadership in generating quick wins. He presented the specificities of some of the ocean business clusters. These specificities are developed more in depth in the [WOC-ETG White Paper on Maritime Clusters](#).

**Stewart Frusher, University of Tasmania**, presented the Centre for Marine Socioecology, a cooperative marine research center focused on seafood and renewable energy. The centre works to cover all components of its foci, from science and technology to law, sociology, and governance. It works to develop ecosystem aquaculture (multi-culture) and models combining offshore renewable energy, research platform, sequestration facility and

aquaculture. He remarked that the cluster industry will need to harness expertise and develop international linkages.

**Joshua Berger, State of Washington**, talked about the Washington State Department of Commerce initiative “Washington Maritime BLUE: 2050 Vision for a Sustainable Maritime Industry.” The concept is to build a consortium of associations representing different subsectors, from trawlers to recreational boating, to support commercialization and integration of innovative technology, and to connect existing businesses and start-ups to necessary resources and partners for the creation of new opportunities. Innovative funding options are also considered as a central element. Appropriate communication, education and training are part of the project.

**Matt Hebb, Dalhousie University**, presented Canada’s “Ocean Supercluster Initiative”. The ocean economy has been undervalued in Canada, despite the country having one of the longest coastlines and one of the largest maritime zones in the world. The Canadian government has plans to invest US\$950 million in three to five superclusters over a five-year period. The goal is to develop the ocean economy through business-oriented R&D, open calls for innovation, form partnerships and attract world-class talents. Another point of discussion was the digitalization of the oceans (ocean monitoring and communications) and ocean-related companies.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	Clusters gather academic, technological and governmental structures. The three pillars of an efficient cluster are innovation, economic growth and environmental impacts. Innovative financial instruments are needed for cluster formation. Leadership is key in Corporate Ocean Responsibility action from national clusters.
<b>Social</b>	Corporate leaders from different maritime industries must deliberately overlook their nuanced differences to build new partnerships. There is a need for global collaboration amongst ocean clusters for a faster and more beneficial learning process.
<b>Environmental</b>	Ocean clusters in the blue economy entail potential downsides. It is necessary to anticipate and mitigate them. Through collaboration, new technologies and projects can emerge with fewer negative environmental impacts on the ocean.
<b>What does it mean for the World Ocean Council?</b>	The WOC’s experience in multi-stakeholder collaboration can help develop new clusters.  The <a href="#">WOC White Paper on Maritime Clusters</a> is now available for download.

### 1.3. WOC Young Ocean Professionals (YOP) and MIT Solve – Identifying Innovation Challenges for Ocean Sustainability

#### Framing questions

- Cross-sectoral, interactive and dynamic discussions: what are the sustainability goals for the global ocean community, the barriers and stakeholders, and the key challenges that need to be tackled to meet those goals?
- How to drive impact on global challenges through open innovation and partnerships?
- How to catalyze and leverage sustainability in the Ocean Business Community?

#### Facilitators

Chair – Julia Tasse, Marketing and Communications Officer, World Ocean Council; Lead Young Ocean Professionals  
Alexander Dale, Community Relations Senior Officer, Sustainability, Solve Massachusetts Institute of Technology (MIT)

#### Discussions

**Alexander Dale, MIT**, introduced the workshop with a presentation on the [MIT Solve initiative](#). It intends to identify solutions to current environmental and social issues through open innovation, and build a community of “changemakers” committed to partnering to pilot and implement these solutions.

**Julia Tasse, World Ocean Council**, presented the [WOC Young Ocean Professionals Initiative](#). The Young Ocean Professionals Initiative is a global, multi-sectoral and educational network established to catalyze and leverage sustainability in the Ocean Business Community.

Workshop attendees were asked to identify ocean-related challenges. A range of subjects were proposed, such as the implication of indigenous people in law-making processes related to the oceans, protection of marine biodiversity and reduction of plastics in the oceans.

Participants were then asked to identify barriers to overcoming these challenges. Several factors were identified:

- The magnitude of the challenges and lack of public awareness
- Political issues
- Technological issues
- The lack of funding

The challenges were categorized according scale and focus (technology, locally unique, globally critical, policy). Solutions were proposed and discussed: raising awareness among the general public through digital communication, early education, developing new technological solutions (e.g. for detecting plastic in the oceans, for plastic recycling), encouraging the development of guiding or binding policies, and implementing business partnerships to reduce the use of plastic.

The workshop was concluded with a presentation on the [2018 Fishackathon](#). The event was held simultaneously in more than 40 cities around the world. The goal was to use digital solutions to address sustainable fisheries challenges

### Key takeaways

This workshop emphasized a strict and structured solving process: a rigorous identification of the problem, its barriers, and its possible solutions.

Challenge-solving events as such stimulate creativity and enable social or environmental entrepreneurs to test their ideas. They also represent a good opportunity to identify successful partnerships.

## Day 2

### 2.D. The Digital Ocean, Big Ocean Data and Ocean Cloud Computing: The Future of Ocean Sustainable Development

#### Framing questions

- What are the status, trends and forecasts for the development of the Digital Ocean, Big Ocean Data and the use of Cloud Computing for ocean sustainable development?
- What are the benefits (economic, sustainability, maritime security, etc.) from a Digital Ocean that produces Big Ocean Data and harnesses Cloud Computing in support of Agenda 2030, and what are the challenges to achieving these benefits?
- What are the opportunities for industry leadership and collaboration in advancing the most beneficial progress in the Digital Ocean, Big Ocean Data and Cloud Computing for ocean sustainable development - at national, regional and global scales - and what should industry do to best engage other ocean stakeholders?

#### Speakers/Panel

Chair – Paul Holthus, Chief Executive Officer, World Ocean Council  
 Marc Fagan, Chief Executive Officer, EOS Data Analytics  
 Peter Mabson, President, exactEarth  
 Chris Coyle, Chief Strategy and Revenue Officer, Exocetus Autonomous Systems  
 Ferial El-Hawary, Professor, Dalhousie University  
 Melissa Garren, Chief Scientific Officer, Pelagic Data Systems  
 Graham Stickler, President, Beyond One Eighty

### Discussions

**Marc Fagan, EOS Data Analytics**, introduced the session by sharing the constant changes and development in the collection of satellite data. Through the concept of virtual constellation (which gathers all the data collected

by independent systems), EOS Data Analytics is developing a unique technology for an extensive earth data collection system in cooperation with 20 partners. This system continuously analyses pictures of the planet, and monitors world maritime flows and coastal infrastructures. Information about equipment as well as damages, such as conditions after extreme weather events, can be delivered instantly.

**Peter Mabson, exactEarth**, indicated that management systems require information, and that satellites allow for data collected from sensors on Earth to become widely available. With this technology, exactEarth tracks commercial ships around the world. Over the past decades, the data revolution has tremendously increased data transmission capabilities in tandem with a growing need for real-time data. This revolution has triggered a boom in space orbiting-collection systems that are light, relatively small in size, fast and less energetic, such as the AIS. Internet giants and data companies have proposed to deploy 10,000 satellites in the next five to seven years, including the Iridium Next project: more than 70 satellites connected to each other in a constellation that will cover the whole Earth at all times.

**Chris Coyle, Exocetus Autonomous Systems**, presented the role of drones in data collection. Drones – small, unmanned aerial and subsea vehicles – have enabled novel ways of data collection, with applications for education and awareness as well as military purposes and deep sea mining, in order to better understand and monitor erosion and climate system phenomena. Large drones can also collect visual, sonic and acoustic data, complementing satellite services.

**Ferial El-Hawary, Dalhousie University**, encouraged the development of underwater robotics systems for data collection and mechanical purposes (such as the installation of fiber optic cables, which has vastly speeded up data communication). There are many areas to explore, from continental shelves of countries to the Arctic ocean. Drones can now be deployed to go through ice cover and collect data from unexplored areas of the globe.

**Melissa Garren, Pelagic Data Systems**, spoke about the contribution of the Pelagic Data Systems to small-scale fishing sectors. Solar powered tracking systems have helped fishermen optimize their routes and fishing times through real-time, autonomous, inexpensive and constant monitoring. High-resolution data on behavior (e.g. vessel to vessel interaction, catch data such as bycatch, egg-bearing females) has enabled fishermen to localize their fleets of vessels and adapt their practices to different situations. The systems have also generated data for groups working on fish stock protection, leading to a reduction in illegal fishing and better management of fish stocks.

**Graham Stickler, Beyond One Eighty**, highlighted the problems of data collection: there is currently too much data (e.g. diving data, satellite data) to be computed, shared, analyzed, sorted and delivered. Data from isolated systems will need to be aggregated and made more transparent. Before being integrated into a system, data should be checked for safety and accuracy. This has led to an urgent need for standards. Where competitive advantages deter the private sector from sharing its data, a solution would be to divide up the data and allow scientists to study only a part of it. Before computing data, it is essential to define its usage, what information is needed and the stakeholders concerned. Beyond One Eighty has been supporting Mission Blue in the creation of the Hope Spot Information Platform. The project makes use of collected data to raise awareness on marine protected areas through an interactive platform. As technology progresses, we need to think about the different usages for the data we collect.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	<p>The increase in transmission capabilities and the need for real-time data have led to a boom in the data market as well as constant changes in satellite and drone data collection systems.</p> <p>Key issues raised by the sharing of data:</p> <ul style="list-style-type: none"> <li>• Cost: There is a huge demand for free and accessible data, but data cannot be produced for free. There needs to be innovative funding.</li> <li>• Confidentiality: Some data cannot be shared directly and openly; the right granularity has to be determined in order to share them without affecting confidentiality.</li> <li>• Trust: Setting standards can help improve trust in shared data.</li> </ul>
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	Crowdsourcing data collection to vessels navigating on the oceans can help gather data in an efficient and cost-effective way. Deep neural networks and artificial intelligence can also be used to analyze data. There is a strong need for links between different data systems. Data analysis requires foremost a clear definition of the goals: what do we want to achieve with these data?
<b>Social</b>	The collection and sharing of appropriate data can serve communities. For example, inexpensive and constant monitoring and tracking systems can help small-scale fishermen optimize their routes and fishing times.
<b>Environmental</b>	Data are collected, computed and stored in large data centers which are energy demanding. There is currently too much data to be computed, shared, analyzed, sorted and delivered. In particular, data from isolated systems need to be aggregated and made transparent. This will improve energy efficiency. The collected data can be used to raise awareness about sustainability issues such as marine protected areas and coral bleaching.
<b>What does it mean for the World Ocean Council?</b>	Through its Smart Ocean-Smart Industries program, the WOC is working to ensure that industry data collection and sharing is efficiently coordinated, and subsequently integrated into national and international public science programs. In that perspective, the WOC can provide evaluations of the type and fineness of data required by different industries, and help organize data collection and sharing. The WOC can also help connect data-producing industries and data-consuming industries through a specific network.

## 2.1. Coastal Infrastructure, Extreme Weather Events, Green Infrastructure, and Blue Carbon – Advancing Adaptation especially for Small Island States and Least Developed Countries

### SDG 14 • CLIMATE CHANGE AND OCEAN ACIDIFICATION

*“SDG 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels”*

#### Framing questions

- How can the ocean business community best ensure that ports and essential coastal infrastructure are being adapted to ensure resiliency in extreme events, especially in SIDS and developing countries?
- How can the ocean business community best collaborate with other key stakeholders, e.g. multilateral/bilateral development assistance, national governments, science institutions, etc.?
- What are the potential role and incentives or benefits for ocean industries in the maintenance or restoration of coastal and marine ecosystems for their Blue Carbon value?
- What is the best way to develop and implement a global, multi-stakeholder leadership alliance to ensure ports and coastal infrastructure worldwide are ready, resilient and able to minimize the impacts of extreme events on communities, businesses and economies?

#### Speakers/Panel

Chair – Chris Allen, Owner, Chris Allen + Associates  
 Mikis Tsimplis, Professor, Oceanography and Maritime Law; Deputy Director, Southampton Marine and Maritime Institute, University of Southampton  
 Alfredo Quarto, Executive director and Co-founder, Mangrove Action Project  
 Abel Macarini, Climate Change Adviser, South Pole Group  
 Charles Colgan, Director of Research, Center for the Blue Economy, Middlebury Institute of International Studies at Monterey  
 Steve Crooks, Co-founder, Silverstrum Climate Associates

#### Discussions

**Chris Allen, Chris Allen + Associates**, started the session by presenting the two kinds of infrastructures: the grey infrastructure (ports, bridges, buildings, etc.) and the natural infrastructure (wetlands, reefs, other natural coastal features etc.). The latter has been largely undervalued. As coastal areas support 61% of the world’s GDP, there is an urgent need to adapt these infrastructures to climate change.

**Mikis Tsimplis, University of Southampton**, highlighted the vulnerability of coasts. Ports subject to extreme weather events must adapt their infrastructure to become resilient to climate change, especially in island states and developing countries. However, international standards have not provided sufficiently clear goals and guidance on this topic. Additionally, the IMO’s emphasis on Sustainable Shipping creates potential conflicts with

coastal adaptation plans for sustainable development by coastal states. Another difficulty lies in conciliating local and international adaptation concerns. For Mr. Tsimplis, there is an urgent need to adapt coastal infrastructure to climate change in order to avoid direct and indirect impacts caused by extreme weather events on local economies. Shipping governance needs to be overhauled with consideration for the interests of coastal states so that sustainability policies of shipping, ports and coastal states can function.

**Alfredo Quarto, Mangrove Action Project**, spoke about the role of mangroves in the global ocean and climate system and their great carbon-storing capacity (937 tons per hectare annually). Mangroves support not only copious primary production, but also protection of coastlines from erosion. However, rising sea levels and drainage issues are threatening to drown important mangrove forests. Local communities rely on mangroves for sources of food and recreation, but these have been dwindling as unmitigated development continues to encroach on the areas. Mangrove diseases have spread as a result of climate change, resulting in shrimp farms being abandoned due to fatal diseases. Common restoration techniques, such as hand plantation, are no longer effective as only a few varieties can be planted. In conclusion, immediate efforts are required in order to restore these incredibly valuable ecosystems.

**Abel Macarini, South Pole Group**, supplemented Mr. Quarto's presentation by emphasizing the value of mangroves, tidal marshes and seagrass meadows. These ecosystems offer huge CO<sub>2</sub> storage capacities (blue carbon ecosystems) with high carbon sequestration rates. However, they are also becoming increasingly threatened, with approximately 67% lost thus far. Voluntary action is crucial for the restoration of these habitats. Restored ecosystems have offered multitudinous benefits, including enhancement of biodiversity, habitats for commercially important fisheries (young fish mature in these areas), food security for coastal communities, flood protection, and erosion control. There is an urgent need to offset emissions through Blue carbon credits.

**Charles Colgan, Middlebury Institute of International Studies**, raised issues of project funding: monetary evaluation is essential to better understand the necessity of restoring mangroves and wetlands. According to Lloyd's, the presence of wetlands reduced losses in property damage caused by Hurricane Sandy by US\$625 million. Restoration of natural infrastructures is crucial in adapting coastal areas to climate change and periodic storms and crises. There are many innovative ways to finance such projects: impact investing, which provides social benefits in addition to good market rates of return; performance standards; catastrophe bonds, the issuance of which provides insurance; resilience bonds, offered to support risk-reducing efforts such as ecosystem restoration; and ecosystem services evaluation. The screening of criteria for blue carbon ecosystem projects is a complex and multifaceted process, but provides recognition to risk-reduction strategies. Financial preparations in anticipation of coastal damage and improved resilience of human and natural infrastructures require complex evaluations and adequate resources, sources of which can be found in public-private partnerships.

**Steve Crooks, Silverstrum Climate Associates**, stated that the phase of operationalization of the conservation of these ecosystems has begun, after an initial phase of awareness. The UNFCCC's Nationally Determined Contributions (NDC) have been helping develop carbon finance mechanisms to reduce emissions of greenhouse gas while maintaining a strong and resilient economy. In response to the huge loss of wetland ecosystems over the past 50 years (10 billion tons of CO<sub>2</sub> have been released in Asia alone), over US\$400 million have been raised to fund ecosystem restoration projects through carbon finance. The restoration of coastal ecosystems can create a win-win situation for coastal ecosystems and local businesses – fisheries, aquaculture and infrastructures endangered by erosion and extreme weather events. Information transfer from successful operations can benefit the more recent initiatives.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	<p>Natural infrastructure and restoration of destroyed natural zones have immense untapped commercial value.</p> <p>The challenge lies in the funding of the projects. No government has the capacity to embark on mitigation and adaptation initiatives alone. These must be done by partnering with the private sector.</p> <p>Climate bonds standards can enhance the funding of such projects. Renewable energy and fisheries were the first targets, but coastal infrastructure bonds standards are currently under development (such as the Climate Bond Initiative).</p>
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<b>Social</b>	Green infrastructures, such as mangroves, are critical not just to the health of oceans but to the survival of coastal communities. Islands and developing countries are the most vulnerable to climate change and sea level rise. Community involvement and education are crucial. Academia, local communities and local authorities should connect to ensure the success of projects.
<b>Environmental</b>	There is an urgency for coastal (natural and artificial) infrastructures adaptation. Green infrastructures have a direct impact on the amount of damage and losses suffered through natural disasters. The need to restore mangroves, tidal marshes and seagrass meadows is also linked to their huge CO <sub>2</sub> storage capacities and their essential role for biodiversity. Restoring natural infrastructures or adapting manmade infrastructures can be two complementary solutions to restoring biodiversity and limiting CO <sub>2</sub> release.
<b>What does it mean for the World Ocean Council?</b>	The WOC can play a role in the funding of restoration projects by connecting the project leaders and industries or investors interested in supporting these projects.

## 2.2. Biofouling and Invasive Species: Addressing the Threat through Industry Collaboration

### SDG14 • MARINE POLLUTION

*"SDG 14.1 By 2025, prevent and significantly reduce marine pollution"*

#### Framing questions

- How can diverse ocean industries collaborate to understand and address the shared problem of biofouling and the introduction of invasive species?
- What opportunities exist with science, government and industry to create a common research and development platform on the causes, prevention and removal of biofouling?
- What are the proposed and new regulations regarding the potential importation and spread of non-indigenous marine species and can a pan-industry platform be developed to minimize business risks of biosecurity problems?

#### Speakers/Panel

Chair – Paul Holthus, Chief Executive Officer, World Ocean Council  
 Peter Wilkinson, Ministry of Agriculture and Water Resources, Australia  
 Stein Kjølberg, Global Sales Director - Hull Performance Solutions, Jotun Performance Coatings, Jotun A/S  
 Laurance Langdon, General Manager, Hullwiper  
 John Alonso, Assistant Technical Advisor GloFouling, Marine Environment Division, International Maritime Organization  
 Paul Holthus, Chief Executive Officer, World Ocean Council

### Discussions

**Peter Wilkinson, Ministry of Agriculture and Water Resources, Australia**, opened the session by reminding audience of the economic importance of the shipping sector, which represents 99% of exports, and of the need for collaboration with other industries – shipping, tourism, fisheries, and aquaculture. Ship hulls are the main vector of bio-invasions. Even if the aerial part of the hull looks immaculate, its underwater parts of the hull can be biofouled and many niche areas – intake valves, sea chest (strainer), propeller – can hide mobile and immobile, adult and juvenile, animals and plants. The reproductive state of organisms being transported can affect the whole ecosystem. In addition, biofouling of the hull can significantly affect the fuel efficiency of the vessel. As a result, regulations to manage biofouling are gaining ground around the world, especially in the Pacific region (Australia, Hawaii, New Zealand and California). Mr. Wilkinson concluded by calling for international/industry-specific standards on biofouling (guidelines would be complemented by regulations).

**Stein Kjølberg, Jotun A/S**, outlined the important costs of biofouling control for shipowners and ports. Shipowners are willing to measure precisely the performance and the necessity of their investments. There is a need for incentives for shipowners to invest in anti-biofouling projects. Biofouling can be avoided with poison and biocide but there are strict regulations on the use of these chemical substances. Anti-fouling paint, applied as the outer layer to the hull, is one solution. A template for biofouling management plans, titled "MEPC 70", is now available for reference. The largest project in this domain is the ISO 19030, a project based on four performance indicators: in-service performance (e.g. efficiency, speed loss over time); dry docking performance - quality of work done (e.g. entire paint layer or minor repair); maintenance trigger and maintenance effect (extent and durability of the improvement). An efficient maintenance system is a worthy investment.

**Laurance Langdon** presented **HullWiper**, a company which specializes in hull cleaning services with underwater drones with the help of a high-pressure water and a vacuum system. After presenting the history of biofouling (from pirates cleaning biofouling on their ship to maintain high speed, to exploration and commercial ships carrying invasive species), Mr. Langdon explained the many challenges of the move towards more sustainable practices, i.e. practices that do not involve chemical substances. International and governmental authorities should work to establish more regulations, the enforcement and promotion of which should be supported by local/port authorities. Collaborative efforts on biofouling are necessary to tackle the issue.

**John Alonso, International Maritime Organization**, introduced the global biofouling project “GloFouling”, which gathers major international organizations including the GEF (for funding), the UNDP (for implementation) and the IMO (for execution). This initiative is part of a 20-year project that works on implementing IMO guidelines and the conception of comprehensive regulations. Where programs are based on a country’s long-term commitments, there is a need for collaboration with industry players to identify problems, address concerns and gather relevant resources for the transfer of technology. GloFouling is also working on capacity building (through educational tools), training of seafarers and raising stakeholder awareness. GloFouling is now looking for strategic partners (NGOs, governments, port authorities and companies) for consultations, technological review and implementation. No engaging commitment is being sought until July 2018, but organizations are invited to send in letters of interest.

**Paul Holthus** announced that the **World Ocean Council** has been invited to partner with Glofouling and to take part in its international multi-sectoral approach. In addition to the shipping industry, a wide range of sectors are also involved and affected by biofouling. The WOC will work on shaping priorities and the political will of the business sector in the broader context of the emerging maritime industry. Mr. Holthus invited individual companies and industries to send in letters of support. The WOC will identify potential business sector contributions and propose an economic case for governments. A broad and holistic look at the whole set of issues and their gaps is needed to mobilize stakeholders. A comprehensive overview (taking into account geographic and temporal issues) will create a basis for the continued evolvement of the global alliance against biofouling.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	The business sector should collaborate to identify eco-friendly solutions to prevent biofouling. There are many aspects to work on (differentiated by the size of vessels and the areas affected by biofouling), which leaves room for positive competition. Solutions need to be evaluated for shipowners to better understand their investments. The paint industry should take part in biofouling research. The “GloFouling” project is based on collaboration and partnerships. All industries are invited to join global efforts in reaching common standards and solutions to biofouling.
<b>Social</b>	Partnerships between governments and industries should be strengthened, and should take into account industry needs and regulations. Further efforts are needed to raise global awareness on biofouling.
<b>Environmental</b>	Some eco-friendly technical solutions exist, but they require further industry and political exposure and stronger regulations to become more broadly adopted. There are currently non-mandatory guidelines, but they should be adapted for each type of vessel and updated regularly.
<b>What does it mean for the World Ocean Council?</b>	The WOC, as a partner of the Glofouling project, will organize an industry-led forum and challenge the paint industry to build solutions to address biofouling.

## 2.3. Synergies in Shipping and Sustainability: International Collaboration on Green Shipping Programs and Infrastructure

### SDG14 • OCEAN CONSERVATION AND ECOSYSTEM BASED MANAGEMENT

*“SDG 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems “*

*“SDG 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas”*

#### Framing questions

- How can collaboration help the maritime industry to realize greater benefits from green shipping programs and infrastructure, while maintaining flexibility?
- What are the opportunities to create efficiencies for ports, shipping lines and shippers in the implementation and uptake of these programs and infrastructure, and how can environmental rating systems and data management providers facilitate those efficiencies?
- Who could lead and maintain a collaboration on this scale and how, ensuring that the range stakeholders are engaged and minimizing the risk of developing multiple solutions to solve the problem of multiple solutions?

#### Speakers

Chair – Craig Carter, Director of Marketing and Customer Service, Thordon Bearings  
 Lee Kindberg, Director, Environmental and Sustainability, Maersk Line  
 David Bolduc, Executive Director, Green Marine  
 Anuj Chopra, Vice President, RightShip Americas, RightShip  
 Peter Ellis, Executive Director, Clear Seas Centre for Responsible Marine Shipping

#### Discussions

**Lee Kindberg, Maersk Line**, presented environmental initiatives from the vessel operator perspective. She gave the example of the Clean Shipping Index, data for which is assembled from a voluntary questionnaire distributed to vessel captains and operators. The results have been used by companies for training purposes and for raising awareness on better practices. She called for more transparent and shared practices, and advocated for a global, open database of effective attempts/ideas and best practices. Involving all stakeholders in discussions can maximize the effectiveness of new strategies. Mrs. Kindberg also pointed out that larger ships are creating smaller environmental footprints while generating greater profits. Port infrastructures should thus be adapted to handle larger, more efficient ships. The shipping industry can lead climate change mitigation by setting very clear and transparent goals.

**David Bolduc, Green Marine**, spoke about the mission of Green Marine: to promote partnerships between the industry, the government and NGOs. This voluntary multi-stakeholder initiative has enabled individual and collective (industry) environmental performance to be measured and tracked temporally. Its set of targets exceeds regulatory compliance. With 116 participants in the United States and Canada, Green Marine encourages companies to conduct a self-evaluation every two to three years, and to have it verified externally. The results should be made public online and be used as a benchmark tool to measure the performance of different companies/vessels. Its long-term goal is to combine different types of sustainability metrics (air emissions, garbage management, invasive species introduction, etc.) into one transparent program. The shipping industry can form meaningful partnerships to identify sectoral and individual strengths and weaknesses, and to come up with common strategies.

**Anuj Chopra, RightShip**, highlighted the link between ship safety, economic gain and reduced greenhouse gas emissions. Rightship is gathering real-time dynamic ratings of greenhouse gas emissions and fuel efficiency from about 45,000 vessels. This ranking system (A–G) is available online and enables companies to choose the most fuel-efficient vessels. Fuel costs account for almost 40% of overall vessel operating fees. The efficiency of a “Rank B vessel” and a “Rank F vessel” can differ by as much as 25%. The project also identifies peak emission periods. Inefficient vessels tend to be less safe, while the more efficient ships have produced lower casualty and incident rates. It should be the goal of every company to ensure that their vessels are safe for seafarers and the environment alike.

**Peter Ellis, Clear Seas Centre for Responsible Marine Shipping**, stated that to be environmentally sustainable, shipping needs to be economically sustainable. It is important to work with stakeholders to ensure that all their concerns are acknowledged and addressed. We should focus on incremental gains by setting both short and long-term targets. With common goals and targets, costs of research could be spread out among stakeholders to maximize effectiveness. Through competition but also collaboration, the industry can acquire the flexibility it needs to become more effective than governments in changing sustainability goals. He concluded the session by



emphasizing the importance of including traditional knowledge in decision-making, such as First Nation's cultures.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	There are potential financial costs associated with the reduced environmental impact of vessels, but over time these would be set aside through increased fuel efficiency. Sustainable shipping initiatives need to deal with issues of scaling: unilateral measures increase the complexity of regulating shipping emissions, but regional specificities have to be taken into account. Collaboration between initiatives could be enhanced. More financial (and non-financial) incentives for moving up the ranks should be implemented as they work well to foster stakeholder involvement.
<b>Social</b>	Indexes have been designed based on the results of voluntary questionnaires, entailing greener operations by vessel captains and operators. Many green initiatives exceed regulatory requirements and represent a closer step towards obtaining a social license. A reduction in air emissions brings health benefits for people who live around ports and work on vessels. Ships with reduced emissions often have better safety records, according to Rightship
<b>Environmental</b>	The shipping industry can lead climate change mitigation by setting very clear and transparent goals. It is interesting to note that the larger the ship, the more energy-efficient it is. Larger port facilities have to be installed to reduce global shipping emissions. Trust is crucial in emissions reduction programs. The panel called for greater transparency despite potential competition. It would help to have the data occasionally verified by a third party.
<b>What does it mean for the World Ocean Council?</b>	The Sustainable Ocean Summit represents an opportunity to promote green shipping and connect shipping industries with green shipping initiatives.

## 2.4. Ocean Energy: Scaling up Low Carbon Energy Sources from the Sea, with a View towards SIDS and LDCS

### SDG14 • ECONOMIC BENEFITS TO SMALL ISLAND DEVELOPING STATES (SIDS) AND LEAST DEVELOPED COUNTRIES (LDCS)

*"SDG 14.7 By 2030, increase the economic benefits to Small Island Developing States (SIDS) and Least Developed Countries (LDCs) from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism"*

#### Framing questions

- What has Canada done to lead the way in marine renewable energy development?
- Spotlight on the Bay of Fundy - Developer/Customer perspectives: What have been the challenges and what are the expected benefits?
- How can ocean renewable energy development benefit SIDS and LDCs?
- What are the investment opportunities for expanding and accelerating offshore wind and ocean renewable energy in SIDS and LDCs?

#### Speakers/Panel

Chair – Reenst Lesemann, Chief Executive Officer, Columbia Power Technologies  
 Steve Stanford, Nova Scotia Department of Energy  
 Tony Wright, General Manager, Fundy Ocean Research Centre for Energy (FORCE)  
 Alisdair McLean, Country Manager, Canada, Open Hydro Naval Energy  
 Brad Buckham, University of Victoria, West Coast Wave Initiative  
 Bill Staby, Chief Executive Officer, Resolute Marine Energy

#### Discussions

**Reenst Lesemann, Columbia Power Technologies**, introduced the governmental perspective on setting up policies in developing countries and islands regarding low carbon energy sources from the ocean. He differentiated ocean energy production into four major areas: wave energy, tidal energy, ocean thermal energy and ocean current energy. While the technology for wave energy has reached certain level of maturity, tidal energy and ocean thermal energy (the latter of which takes advantage of temperature differentials in different

strata of the ocean) have yet to be further developed. Direct applications of these energy sources include water desalination, local communities power, security and defense power plants, and aquaculture based on marine kinetic energy. Mr. Lesemann also talked about underwater data centers, which are based on natural cooling cycles of the ocean and marine hydro-kinetics forces. By 2050, ocean energy extraction could be double of current electricity production, reaching €535 billion.

**Steve Sandford, Nova Scotia Department of Energy**, presented Nova Scotia's analysis of its potential to meet its 2020 targets for marine renewable energy. Of these energy sources, tidal energy is particularly relevant for Nova Scotia due to the region's high and rapid tides. The province's Marine Renewable Energy Strategy aims to lead in the harnessing of technology and instituting of strict legislation. There is a need for risk-reduction research that takes advice from all sectors. Adaptable and informed decision-makers manage risks and benefits from sound knowledge and information. The Marine Renewable Energy Act is based on two pillars: (1) a licensing and permitting regime (vetted and scalable projects which are compatible with other users, and which make use of checks and balances to mitigate environmental risks and inform future decisions); and (2) a planning aspect, with Marine Renewable Energy development limited to designated priority areas at demonstration scale. These pillars require consultations and impact assessments. Nova Scotia is willing to share its experience and knowledge with other jurisdictions.

**Tony Wright, Fundy Ocean Research Centre for Energy (FORCE)**, owns and operates a leading project in tidal energy. His target is to understand the social and environmental impacts of pursuing tidal energy, specifically in-stream tidal energy that is predictable and does not block flows. The tides on the East Coast of Canada are some of the highest in the world (with a range of 13m, equivalent to 700 MW of energy potential). There has been growing interest in marine renewable energies across the globe, and some countries are now conducting pilot projects. The fundamental issues are the viability and safety of the infrastructure as well as its co-existence with other marine space users. Verifiable data is critical for decision-making. There is a need to implement an effective data collection system. In the case of the FORCE project, this is done through a pilot unit.

**Alisdair McLean, Open Hydro Naval Energy**, spoke about the joint Cape Sharp Tidal Venture. This Nova Scotia-based project connects 100 international companies to local facilities and infrastructures related to tidal energy. The project is based on three elements: (1) turbine technology; (2) marine assets and operations; and (3) environmental monitoring. Issues of biofouling have been taken into account with adjustments to the design of the turbine. The last of the challenges is to win the approval of people living in the pilot unit area, since competing usages of the same space can trigger concerns regarding the economic advantages of the technology. Communication is crucial, and enlisting the involvement of the academia can be extremely beneficial.

**Brad Buckham's** project, the **West Coast Wave Initiative** at the Institute of Victoria, represents efforts to create a framework of best practices and community leadership for marine energy tech developers on the British Columbia Coast. It aims to mitigate risks while matching marine renewable energy potential with the needs of remote communities. This implies on-going discussions with remote communities on the costs and benefits of wave energy. Many of these communities rely on diesel. There is also a need for autonomous sources of energy for small areas in developed states that have inadequate energy supplies or rely on pollutant sources of energy. The program currently has 78 operational energy projects, including hydro, solar, wind and geothermal energy. There is a real demand but limited supply. The main barrier is the funding of the projects.

**Bill Staby, Resolute Marine Energy**, explained how Resolute Marine Energy developed wave energy converters to supply desalination systems. This technology has potential to help solve the world water crisis, however, it remains an unrealistically expensive and high-energy process. It is crucial for water resource managers to develop a strategy that allows them to quickly respond to water scarcity problems. One such project is taking place in Cape Verde, where 80% of the water is provided by water desalination plants powered by diesel. The diesel generators pose negative economic and social impacts. Also, water scarcity triggers a dependency on food imports, which widens the social gap. On the other hand, water supply projects contribute to resiliency. A stable source of sweet water contributes to food security and to minimizing inequalities. It also alleviates political instability and civil unrest. To conclude, ocean energy brings great benefits for SIDS, but evaluation and measurement remain a challenge.

**Key takeaways from the presentations and Q&A**

<b>Economic</b>	There is huge potential for ocean energy. By 2050, ocean energy extraction could be double of current electricity production, reaching €535 billion. The main problem lies with funding. Financial and technological risks and uncertainties are involved. Important test phases and funding are essential to avoid overpromising and under-delivering.
<b>Social</b>	To have a social license to operate, marine energy projects must involve stakeholders and local communities. They must communicate the benefits of this new technology and take into account all public concerns. Mutual respect and trust will be built on ongoing dialogue. The fundamental questions are the viability and safety of the infrastructure as well as its co-existence with other marine space users. Some of the direct applications of these energy sources are water desalinization, local communities power, and aquaculture based on marine kinetic energy. These have important social implications, from reducing sweet water scarcity (which decreases dependency on food imports and narrows social gaps) to providing power to more villages and communities and enabling the development of aquaculture.
<b>Environmental</b>	Many current diesel generators on islands and remote communities could be replaced by ocean energies, leading to a sharp decrease in greenhouse gas emissions. The local biodiversity has to be taken into account during the design stages. Biofouling should also be avoided.
<b>What does it mean for the World Ocean Council?</b>	The Sustainable Ocean Summit helps connect emerging ocean energy industries with potential users. The Ocean Investment Platform can assist in engaging investors.

## 2.5. The Law of the Seas New Legally Binding Instrument on Biodiversity in Areas Beyond National Jurisdiction (BBNJ): What Will it Mean for Ocean Industries

**SDG 14 • OCEAN GOVERNANCE INCLUDING UNCLOS**

*"SDG 14.c Ensure the full implementation of international law, as reflected in UNCLOS for states parties to it, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties"*

**Framing questions**

- What is the final version of the legally binding BBNJ agreement that was developed in 2016-17?
- What is the process for formal consideration and adoption of the BBNJ agreement by the U.N. General Assembly (UNGA)?
- How can and should ocean industries engage with other ocean stakeholders, including governments, as the BBNJ agreement moves to and through the UNGA?

**Speakers/Panel**

Chair – Peter Hinchliffe, Secretary General, International Chamber of Shipping  
 Elizabeth McIsaac, Associate, McInnes Cooper  
 Robin Warner, Professor, Australian National Centre for Ocean Resources and Security (ANCORS), University of Wollongong  
 Susanna Fuller, Marine Conservation Co-ordinator, Ecology Action Centre  
 Fred Kingston, Executive Secretary, Northwest Atlantic Fisheries Organization (NAFO)  
 William Sharpe, Barrister and Solicitor, ROUTE Transport & Trade Law  
 Andreas Kaede, Attorney, Haver & Mailänder Rechtsanwälte

**Discussions**

This session focused on a new legally binding instrument on Biodiversity in Areas Beyond National Jurisdiction (BBNJ), which will complement the United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS entered into force on November 16, 1994, and set out the rights and obligations of States regarding the use of the oceans, their resources, and the protection of the marine and coastal environment. The new instrument will regulate Areas Beyond National Jurisdiction (ABNJ), composed of the high seas and the Area – the deep seabed and ocean floor (including its subsoil) adjacent to the continental shelf that lies beneath the high seas. The process started in 2004 with an Open-ended Informal Working Group and continued until June 2015 with the establishment of a **Preparatory Committee (PrepCom)**. With the conclusion of PrepCom meetings in July 2017, official negotiation processes have been initiated.

**Elizabeth McIsaac, McInnes Cooper**, started the session by outlining the increasing emphasis regulators put on the need for international consultation processes. The term “due regard” – that one state exercising its sovereign rights must take the international community into account – is a driver of BBNJ and implies discussions and compromises. The inclusion of “due regard” in the BBNJ text will serve to reduce the use of marine resources: all stakeholders (states, industries, NGOs and other organizations) will need to take into account other stakeholders and their own use of marine resources.

**Robin Warner, University of Wollongong**, spoke about the implications of mandatory environmental impact assessments (EIA) in Areas Beyond National Jurisdiction (ABNJ) for the private sector. Areas Beyond National Jurisdiction (ABNJ) cover almost 50% of the Earth’s surface. Human activities in ABNJ have been increasing, despite the lack of a comprehensive governance framework. One of the objectives of BBNJ is to implement a cross-sectoral system of ocean governance enabling conservation and sustainable use of marine resources. In addition to setting standard instruments, the text should encourage and facilitate compliance with best practices of sustainable ocean use (with the help of technology transfer), such as by mandating EIAs for permission to operate activities within ABNJ. EIAs in ABNJ will be difficult to define and perform, but should be required nonetheless. It should be a transparent process, and should enable stakeholders to embed ecosystems and biodiversity in their decision-making process. The concept of cumulative impacts is currently under discussion.

After introducing the conundrum of regulations currently governing the high seas, **Susanna Fuller, Ecology Action Centre**, highlighted the areas of convergence as well as the absence of consensus in discussions on BBNJ. Sectoral differences in opinion on the mandatory elements and tools for compliance need to be resolved. Since consultation processes have already begun at the governmental level, we can expect the discussions to shift towards economic stakeholders and industry players. Cross-sectoral integration should be implemented to prevent conflicts among industries.

**Fred Kingston, Northwest Atlantic Fisheries Organization (NAFO)**, commented on the active participation of the Northwest Atlantic Fisheries Organization (NAFO) (with 12 Contracting Parties including Canada, the United States, France and Denmark) in BBNJ discussions. NAFO’s working group on marine resource management supported the BBNJ PrepCom process by sharing its well-developed and complex resource models, environmental impact assessments and area-based management tools. The organization has also helped establish indicator species (such as corals and sea pens) to protect vulnerable marine ecosystems.

**William Sharpe, ROUTE Transport & Trade Law**, raised questions on the governance of water columns, and specifically of human-built structures underwater. The UNCLOS constitutes an incoherent, fragmented and non-predictive regulatory system, and contributes to the delay of investments in ABNJ. It has always been the case that whenever issues arise, legal responses that are geographically defined would be introduced to exert influence on localized projects. The UNCLOS, however, is an international agreement and needs to be coordinated on a global scale. Since its articles reflect only the consensus on short-term mitigation measures, emerging technologies and common challenges are often disregarded. Thus the aim of the new negotiations process is to develop a complementary, holistic, public, predictive, preventive and prescriptive governance text. Likewise, it should foster better use of water columns.

**Andreas Kaede, Haver & Mailänder Rechtsanwälte**, commented on the core problems of technology transfer, as well as its importance for regulation compliance. He compared the advantages, limits and risks concerning licensing before concluding that licensing is one of the best means to enforce the aforementioned objectives: it is unidirectional and can be used as a tool for information sharing. Mr. Kaede concluded by reasserting his recommendation for the use of licensing in the BBNJ framework, but warned that liability issues could emerge from this use.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	As the process moves forward, the focus of BBNJ will shift towards economic stakeholders and cross-sectoral industry engagement. Technology transfer and licensing are strongly recommended tools for BBNJ.
<b>Social</b>	The BBNJ PrepCom built on the identification and the consultation of relevant regional parties.

	The term “due regard” (that one state exercising its sovereign rights must take the international community into account) will play an increasingly important role in defining the objectives and the means of the new regulatory text.
<b>Environmental</b>	One of the objectives of BBNJ is to implement a cross-sectoral system of ocean governance enabling conservation and sustainable use of marine resources. International, multi-stakeholder environmental impact assessments (EIA) in Areas Beyond National Jurisdiction (ABNJ) will likely be mandatory for the private sector. The concept of cumulative impacts is currently under discussion.
<b>What does it mean for the World Ocean Council?</b>	The WOC can help businesses get involved in the negotiations process and represent their opinions in upcoming BBNJ negotiations.

Special note: A draft of the BBNJ agreement was made available on December 5, 2017. The document is accessible at the following link: <http://www.un.org/depts/los/biodiversity/prepcom.htm>

## 2.6. Arctic Sustainable Development – Vessel Traffic and Maritime Infrastructure Projections and Scenarios

### SDG 14 • OCEAN CONSERVATION AND ECOSYSTEM BASED MANAGEMENT

*“SDG 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems “*

*“SDG 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas”*

#### Framing questions

- What kinds, levels, locations and patterns of vessel traffic from all sectors is projected for the Arctic through 2030, and what scenarios will affect this?
- What infrastructure development and long-term investment will be necessary for these changes in vessel traffic?
- What are the environmental, business and investment risks and opportunities associated with maritime infrastructure development and increased vessel traffic in the Arctic?

#### Speakers/Panel

Chair – Paul Berkman, Coordinator, Arctic Options and Pan-Arctic Options Projects; Professor of Practice in Science Diplomacy, Fletcher School of Law and Diplomacy, Tufts University

Shipping: Bruce Harland, Vice President, Crowley Maritime

Cruise Tourism: Birger Vorland, Captain, Crystal Serenity, Crystal Cruises

Expedition Tourism: Alana Faber, Vice President, Operations and HR, Adventure Canada

Investment: Jacques Demers, Chairman and Managing Partner, Agawa Partners

Coast Guard: Neil O’Rourke, Canadian Coast Guard

Conservation: Melissa Nackle, Specialist, Arctic Shipping and Marine Conservation, WWF Canada

Research: Greg Fiske, Senior Geospatial Analyst, Research Associate, Woods Hole Research Center

### Discussions

**Paul Berkman, Tufts University**, spoke about the likelihood of significant increases in Arctic vessel traffic as the Arctic Council moves to sign several agreements, due to predictions for unforeseen investments in the region in the near future. Satellite information had not been available at the beginning of the process, when the Arctic Council established guidelines for the safety of marine activities. Today, coverage of the pan-Arctic region is obtainable, and should be used to guide operations, patterns and trends. All data and perspectives regarding sustainability should be considered in decision-making processes, including relevant governance records and indigenous knowledge. Data collection should serve to inform decisions.

**Bruce Harland, Crowley Maritime**, discussed the pros and cons of economic development resulting from shipping activity in the Arctic. Some native communities support this development, but many do not. Increased vessel traffic poses increased risks for wildlife and local communities. Port development will be required, but the geology of the Arctic region does not support such development. Current deliveries to villages are sporadic and expensive, and existing ports are not adapted to receiving cargos. For the shipping industry to develop in the Arctic, significant funding and efforts will be necessitated. A vessel-based support system for emergency and spill response should also be considered in case of accidents.

**Captain Birger Vorland, Crystal Cruises**, shared his experience as captain of the Crystal Serenity, a large cruise ship that is re-examining its Arctic plans. The vessel’s longest cruise to date is a 32-day trip from Alaska to Canada,



Greenland and New York City. These trips require extensive planning (three years for the first cruise in the Arctic) and risk-mitigation efforts. Safety and the environment are paramount, and consultations with the governments of the United States, Greenland and Canada are regularly conducted to mitigate risks. The Crystal Serenity has ice radar and maps, as well as infrared and sonar equipment installed. They also work and share travel plans with local communities, so that they know when to expect the Crystal Serenity. The Crystal Serenity also produces a vessel tracking report, data from which is submitted to NordReg (Canada) and GreenPos (Greenland). This has helped locate and control traveling patterns to ensure the safety of the passengers and the surrounding wildlife. Currently, cruises and shipping in the Arctic can be organized over the time period of one month, in the summer, during which the ice layer is thinner. However, due to climate change, cruise shipping is expected to become more popular. Mr. Vorland called for more regulation that takes into account environmental concerns. Regulation could be difficult to implement globally as the Arctic is surrounded by sovereign states.

**Alana Faber-Swan, Adventure Canada**, explained that Arctic expeditions are becoming increasingly popular. Fifty-three ships are currently cruising the Arctic, with an approximate total of 187,000 passengers; 72 ships are anticipated by 2021, with about 315,000 passengers. Travel guidelines are available to help mitigate the risk of harms caused to local species and communities. For Adventure Canada, a tour operator working with the communities of Nunavut, it is crucial that all stakeholders be taken into consideration.

**Jacques Demers, Agawa Partners**, presented the work of Agawa Partners on institutional investment in private and public programs. The private programs are Arctic-based and focus on immediate development. Currently, there is an approximately a 4-4.5% risk-free rate, pension funds have a 6-10% return and the Arctic investment risk has 85% return. Most infrastructures in the Arctic are financed by revenue that governments collect from businesses to support institutional investment, an arrangement that has been increasingly employed. To maintain this investment, there is a need to establish regulations to bring the institutional investor back to territorial waters, and to take into account practical considerations of this sector.

**Neil O'Rourke, Canadian Coast Guard**, stated that the Canadian Coast Guards have been working with local communities and governments for the past 50 years for coastal safety. There are 22 equipment sites for environmental response, which provide training for community members as a way to involve the local population. Traffic services are being built in Iqaluit as ice caps in the North continue to melt and demands for service increase. Although traffic has grown, the number of vessels passing through Arctic waters remains low. A low impact shipping initiative has been established to incentivize the move of marine transportation traffic to lower risk areas for marine species. This initiative has a co-governance model, unique to the specific requirements of the Arctic. For the Canadian Coast Guards, increased traffic has resulted in a rise in the number of rescue operations. The Arctic Search and Rescue Agreement states that Arctic countries including Canada are committed to rescue operations outside of national waters. This has led to various challenges, such as an increased need for icebreaking.

**Melissa Nacke, WWF Canada**, remarked that there has been an increase in voyages and transits in the Canadian Arctic. We are anticipating voyage numbers to double from 2010 to 2020, and from 2020 to 2030. It is crucial that we monitor sustainability issues during this growth, with the help of existing technology and communities. Corridor development must take into consideration key locations for species migration during the summer and winter seasons. This would minimize the impact of vessels on environmentally and socially sensitive areas, and enable the sustainable development of infrastructures and navigational aids.

**Greg Fiske, Woods Hole Research Center**, presented the SpaceQuest data collection tool, which daily tracks data points from ships and verifies the accuracy of this data with seafarers at a subsequent stage. While the data cannot provide concrete evidence of the increasing number of ships, they serve to show that sea ice extent has been declining, and that ships have been increasingly moving towards the North and the East. Ships operating under this system transmit information on their location of sea ice.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	Arctic sea ice cover is declining, and the expansion of Arctic shipping routes is inevitable. The Arctic shipping industry is expected to double within ten years. All speakers highlighted the issue of a lack of data. Data collection must be improved to develop investment strategies and risk-mitigation efforts. It is necessary to analyse benefits and costs when developing transportation in the Arctic.
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	Risks linked to the development of shipping in the Arctic include a lack of infrastructure to handle the traffic, as well as the local authorities' limited capacity for emergency response.
<b>Social</b>	<p>The challenge for the Arctic Council is to prevent conflicts and promote cooperation, in particular between the USA and Canada, and Russia.</p> <p>A regulatory framework is needed before the Arctic can be opened to shipping. Opinions from all stakeholders, including the federal government and local Arctic communities, must be considered when setting up guidelines. Efforts must be made to ensure that Arctic residents are fully aware of future plans.</p> <p>There is a strong need to improve local infrastructures and develop microbusinesses, especially for indigenous communities. Inuit people can also benefit from the creation of job opportunities.</p> <p>Detailed planning and adequate communication at all levels (involving regulating bodies and communities) will be crucial in ensuring the safety of Arctic travel.</p>
<b>Environmental</b>	<p>Sustainable shipping strategies need to be discussed in anticipation of future Arctic traffic. Traffic in the Arctic is currently sporadic. This provides a unique opportunity for research in sustainable shipping strategies.</p> <p>Wildlife protection approaches should be implemented, such as low impact shipping corridors designed to minimize the impact of shipping on wildlife in the Arctic.</p>
<b>What does it mean for the World Ocean Council?</b>	The WOC helps connect Arctic stakeholders willing to engage in Arctic sustainable development. The WOC is a partner of three European projects ( <a href="#">EU-PolarNet</a> , <a href="#">Blue-Action</a> and <a href="#">ARICE</a> ) that gather industry and science communities in the collection of data and the design of a common future for the Arctic.

## 2.7. Ocean NETs: CO<sub>2</sub> Sequestration Via Ocean-Based Negative Emissions Technologies (NETs)

### SDG 14 • CLIMATE CHANGE AND OCEAN ACIDIFICATION

*"SDG 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels"*

#### Framing questions

- What are the requirements of the International Climate Agreement (Paris 2015) for negative emission technologies (NET's) to remove atmospheric CO<sub>2</sub> to meet planetary safe limits for global temperatures?
- What are the potential ocean-based NETs, what science is available on them and what are the risks and benefits of Ocean NETs?
- What is needed to advance careful, science-based consideration of Ocean NETs as a potentially viable, important means to address increasing atmospheric CO<sub>2</sub>?

#### Speakers/Panel

John Ridley, Managing Director, Ocean Nourishment  
Paul Holthus, Chief Executive Officer, World Ocean Council

### Discussions

**John Ridley, Ocean Nourishment**, reminded the audience about the safety threshold for carbon concentration in the air, which is designated at 450 part per million of carbon dioxide (CO<sub>2</sub>). We are currently at 407 ppm. Predictions have been made for a peak at 750 ppm by the end of the century, based on the Business as Usual scenario, which would lead to a 4–5°C increase in temperature. In addition to reducing carbon emissions, what we can do is withdraw carbon dioxide from the airspace, a process known as negative emissions. Emissions from coal, oil, gas and land-use are currently absorbed by natural sinks (the atmosphere, oceans and soil). The ocean takes in most of the atmosphere's CO<sub>2</sub> through plankton (which accounts for 95% of the productivity of the ocean). Without the ocean's intake, we would already have reached 500 ppm of CO<sub>2</sub>. One way is to increase the number of carbon sinks, but this entails long-term storage in excess of 100 years. The testing of sink technologies for CO<sub>2</sub> sequestration requires at least ten years. Many opportunities related to geoengineering are available, but a better understanding of their operations and investments is required.

There are many types of Negative Emission Technologies (NETs): direct air capture; cloud treatment to increase alkalinity; enhanced weathering; enhanced ocean productivity; blue carbon habitat restoration; afforestation and reforestation; bioenergy with carbon capture; building with biomass; and soil carbon sequestration.

Ocean NETs are split into three categories: geochemical, chemical and biological. Geochemical NETs involve changing ocean alkalinity by putting limestone into the oceans to absorb more carbon and to reduce water acidification. The technology has received funding, but its experimental phase has yet to produce concrete results. One ton of CO<sub>2</sub> storage requires 1.6 tons of limestone, which costs US\$22. Chemical NETs involve injecting CO<sub>2</sub> deep into the oceans to quicken the natural carbon intake of the ocean. The deeper CO<sub>2</sub> is injected, the “safer” it is. There are risks and uncertainties concerning this usage, and for this reason, the technology has yet to be widely developed. Biological NETs make use of ocean fertilization, and are based on over 40 plankton growth experiments, mostly in the polar region. The efficiency of biological NETs has been called into question, however. This technology is based on the addition of nitrogen to water, which triggers an increase in plankton growth and initiates a nitrogen production circle. Removing one ton of CO<sub>2</sub> with this technology costs US\$20. Moreover, the production of nitrogen requires and consumes energy, emitting CO<sub>2</sub> in the process. Another possibility is to look at nitrogen as a source of renewable energy. Cyanobacteria could prove to be an efficient agent, as it naturally feeds ocean biological pumps with nitrogen. Its effect could be significant but is currently unproven. Presently, all geoengineering solutions remain at the experimental phase, due to uncertainties linked with their usage in the interconnected climate system. The next ten years will be crucial for us in understanding the environmental and economic viability of the technologies.

This session raised questions and comments on:

- The risks of adding macronutrients into the ocean, which could affect the equilibrium of ecosystems
- The possibility of using coastal wetlands – such as mangroves and seagrasses – as carbon sinks
- The assessment of benefits and risks of ocean NETs
- The potential role of the WOC to promote collaboration on development and assessment of NETs
- The possibility of using CO<sub>2</sub> pricing to finance these projects
- The scale required for significant sequestration with each technology
- The potential of macro-algae and their complex lifecycle
- The proposition to combine hydrogen with CO<sub>2</sub> to make CH<sub>4</sub>

### Key takeaways from the presentations and Q&A

<b>Economic</b>	The NETs industry has the potential to be as big as the oil and gas industries. However, there needs to be an economic incentive for entrepreneurs to consider starting NET businesses, such as governmental subsidies or carbon taxes. The potential risks of implementing these new technologies should be examined in tandem with the consequences of inaction and letting climate change proceed and for atmospheric carbon to reach the threshold of 450 ppm. To do this, we need more information on how geoengineering solutions can work. Politicians, entrepreneurs, scientists and industry members must convene to figure out the best way to implement NETs in the ocean. There is a strong need for a workable technical, governmental (regulatory) and financial structure. More research is needed to understand the effectiveness of each NET.
<b>Social</b>	The NET industry can bring a significant number of jobs to certain coastal areas. Local competition in coastal zones for marine space should be taken into account before implementing NET projects. Collaboration with local communities will be crucial to the local acceptance of important projects.
<b>Environmental</b>	The environmental impacts of each NET must be considered before implementation, as environmental impacts of NETs on the ocean could be greater than the current effects of CO <sub>2</sub> . Cost-benefit analyses need to be performed for each NET.
<b>What does it mean for the World Ocean Council?</b>	NETs are an emerging and sensitive topic. The WOC could organize roundtables or create a platform to foster ideation and help NET businesses develop and communicate.

## 2.8. Social License for the Blue Economy: What It Is and How Companies Can Achieve It?

### SDG 14 • OCEAN GOVERNANCE INCLUDING UNCLOS

*"SDG 14.c Ensure the full implementation of international law, as reflected in UNCLOS for states parties to it, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties"*

#### Framing questions

- What are the sector specific and cross sectoral factors relevant to social license in the Blue Economy?
- What is a strategic, cross sectoral and systematic assessment of the social license challenges and opportunities within the Blue Economy?
- How can the sharing of information on best practices and lessons learned by different sectors in addressing social license be facilitated through case studies and interactive discussions?
- What are the approaches for a collaborative and systematic approach to addressing, monitoring and maintaining a social license for the Blue Economy, and its component industries?

#### Speakers/Panel

##### Chair/Moderator

- Michelle Voyer, Australian National Centre for Oceans Resources and Security (ANCORS), University of Wollongong
- Judith van Leeuwen, Environmental Policy Group, Department of Social Sciences, Wageningen University

##### Speakers/Panel

*Fisheries:* Jenna Lahey, Louisbourg Seafoods

*Seabed Mining:* Samantha Smith, Director, Blue Globe Solutions

*Offshore Energy:* Bill Staby, Chief Executive Officer, Resolute Marine

*Shipping:* Peter Hinchcliffe, Secretary General, International Chamber of Shipping

*Oil and Gas:* Fiona Hicks, Woodside Energy

### Discussions

**Michelle Voyer, University of Wollongong**, opened the session by presenting one of the projects of the Australian National Centre for Ocean Resources and Security, which aims to better understand the economic importance of sustainability. Economic resources in the ocean are utilized by many different actors and with different foci on its vertical and horizontal areas (specific areas of the water column and the surface of the ocean). The ocean economy, or blue economy, is the sum of all these parts. The study aims at highlighting the commonalities and social drivers of the different sectors, and how the social licenses of these sectors work together (if one loses its social license, what does that mean for the others?). More broadly, the study aims at helping industries think about their environmental impacts and harnessing political support for these questions, leading to the long-term visibility of relevant industries in sustainability matters.

**Judith van Leeuwen, Wageningen University**, defined the concept of the social license to operate as the ongoing acceptance or approval of a certain activity by societal actors. The concept stemmed from the mining industry, in which mistrust in the political system and its legal licenses led the industry to define its own social license. Through making information available to the public, the industry became increasingly empowered to question and delay projects, and to have a role in decision-making processes. The social license system relies on the creation and improvement of data sharing systems. The different levels of a social license were discussed, including the possibility to withdrawn a social license, the triggering of shutdowns and blockades, and the competing of support from local populations.

**The five following speakers presented case studies from their own experiences about the social license.**

**Jenna Lahey, Louisbourg Seafoods**, spoke about the history of Louisbourg Seafoods, which had its beginnings in the collapse of cod stocks. The company's alternative harvest of wild stocks has been well received by the local community at Cape Breton. By incorporating sustainability and ocean health issues in its operations, the company ensures that stocks are responsibly managed according to fisheries science. Ms. Lahey also commented on the consequences of the local community's approval: the company was able to grow despite the significant decrease in cod stocks. It provided employment for the region. As a result, it has been asked many times to help further the local community.

**Samantha Smith, Blue Globe Solutions**, has worked in both national and international jurisdictions. The social license to operate differs depending on the nature of the project. For projects within Exclusive Economic Zones, the stakeholders are the local communities (such as local businesses, schools and religious groups), national and international regulators (such as the International Seabed Authority and the World Trade Organization), commercial competitors, NGOs and environmentalists, the latter of which are more likely to raise opposition to

new projects. For projects beyond national jurisdictions, stakeholders include all relevant persons from across the globe. Social licenses regarding such projects are difficult to define due to their scope and the lack of an adequate track recording system. To gain a social license, projects must start early, and be transparent, inclusive and engaging of the most critical aspects of their activity. They must also address risks and issues with scientific support and in a holistic and impartial manner. Scientists and external experts can represent a source of credibility. They should also initiate collaboration and partnerships where needed, and conceive management plans to maintain biodiversity as well as mitigation strategies for potential environmental damages.

**Bill Staby, Resolute Marine**, shared his experience in obtaining a social license in the U.S. (Alaska and Oregon) for offshore renewable energy systems. The main obstacle is the public skepticism about these technologies, as well as the time required to develop the level of trust necessary for a social license. His team is currently working to minimize risks step by step. In the U.S., regulations have been relaxed. Projects previously regulated by the precautionary principle (no risks should be taken) are now managed by a more adaptive process (permission can be given for the collection of data with sensors). In general, complex regulatory environments (such as in the U.S. where permits must be obtained from more than 15 regulatory agencies) require project managers to know when they should comply and when they should persist in their demands.

**Peter Hinchcliffe, International Chamber of Shipping**, examined the social license from the perspective of the shipping sector. Even though shipping accounts for 90% of the world's trade, there remain misconceptions regarding the sector's social significance. For example, ports of refuge are often denied, due to unfounded presumptions that captains and crewmembers are guilty. The social license has to be highly compliant and timely as the impact of non-compliance can be huge. In addition, the social license involves taking standards further than is required (e.g. employment standards).

**Fiona Hicks, Woodside Energy**, remarked that there has been a pendulum shift. The social license is intangible, informal and temporary, but businesses must respond to the needs of the wider community. This shift has been given prominence by a range of laws and the corporate community in Australia. For the oil and gas sector, communications have been largely established, with community groups, NGOs, regulators, investors, suppliers, employees and contractors. A number of shared concerns have emerged from these discussions, including on climate change, regulatory compliance, transparency, anti-bribery, major incident prevention and compliance. The importance of community approval was recently spotlighted in BP's abandonment of its plans in Australia due to the lack of a social license. Likewise, Chevron pulled out for the same reason. The Australian Energy Minister has proposed to improve public consultation, establish a register of interest for future dialogue, initiate environment plans, and implement community engagement programs concerning the petroleum sector. Companies should work on establishing genuine two-way conversations by making known their goals, achievements, and health and safety performance. Environmental impacts have also become more tangible in terms of reputation risks and economic impacts.

**The presentations were followed by interactive discussions in breakout groups on the issues below:**

- Who? Sector-specific examination of interest groups relevant to the obtaining of a social license (such as neighbors, regional communities, NGOs/conservation groups, human rights NGOs and other marine users)
- What? Sector-specific examination of concerns and public perceptions relevant to the obtaining of a social license
- How? Sector-specific examination of approaches (such as CSR) relevant to the obtaining of a social license

Discussion themes include:

**The experience of the Canadian shipping industry:** Local communities share a lot of misconceptions about the industry. One company spent six months explaining their operations in a newspaper. The strategy proved to be a success and led to economic gains.

**The scallop industry in the U.S.** utilized cooperative research. With the support of research personnel on their vessels, mortality rates of turtles dropped drastically.

**The seafood industry in New Zealand** recently ran an ad campaign to highlight the lack of public knowledge about the industry, and to communicate new promises made for the conservation of the environment and its resources.

**Key takeaways from the presentations and Q&A**

<b>Economic</b>	The blue economy is defined by numerous sectors. Sectors must a) operate in harmony and b) respect traditional owners of the resources in their use of the oceans. By obtaining a social license, companies can gain the support of local communities as well as increase their profits.
<b>Social</b>	Social licenses rely on trust as well as transparent and inclusive engagement. Local stakeholders should be engaged at all stages. Failing to obtain a social license can be costly for businesses. It can result in a loss of access to certain marine space or competition for intellectual property rights.
<b>Environmental</b>	Social licenses necessitate transparency on the environmental impacts of economic activities. As such, a generalization of the social license to operate would decrease the business sector's environmental impacts on the ocean ecosystems.
<b>What does it mean for the World Ocean Council?</b>	The WOC can help industries focus on sustainability issues and obtain their social license to operate.

## Day 3

### 3.1. Marine Sound: Tackling a Global Problem through Science Based Industry Leadership and Multi-Stakeholder Collaboration

**SDG 14 • MARINE POLLUTION**

*"SDG 14.1 By 2025, prevent and significantly reduce marine pollution"*

**Framing questions**

- *What are the needs and opportunities for cross-sectoral ocean industry leadership, innovation and synergies in addressing anthropogenic sound in the marine environment?*
- *How to best create and implement an international, multi-stakeholder "platform" on marine sound as the structure and process to bring together industry, science, government, intergovernmental organizations and NGOs?*
- *How can such a platform best catalyze collaboration among ocean industries and with other stakeholders, coordinate development of a shared priorities and an agenda for action and work to advance practical, cost-effective solutions, practices, policies and regulation to address marine sound based on good science?*

**Speakers/Panel**

Michel Andre, Director, Applied Bioacoustics Laboratory, Universitat Politècnica de Catalunya  
 John Young, Director, Marine Environment, DHI Water and Environment  
 David Bolduc, Executive Director, Green Marine  
 Johnathan Davey, Executive Director, Seafood Industry Victoria  
 Mark Wochner, Chief Executive Officer, AdBm Technologies  
 Paul Holthus, Chief Executive Officer, World Ocean Council  
 Jesse Ausubel, International Quiet Ocean Experiment (IQOE)  
 Jim Theriault, Senior Scientist, Ocean Environmental Consulting  
 Joseph Appiot, Associate Programme Officer, Convention on Biological Diversity (CBD)  
 Michael Jasny, NRDC  
 Mark Wood, Ocean Sonics & Instrument Concepts

**Discussions**

**Michel Andre, Universitat Politècnica de Catalunya**, introduced the session by discussing the impact of noise on ocean ecosystems and presenting different monitoring strategies. While no evidence of acoustic trauma for marine mammals has yet been found, scientists have discovered proof of acoustic trauma for some marine invertebrates such as jellyfish. The EU Marine Strategy Framework Directive sets out regulations for sound levels and monitoring requirements for EU waters. Data collected from ships and 3D modeling allow for the mapping of ocean noise. This information should be used to make recommendations at the ecosystem level and finding the balance between conservation matters and the interests of industries.



**John Young, DHI Water and Environment**, introduced the session by discussing the impact of noise on ocean ecosystems and presenting different monitoring strategies. While no evidence of acoustic trauma for marine mammals has yet been found, scientists have discovered proof of acoustic trauma for some marine invertebrates such as jellyfish. The EU Marine Strategy Framework Directive sets out regulations for sound levels and monitoring requirements for EU waters. Data collected from ships and 3D modeling allow for the mapping of ocean noise. This information should be used for making recommendations at the ecosystem level and finding the balance between conservation matters and the interests of industries.

**David Bolduc, Green Marine**, spoke about creating criteria and verification for marine sound. The Green Marine Certification program was launched in 2007 and covers a wide range of issues, including underwater noise. Shipping companies, shipyards and ports are rated on a scale (of one to five) with specific indicators. The underwater noise working group is composed of companies, ports and other stakeholders including scientific, environmental and shipowners' organizations. The group is in charge of setting indicators and making recommendations for underwater noise. These indicators were the results of a consensus established among all stakeholders and organizations, and should be made mandatory by 2018.

**Johnathan Davey, Seafood Industry Victoria**, advocated for further dialogue among industries, especially between the oil and gas sector and the fisheries sector. Some Australian studies have highlighted the negative impact of seismic exposure on the Southern Rock Lobster, scallops and zooplankton. Seismic surveys can also affect other fishes that rely on zooplankton for food. The mitigation of these negative interactions will require consultation and communication. Mr. Davey suggested creating a website that will allow the oil and gas sector and fishery organizations to share their objectives and commonalities. He also recommended holding annual regional roundtable discussions with members from both industries. The goal is to encourage two-way conversations and the funding of common research projects to evaluate impacts and identify solutions to minimize them..

**Mark Wochner, AdBm Technologies**, shared his expertise in addressing underwater noise from offshore wind energy systems. Pile driving represents a significant source of such noise. Mr. Wochner presented some of the existing methods for noise mitigation: (1) reducing noise at the source: reducing impact hammer energy, pushing the piling, vibration piling, or Blue Piling which involves using water within the piling to push it down, (2) containing the sound with double-walled steel pipes, pile-in-pile or cofferdam, and (3) absorbing the sound with the resonance of bubbles that have specific shapes and sizes and can collect different frequencies. Future solutions could involve reducing noise generation, improving mitigation systems and developing different foundation types, such as floating foundations.

**Paul Holthus** presented the **World Ocean Council's** plan to create a Global Marine Sound Issue Platform. The purpose is to facilitate dialogue between multiple stakeholders, and enhance industry involvement in marine sound issues to help shape research programs, practices and regulations. Many companies have expressed a desire to tackle the issue in a proactive, progressive way, and the platform can serve to coordinate these efforts.

**Jesse Ausubel** spoke about the **International Quiet Ocean Experiment (IQOE)**, an international scientific program aimed at improving the understanding of ocean soundscapes and the effects of sound on marine organisms. She explained that much can be learned through passive acoustics, i.e. comparing noisy and quiet ocean conditions. The projects comprise five working groups: Standardization (to ensure that results are comparable across large spatial and time scales), Data Management and Access, Arctic Acoustic Environment (an environment that is predicted to become noisier in the near future), Acoustic Measurement of Biodiversity Hotspots (such as coral and deep-water reefs), and Partnership for Observation of the Global Oceans (which works to create an Essential Ocean Variable related to sound for the Global Ocean Observing System). The next steps are to gain feedback from stakeholders, attract more research proposals, access archival data (especially data declassified by the Navy), and hopefully orchestrate a day, week or year of quiet oceans.

The panel of stakeholders (**Jim Theriault, Ocean Environmental Consulting ; Joseph Appiot, Convention on Biological Diversity ; Michael Jasny, NRDC and Mark Wood, Ocean Sonics & Instrument Concepts**) made comments on the project. Some remarked that a sector-to-sector approach could be more effective than a multi-sector process, since each industry has specific economic features and requires specific solutions. The costs of coordination measures were spotlighted. The work of CDB on underwater noise was also mentioned as a source of information.

**Key takeaways from the presentations and Q&A**

<b>Economic</b>	Reducing or limiting the growth of man-made marine sounds will require coordination among industries and other stakeholders (scientists, governments and NGOs). The best way to proceed has yet to be defined (multi-sector approach vs single-sector approach). Consultations with all sectors through meetings will need to be organized and should lead to concrete actions due to significant costs and limited time.
<b>Social</b>	Technical jargon can be unfamiliar to the layman (such as the term “seismic testing”). It is important that the concerns of stakeholders be taken into account and allayed.
<b>Environmental</b>	Much remains unknown of the effects of underwater noise on biological organisms and animal behavior, especially for marine mammals. Sound, peer-reviewed research must be funded.
<b>What does it mean for the World Ocean Council?</b>	The WOC presented its plans for creating a Global Marine Sound Issue Platform. This platform will facilitate inter-governmental efforts and collaboration across industries. Coordination efforts will entail time and costs, but they will also bring valuable opportunities. This platform will need to take into account existing collaboration facilitators, which are presently focused on research.

### 3.2. From Local Enterprise and Sustainability Practices to Global Seafood Markets: Real Solutions for Fishery Sustainability, Ghost Gear and Traceability in a Multiple Use Ocean

**SDG 14 • FOOD SECURITY: SUSTAINABLE FISHING AND AQUACULTURE**

*“SDG 14.4 By 2020, effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing “*

*“SDG 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing”*

*“SDG 14.b Provide access of small-scale artisanal fishers to marine resources and markets”*

**Framing questions**

- How can ocean health improve through practices adopted by vertically integrated fishing operations, smaller-scale fisheries and by removing ghost gear?
- What are the role of sustainability certification and seafood traceability in these solutions?
- What do fishing industry and non-governmental organization leaders see as the threats to or impacts on sustainable fishing from other ocean sectors?

**Speakers**

Chair – Jay Lugar, Program Director, Canada, Marine Stewardship Council (MSC)

Martin Sullivan, Chief Executive Officer, Ocean Choice International

Aaron Irving, Executive Chair, National Aquaculture Council, Australia; Executive Officer, Pearl Producers Association

Lynn Kavanagh, Manager, Global Ghost Gear Initiative, World Animal Protection

Wendy Banta, Supply Chain Standard Manager, Marine Stewardship Council (MSC)

**Discussions**

**Jay Lugar, Marine Stewardship Council (MSC)**, started the session by introducing the Marine Stewardship Council (MSC), which sets standards for sustainable fishing. The ecolabel is a self-elected labeling certification. About 12% of global wild captures in 34 countries are involved in its ecolabeling program. The goal of the MSC is to raise awareness among customers and to present them with options of more sustainable fishes or seafood, and in doing so promote responsible fisheries. The program also encourages fisheries to implement global best practices.

**Martin Sullivan, Ocean Choice International**, spoke about the commitment of Ocean Choice International to sustainable seafood and ocean health. Ninety-five per cent of their products are currently certified or in the process of being certified. Mr. Sullivan stated that the sustainability of fisheries is directly tied to the health of the oceans: if resources become depleted, the fishing industry will suffer, as has happened in Canada in 1992 when the East Coast Canadian industry was shut down and put under a moratorium. Moreover, customers worldwide are increasingly demanding for sustainable seafood. Wild capture fisheries generate the lowest carbon footprint per kilogram of protein produced.

**Aaron Irving, Pearl Producers Association**, explained that pearl oyster fisheries have a long history in Australia. Business shrunk after 1945 due to the generalization of the use of plastic. Australia is the only country where pearls are still cultured in the wild. The pearling industry exhibits sustainability in a “triple bottom line context”, i.e. ecologically (high-quality products require high-quality environments), economically and socially. Thanks to industry and government cooperation, some wild capture oyster fisheries have achieved MSC certification. That said, sustainability practices cannot be confined to certification; they have to be broadly conceived. One of the challenges for the pearling industry is to manage its interactions with other ocean users. For instance, seismic surveys for oil and gas exploration can pose severe impacts on oysters. Collaboration between the two industries has enabled progress to be made in addressing these gaps and establishing mutual understanding.

**Lynn Kavanagh, World Animal Protection**, described the Global Ghost Gear Initiative (GGGI), a multi-stakeholder alliance committed to driving solutions for the problem of abandoned, lost and otherwise discarded fishing gears. Ghost gears can stem from IUU (illegal, unreported and unregulated) fishing, adverse weather and spatial pressure, and from the costs and lack of disposal facilities. They can harm marine habitats, create navigational hazards, compromise yields in fisheries and generate microplastics. The GGGI comprises three working groups: (1) gathering evidence; (2) defining best practices (including prevention, mitigation and cure) and informing policies; and (3) catalyzing and replicating solutions. Mrs. Kavanagh introduced three GGGI Solution Projects: the Indonesian gear marking project with the FAO, the Olive Ridley Project in Pakistan (which focuses on education and the reuse of recovered gears), and the Alaska net recovery and recycling project (which looks into the lack of disposal infrastructure). The next steps are to encourage the uptake of the Best Practice Framework, pilot this framework in Fisheries Improvement Projects, and develop more solution projects.

**Wendy Banta, Marine Stewardship Council (MSC)**, addressed the issue of traceability in the seafood supply chain in the context of MSC certification. The consequences of mislabeled seafood are vast: illegal, unreported and unregulated (IUU) fishing, concealed trade of vulnerable species, consumer deception, risks to consumer health, etc. The MSC operates a Chain of Custody (CoC) program, which specifies that each step of the supply chain has to meet MSC CoC Standards and be audited by an independent third party. The five pillars of the program are: (1) certification at catch; (2) physical separation of different types of fishes; (3) visual identification of certified fishes; (4) traceability through documentation or records; and (5) the underpinning of organizations by management systems that support these pillars. Regarding the next steps, the MSC has several forthcoming projects: digital traceability, supply chain labor requirements, and the World Economic Forum’s Tuna 2020 Traceability Declaration.

### Key takeaways from the presentations and Q&A

<b>Economic</b>	The fisheries sector depends on the sustainable use of marine space more than any other ocean industry; unsustainable fishery practices can severely undermine the sustainability of the industry. Certification and traceability are valuable tools to guarantee that seafood has been sustainably produced. Certification serves to promote sustainable practices by aiding consumers’ choice of products. However, outside of certification, sustainability remains a broad concept.
<b>Social</b>	MSC is currently focused on governance and environmental issues. It has yet to develop a social standard, but is striving to ensure that certified companies are not involved in labor abuses, directly or indirectly, through their supply chains. The program will likely move towards mandating participants to demonstrate that they have met social standards in high-risk areas.
<b>Environmental</b>	Ghost gears pose a real threat to marine environments and wildlife. Addressing this issue requires multi-stakeholder collaboration.
<b>What does it mean for the World Ocean Council?</b>	The Sustainable Ocean Summit enables initiatives (e.g. MSC and the Global Ghost Gear Initiative) to gain visibility, meet different ocean sectors and collect feedback from ocean stakeholders. It represents an opportunity to enhance ideation and collaboration.

### 3.E. Ocean Investment Platform: Financing Ocean Sustainable Development

#### Framing questions

- What can be done to accelerate the interaction of ocean users and investors in identifying ocean sustainable development opportunities?
- How can investors better collaborate to achieve synergies and scale up investment in ocean sustainable development?
- How can ocean industries and investors best identify priorities for investment?

#### Speakers/Panel

Chair – Jacques Demers, Chairman and Managing Partner, Agawa Partners  
 Marc-Andre Blanchard, Canadian Ambassador to the United Nations  
 Jacques Demers, Chairman and Managing Partner, Agawa Partners  
 Michael Maduell, President, Sovereign Wealth Fund Institute  
 Hermann Leiningen, Managing Director, International Family Office Investments Enterprise Strategic Client Group, Royal Bank of Canada  
 Bill Staby, Chief Executive Officer, Resolute Marine Energy

#### Discussions

**Marc-Andre Blanchard, Canadian Ambassador to the United Nations**, spotlighted the importance of collaboration in meeting the SDGs. Seven trillion dollars a year are required to fund the 2030 agenda. He underlined the key role of the private sector, the growing importance of the ocean to the global economy, and the need to think about risks and opportunities differently. The costs of inaction have to be taken into consideration as well. The main barriers to sustainable investment in ocean businesses have been regulatory and informational gaps. Key factors for a sustainable blue economy include partnership, trust (by engaging in dialogue with local communities) and decisiveness. Governments should play the role of a convener, and investors should contribute to the success of impactful projects.

**Michael Maduell, Sovereign Wealth Fund Institute**, spoke about sovereign wealth funds and the role they play in the ocean economy. There are three types of sovereign wealth funds: 1) stabilization funds, which are set up to protect budgets and the economy from commodity price volatility and external shocks; 2) saving funds, which share wealth across generations; and 3) development funds, which allocate resources to priority socio-economic projects. Thanks to their unique time horizons, sovereign funds are able to pursue opportunities in areas that traditionally do not attract investments. Already, sovereign funds are being used to support food security through investments in aquaculture. There are many opportunities of mobilizing this capital for a sustainable blue economy.

**Hermann Leiningen, Royal Bank of Canada**, remarked that more banks have become willing to invest in socially responsible companies. The younger generation - the “millennials” - has particularly been increasingly requesting for responsible investments. Key requirements for sustainable investment include the corporate culture, employee engagement, supply chain engagements and the ownership mindset. Any absence of investment on R&D should pose as a red flag. He concluded his presentation with a call for a more integrated approach.

**Bill Staby, Resolute Marine Energy**, shared his experience of raising capital for an early stage company involved in ocean energy. Early stage technologies do not generally meet the requirements of capital finance. In the case of Resolute Marine Energy, by moving away from electricity towards water production and spotlighting the impacts and returns, they were able to secure stronger investments. Once the technology has been acknowledged, it will open up further investment opportunities. Mr. Staby highlighted the need for the WOC Ocean Investment Platform to attract dedicated capital for the oceans, experienced professionals and a larger network, with the objective of funding enterprises addressing ocean-related challenges profitably and with a positive social impact.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	Investors should see investments in sustainable ocean businesses as an opportunity for growth. Sovereign wealth funds could be invested in projects that need long-term commitments.
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	Creative investment opportunities, such as pension funds, could be leveraged. Crowdfunding is an option but may hinder companies that are hoping to scale up rapidly. COVE (Centre for Ocean Ventures & Entrepreneurship, located in Halifax) and OFI (Ocean Frontier Institute) are collaborative platforms that connect entrepreneurs and investors, with support from the government and industry players.
<b>Social</b>	A strong corporate culture, coupled with the engagement of employees and supply chains in sustainability matters, offers the best guarantees for a responsible investment.
<b>Environmental</b>	
<b>What does it mean for the World Ocean Council?</b>	The WOC Ocean Investment Platform represents an opportunity to attract dedicated capital for the oceans, experienced professionals and a larger network, in order to fund enterprises addressing ocean-related challenges profitably and with a positive social impact. The WOC is looking to further this initiative with different investors. Investors need to be better equipped with knowledge of ocean issues for ocean businesses to gain visibility and understanding.

### 3.3. Ship Strikes and Marine Mammals – Practical Solutions for Ocean Industries

#### SDG 14 • OCEAN CONSERVATION AND ECOSYSTEM BASED MANAGEMENT

*“SDG 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems “*

*“SDG 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas”*

#### Framing questions

- What are the scale, extent and trends regarding vessel collisions with marine mammals?
- What practices and technologies are in place to address this problem, and are they effective?
- How can shipping and other ocean industries best collaborate with other stakeholders to address the issue?

#### Speakers/Panel

Chair – Henk van Muijen, Managing Director, IHC Mining BV  
 Kathy Metcalf, President and Chief Executive Officer, Chamber of Shipping of America  
 Christopher Taggart, Oceanography Department, Dalhousie University  
 Dave Wiley, Research Coordinator, Stellwagen Bank National Marine Sanctuary, NOAA  
 Mary Byrd, Community Programs Supervisor, Santa Barbara County Air Pollution Control District

#### Discussions

**Kathy Metcalf, Chamber of Shipping of America**, noted both a global demand for mitigation and an increase in regional initiatives. Data collection (on the number of ship strikes, scale of collisions, etc.) should be supported to drive impactful policies. Speed restrictions may lower the severity of the strike, but do not serve to minimize the number of strikes. The key is to reduce locations shared between mammals and vessels. Seasonal management areas are currently being explored. In particular, we need to be aware of changes in whale migration routes and habitats. What prevails is the current location of whales and not their past location. Real-time reporting of vessel location and wildlife sightings can be extremely useful in notifying ships of potential hazards. The system, however, remains costly and requires much effort in operations. In addition, the weather can influence the capacity of a ship to change direction. Another issue lies in the diverseness of whale species and their different responses to ship noise and warnings. We need to collaborate to identify and agree on strategies for collective problems.

**Christopher Taggart, Dalhousie University**, outlined the size difference between vessels and large marine mammals. According to IWC data (dating till 2010), vessel strikes have been increasing. This may be linked to increased efforts in reporting. Mr. Taggart emphasized the importance of slowing down vessels, since the severity of the impact varies considerably with the speed of the vessel (the killing rate is approximately 50% at 12 knots and 90% at 19 knots). He also highlighted the high number of unreported “slow strikes”. Emerging technologies are largely based on acoustics science, such as using gliders to locate where species are in real time, and transmitting this data to fleets via GPS for immediate response. However, engaging fleets with such technologies has been challenging, taking into consideration the high turnover rate (of approximately 50 vessels a month) and the difficulty of reaching out to these communities.

**Dave Wiley, NOAA**, stated that the majority of whales are hit in national marine sanctuaries. Re-routing, as opposed to speed-reducing, would better avoid collisions and the sharing of locations. Re-routing and speed-reducing often entail minimal time costs for the shipowner (adding only 10–20 minutes to the vessel's trip). Occasionally, however, it may not be possible for the ship to re-adjust its route due to ship maneuverability and a lack of warning. Relevant guidelines stipulate a speed of <10 knots to minimize impact. Awareness of ship strikes needs to be improved among vessel operators and shipowners. To this, incentive-based programs have been established to pay vessels to slow down. Since 2009, the NOAA has been producing report cards that grade compliance by operators (an A or A+ for operators who adhere to the guidelines), a system that has proved to be extremely effective. It has also developed a WhaleAlert app, which provides real-time location of species through GPS activation and acoustic monitoring. The NOAA has established partnerships with different acoustic companies to keep itself informed on investments in reliable data collection systems.

**Mary Byrd, Santa Barbara County Air Pollution Control District**, gave a video presentation, during which she underlined the importance of the shipping sector as a growing industry, and of the need to reduce the harms the sector poses to marine wildlife species. She illustrated her case with the example of the Santa Barbara shipping lanes. These shipping lanes are known to have a high concentration of whales, which increases the likelihood of location-sharing (of the whales and vessels), ship strikes and the death of marine mammals. So far, speed restrictions have proved to be useful and have led an increase in fuel efficiency, resulting in less air pollution (since NOx is emitted at increasing speed rates). Most ship operators follow the guidelines on a voluntary basis. More incentives (such as rewards and penalties for people who comply, or don't comply, with the best practices) would help increase the number of ship operators willing to take part in speed reductions in hazardous waters.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	There is a strong need for collaboration within the sector, based on common concerns for marine mammals. The shipping sector is willing to conform, but it requires information to be sent in time to allow for the adjustment of routes and speeds. Systems to alert vessel operators of the presence of marine mammals in their way need to be developed in greater depth. Ports can play a role in adapting their schedules to route re-adjustments.
<b>Social</b>	Rewards, penalties and legal regulations can be effective ways of ensuring that more vessel operators follow the relevant guidelines. The NOAA's reward system has been incredibly effective. Such leveraging of social involvement may be more effective than imposing regulations and penalties.
<b>Environmental</b>	Speakers from various sectors highlighted the environmental impacts of shipping, and agreed that marine mammal strikes are an issue that merits immediate redress. Speed reductions do not affect trip durations. Rather, they help minimize the impact of potential ship strikes and reduce NOx emissions and air pollution.
<b>What does it mean for the World Ocean Council?</b>	The shipping sector has been actively addressing issues of ship strikes. The World Ocean Council can leverage its multi-sectoral network to facilitate the implementation of programs that protect marine mammals.

### 3.4. Smart Ocean-Smart Industries: Advancing Ocean Industry Data Collection, including on Ocean Acidification and Bathymetry

#### SDG14 • OCEAN KNOWLEDGE, RESEARCH AND TECHNOLOGY

*"SDG 14.a Increase scientific knowledge, develop research capacities and transfer marine technology"*

##### Framing questions

- What is the most effectively way to coordinate between ocean scientists and ocean industry operators in order to engage industry in data collection and sharing?
- What are the barriers to industry involvement in data collection and how can these be addressed?
- What are the priority locations, topics and technology to engage more ships and platforms of opportunity in collecting data, especially for ocean acidification and bathymetry?

##### Speakers

Chair – Mark Fonseca, Vice President Science, CSA Ocean Sciences



Doug Wallace, Scientific Director, Marine Environmental Observation  
 Denis Hains, Hydrographer General of Canada  
 Dariia Atamanchuk, Post-doctoral Fellow, Department of Oceanography – Dalhousie University  
 Jordan Sawler, Naval Architect, Atlantic Towing Company, JDI  
 Stefan Raimund, Scientific Consultant, SubCtech GmbH  
 Stephen deMora, Chief Executive Officer, Plymouth Marine Lab; Trustee, Partnership for Observation of the Global Oceans  
 Christine Valentin, Chief Operating Officer, World Ocean Council

## Discussions

**Doug Wallace, Marine Environmental Observation**, opened the session by highlighting the need for data collection, especially in isolated coastlines and remote regions of North-West Atlantic. These regions are not accessed by large research vessels, but they would benefit from investments in modular research vessels and volunteering data collection from operating vessels. Mr. Wallace called for an international, alternative approach based on private/public partnerships led by Canada. Mr. Jerry Ward answered this call by stating that the fishing industry owns large and sophisticated vessels that are well equipped to conduct data collection for 20 years. They see huge opportunities in collaborating for the benefit of the Arctic and the provision of vessels for research.

**Denis Hains, Hydrographer General of Canada**, spoke about the marine data collection systems of an authoritative marine geospatial working group (formed by the IOS, OGC and IHO). There is a need for big marine data to be visible, qualitative and standardized. A marine cadaster would enable countries to manage marine resources in their Exclusive Economic Zones. All sectors can contribute to ocean mapping via Crowdsourced Bathymetry (CSB). The IHO's Crowdsourced Bathymetry is a data collection and sharing system based on input by non-traditional research vessels. These vessels are efficient in collecting data. They play a key role in surveying 50% of the world's coastal waters that are shallower than 200m. Communication between research offices and operating vessels will need to be improved; acquiring third-party data should be simple. Issues with quality and technical problems of database integration should also be addressed. Mr. Hains gave examples of collaborative projects such as the Canadian COMREN project, the Nippon Foundation-GEBCO Seabed 2030 project and the Canadian Arctic Challenge, the latter of which provides the framework for Arctic users to complete existing data.

**Dariia Atamanchuk, Dalhousie University**, presented the Vessels of Opportunity (VOS) observing systems of Dalhousie University. The systems make available many routes and vessels, and benefit both scientists and vessel operators. The Atlantic Towing Company has installed in-chamber sensors and electronics/controller boxes measuring carbon dioxide, oxygen, GPS localization, etc. Data testing and calibration is done at Dalhousie. The VOS systems are safe and autonomous. They require low maintenance and can be put on different vessels without significant modification.

**Jordan Sawler** from the **Atlantic Towing Company** shared his experience as a private sector partner. The Canadian offshore company owns vessels, tugs and barge fleets, and is interested in acquiring data through sampling, observation and monitoring. Its vessels are compatible with the VOS program, as they have sufficient deck space to host laboratories, large cranes, accommodation, fast craft and iceberg towing capacities. The successful operation of the Atlantic Condor, as the first volunteer ship of the VOS program, serves to prove that communication and collaboration is key. The program provides quality data at a reduced cost, and can be deployed by Atlantic Towing employees without difficulty.

**Stefan Raimund, SubCtech GmbH**, underlined the urgent need for more comprehensive data collection on the ocean's complex and rapid evolution: the oceans are not warming at a uniform rate, CO<sub>2</sub> levels are increasing while pH levels are decreasing, and ocean observations are not being proportionally conducted. These changes impact directly on the private sector, as ocean acidification affects the marine food chain and extreme weather damages infrastructures. Mr. Raimund also spoke about the observation platform installed during the Volvo Ocean Race 2017/18. The instruments operated well and provided high-quality data. However, there were many other challenges including extreme conditions (vibrations and shocks, for instance) linked with high speeds, and the inability to conduct system maintenance for several weeks.

**Stephen deMora, Partnership for Observation of the Global Oceans**, spoke about his visions for the association of directors from marine institutes across the globe to work together and obtain the best possible coverage of ocean observations. This implies improving data collection and professional training, supporting ocean advocacy, and endorsing programs. The group also works on developing collaborative standards and validation systems. The scale and frequency of measurements required for data collection need to be agreed upon. It is important

that the business sector understands the extent and advantages of ocean data applications. The industry can benefit from collaborating with marine institutes, through validation and verification of data, connections with potential customers and improvement of corporate social responsibility policies. He concluded by calling for partnerships with governments and industries for better ocean data collection.

**Christine Valentin, World Ocean Council**, presented the ARICE Project, advancing the Smart Ocean-Smart Industries program of the WOC in the Arctic. The Smart Ocean-Smart industries program works on effectively coordinating industry and science on data collection, removing barriers to industry involvement and broadening the range of industry vessels and platforms. The next step is to develop a joint industry/science steering committee. The development of industrial activities in the Arctic has led the WOC to focus on establishing dialogue between business and research communities to enhance regional leadership. The WOC is working with research institutions in the EU on different programs, including the ARICE (Arctic Research Ice breaker Consortium) project. The six million-euro project aims to systemize the EU Arctic marine research fleets and their data collection. It is based on a Ship of Opportunity Program for the better use of facilities at the global scale, with transnational access, joint research activities and numerous advantages for the industry.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	There are global opportunities to improve collaboration between industry players and scientists, and to enhance data collection and sharing. Working with scientists and developing data collection systems will lead to better modeling and hence benefits for the industry.
<b>Social</b>	Better coordination between industry actors and scientists relies on human capital, communication and coordination. Northern and remote communities can benefit from such data modeling.
<b>Environmental</b>	Advancing data collection can provide a better understanding of current ocean conditions and changes.
<b>What does it mean for the World Ocean Council?</b>	The WOC encourages industry players and vessel operators to participate in data collection on ocean bathymetry and acidification. The <a href="#">Smart Ocean-Smart Industries platform</a> will play a key role in connecting the industry and scientific community, creating win-win partnerships and fostering ocean data collection.

### 3.5. Dark Ships: Advancing Ocean Governance and Maritime Security by Improving Detection of Illegal or Suspicious Vessel Activities

#### SDG 14 • OCEAN GOVERNANCE INCLUDING UNCLOS

*“SDG 14.c Ensure the full implementation of international law, as reflected in UNCLOS for states parties to it, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties”*

#### Framing questions

- What is known about “Dark Ships”, i.e. shipping, fishing or other vessels that operate outside the laws and norms of responsible ocean business practices?
- What are technologies, communications and other approaches that could facilitate more comprehensive information on illicit ocean activity – and what business and investment opportunities do these create?
- Is there value and potential to explore mechanisms for legitimate ocean industry operators to report suspicious vessels to appropriate authorities?
- What are the needs and benefits for better interaction, coordination and synergies among the initiatives operating in this space, and for ensuring long-term resources for these efforts?

#### Speakers/Panel

Stuart Kaye, Director, Australian National Centre for Ocean Resources and Security, University of Wollongong  
 Peter Dorcas, Vice President, Business Development, exactEarth  
 David Frulla, Partner, Kelley Drye and Warren LLP  
 Tony Worby, Director, Oceans and Atmosphere, CSIRO

#### Discussions

**Stuart Kaye, University of Wollongong**, highlighted the fact that data collection tools, such as drones, VMS (Vessel Monitoring System) and AIS (Automatic Identification System), are not generally recognized by global

and national laws and regulations. Due to the lack of legal definition, robotic systems can be categorized as vessels and governed by “archaic legal constraints”. Legislation needs to be updated to enable better navigation of monitoring systems and long-term capacity to conduct investigations. Patrol vessels are currently unable to adequately monitor all activities in Exclusive Economic Zones, sizes of which range in millions of square kilometers.

**Peter Dorcas, exactEarth**, described the “interesting but not illegal” arbitrary behavior of vessels, consisting in turning on and off the Anti-Collision Safety system (AIS). This shows the gap between the clear mission of monitoring the legal uses of Exclusive Economic Zone waters and the limited resources for the enforcement of this mission. Nonetheless, recent disruptive technologies with real-time capabilities (such as micro-satellite and commercial satellite data service) have enabled tracking, detection and alert of monitoring services. This real-time, full coverage reporting systems are key in decision-making. They allow for the notification of abnormal GPS positions and the resumption/suspension of AIS systems on vessels, and alert relevant parties when vessels are found to be assembling in prohibited areas. There are also beacon systems on fishing gears, monitoring entanglement, undeclared loitering and maintenance needs. Together these systems enable authorities to trace pollution and illegal open ocean transfers.

**David Frulla, Kelley Drye and Warren LLP**, commented on the judicial processes relating to illegal, unreported and unregulated (IUU) fishing: unilateral coastal state enforcement against vessels or fishers, bilateral enforcement based on product shipment, and international processes. There is an international obligation for flag states to establish a due diligence regime to prevent and remedy IUU fishing. This obligation should be supplemented by extensive reparations, in the spirit of “See something – say something”. Regarding illegal fishing in international waters, cooperation under the FAO’s “Port State Measures Agreement” should improve notification of suspicious fishing vessels at ports.

**Tony Worby, CSIRO**, presented a key fact: even though fisheries represent only 1% of global trade, many international organizations work on enforcing fisheries agreements, including the PSMA (Port State Measures Agreement), UNCLOS and RPOAs (Regional Plans of Action). The Interpol, FAO, EU and the U.S. all contribute to the monitoring of fishing practices, and observations have been made for the linkage between illegal behavior and small operators and vessels. The CSIRO complements this work by providing data on fish stocks, water quality, piracy and vessels’ compliance. Mr. Worby concluded his presentation by reminding the audience about the costs of these technologies in terms of data collection, management and storage: one terabyte of data can be consumed in a day.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	<p>Enforcing the fight against illegal marine activities requires detailed data and a sharp analysis of these data.</p> <p>From the judicial viewpoint, bilateral enforcement based on product shipment can be efficient.</p> <p>It is necessary to identify gaps and needs from partnerships and conversations among researchers, industries and regulatory bodies.</p> <p>Legislation and regulations should be kept updated to enable better navigation of monitoring systems.</p>
<b>Social</b>	<p>The use of surveillance data in court may or may not be permitted.</p> <p>The “See something – say something” principle can contribute to combatting IUU fishing, although more incentive is required.</p> <p>The ocean business community should raise concerns about “Dark Shipping” as this is often associated with poor social and environmental practices.</p>
<b>Environmental</b>	<p>New data is not always the answer, since metadata requires a lot of energy for storage and processing.</p>
<b>What does it mean for the World Ocean Council?</b>	<p>The WOC can leverage its network to improve collaboration among regulation bodies, researchers and industries. It can organize specific workshops to define the regulations needed to combat illegal practices, discuss the efficiency of different tools and share best practices.</p>

### 3.6. Addressing Cross-Sectoral Conflicts and Developing Synergies: Offshore Wind Energy and Fisheries

#### SDG 14 • OCEAN CONSERVATION AND ECOSYSTEM BASED MANAGEMENT

*"SDG 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems "*

*"SDG 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas"*

#### Framing questions

- What are the real and perceived conflicts between fisheries and the offshore wind industry?
- What science, experience, best practices and other information can help clarify the situation and improve the potential for cooperation and co-existence?
- What ongoing process for dialogue can best identify the issues, define the available or needed science and information and help resolve the problems associated with the interaction of these sectors?

#### Speakers/Panel

Chair – Christine Valentin, Chief Operating Officer, World Ocean Council  
 Stephanie McClellan, Director, Special Initiative on Offshore Wind, University of Delaware  
 Kevin Banister, Business and Government Affairs, Principle Power  
 Daniel Watt, Partner, McInnes Cooper

#### Discussions

**Christine Valentin, World Ocean Council**, opened the session with a presentation on the platform developed by the World Ocean Council to reduce cross-sectoral conflicts. She commented on the current proceedings at the OECD and the difficulties for Japan to authorize offshore energy development, due to its long history in fisheries.

**Stephanie McClellan, University of Delaware**, spoke about an independent program that monitors the impact of offshore wind farms on fish stocks and convenes policy-makers and the business sector (fisheries and energy companies). Offshore wind is a relatively new source of energy, and best management practices are still under development. Some stakeholders have taken standards further than is required, and have started establishing best practices. The established supply chains and markets in Europe serve as proof of the value of cross-sectoral coordination. They have also allowed for scientific studies to be conducted. The pre-construction, construction and post-construction phases of offshore wind farms have raised concerns about benthic ecosystems, marine sound and vibrations. Studies have shown that fishes return to their original habitats after construction has been completed. There could even be a reef effect. Offshore wind farm projects should take reference from Europe, in particular concerning collaborations on monitoring, planning, analyzing, data collection and prevention. Communication should be fostered among stakeholders.

**Kevin Banister, Principle Power**, introduced a potential solution to such conflict of use: floating offshore wind energy, based on buoys and submersible foundations. Floating foundations are generally not extensive, and footprints of the system are small. The technology is promising, as shown by its boom in Europe and Japan. Farms can be installed near coasts as well as in deeper waters (further than regular offshore farms). Floating offshore farms have less impact on the seafloor than other offshore wind systems, although there are pertinent economic and environmental consequences, since their large cable systems can deter fishing and disturb fish migrations. To this, Principle Power is collaborating with fishing communities to solve spatial conflicts. Site selection of floating offshore farms is based on fisheries data and can be flexible. A framework to resolve issues of property damage and the economic consequences of wind farms implementation should be developed, locally and globally. It is important to seize the commercial opportunity of floating offshore wind farms and to capitalize on this aspect of the blue economy.

**Jerry Ward, from Qikiqtaaluk Corporation** in Nunavut, was given by Christine Valentin the opportunity to present the issues from the perspective of the fisheries sector. The sector is one of the oldest industries, and its long history is partly attributable to a reluctance for change. Consultations with the fisheries sector, however, are essential to the conception of wind farms, as they can provide key information on seasonal operations and geographic specificities. He also made recommendations for consultations with the local population, as they depend a lot on the fisheries industry. Test cases could also be part of the solution.

**Daniel Watt, McInnes Cooper**, provided an overview of the legal perspective. There is no regulatory regime for marine renewable energy in Canada. Reference can be taken from the regulatory frameworks for the offshore

oil and gas and fisheries sectors, including on the consultation of First Nation representatives. Mr. Watt alerted the audience to the comprehensive coverage of offshore wind farms and their potential impact on fishing areas. Impacts are also reverse: fisheries activities, through their bottom-trawling vessels, can damage oil and gas sub-sea infrastructures. The offshore wind industry works closely with the Department of Fishery and Oceans in Canada, collaborates with the fisheries sector, and takes part in coastal marine spatial planning. A forum for collaboration, advice and information currently exists to facilitate communication among the fisheries industry, the oil and gas sector, First nation representatives and provincial regulators. It is recommended that a similar structure for the offshore wind industry be implemented, which could include the fisheries sector (for data on fish catch in the area) as well as the recreation industry. Offshore wind farms do not need the same level of supervision as the oil and gas industry; the risks of disaster are different due to the different expanse of their underwater foundations. Safety issues also vary, and for this reason, compensation schemes and marine spatial planning should be initiated in the early stages. Cooperation between these sectors and regular stakeholder consultations will help reduce conflicts and facilitate the implementation of new wind farms.

#### Key takeaways from the presentations and Q&A

<b>Economic</b>	<p>The offshore wind industry will play a key role in clean energy and contribute to alleviating global warming. It represents a huge opportunity to capitalize on the blue economy.</p> <p>As with the oil and gas industry, the establishment of a regulatory framework will require collaboration among all stakeholders.</p> <p>With adequate construction planning, offshore wind installations can offer economic potential for offshore wind proponents as well as the fisheries industry.</p>
<b>Social</b>	<p>Consultation is crucial for offshore wind energy proponents to understand and allay the concerns of local fisheries industries and communities.</p> <p>Due to the lack of regulatory framework for the offshore wind industry, the sector should proactively work towards obtaining a social license to operate. <a href="#">Consultation and mitigation plans are key to</a> gaining the support of host communities.</p> <p>Trust and accurate data are essential for productive collaboration between the fisheries and offshore wind industries.</p>
<b>Environmental</b>	<p>Offshore wind farms contribute to green energy production and to reaching national renewable energy goals.</p> <p>That said, their impacts on fish stocks, local ecosystems and sedimentation should be evaluated.</p> <p>The planning of offshore wind energy farms should proceed with the aim of minimizing disturbance to existing fish stocks and creating an environment for new fish stocks. This can be done with the help of the fisheries industry.</p>
<b>What does it mean for the World Ocean Council?</b>	<p>The World Ocean Council is an international cross-sectoral platform that plays a key role in connecting sectors globally. In particular, its Marine Spatial Planning program can serve to address the challenges spotlighted in this session.</p>