

# SUSTAINABLE OCEAN SUMMIT

"Ocean Sustainable Development -Connecting Asia and the World "

## **Summit Report**

## Hong Kong / 14 – 16 November 2018



The International Ocean Business Forum To Advance Responsible Use Of The Seas





The International Business Alliance for Corporate Ocean Responsibility

The Sustainable Ocean Summit 2018 convened at the New World Millennium Hotel in Hong Kong on November 14-16.

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The World Ocean Council would like to thank all of them in particular.

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### **EXECUTIVE SUMMARY**

The World Ocean Council (WOC) Sustainable Ocean Summit (SOS) has become the premier forum for advancing global industry leadership and collaboration on ocean sustainable development, science and stewardship. Following the success of the SOS in Halifax (2017), Rotterdam (2016), Singapore (2015), Washington D.C. (2013) and Belfast (2010), the SOS 2018 convened at the New World Millennium Hotel in Hong Kong on 14-16 November, with the theme of "Ocean Sustainable Development – Connecting Asia and the World".

Since 2010, the SOS has been bringing together leaders from the diverse **Ocean Business Community** – shipping, fisheries, oil and gas, aquaculture, offshore renewables, tourism, seabed mining, marine technology, law, insurance, finance, etc. – as well as ocean stakeholders from the government, intergovernmental, science and environment communities – to focus on **industry-driven action** on **"Corporate Ocean Responsibility**".

#### **General Highlights**

With an unparalleled line-up of ocean industry leaders (including special speakers Former Seychelles President James Michel, U.N. Ocean Envoy Ambassador Peter Thomson and Hong Kong SAR Director of Marine Maisie Cheng), the SOS 2018 delivered a rich agenda that featured plenary and parallel sessions on Women's Leadership in Ocean and Coastal Business, Asian Shipping and Shipbuilding, Biofouling and Invasive Aquatic Species, One Belt One Road One Ocean, Ocean Investment Platform and more.

Side events at this year's SOS included the inaugural CEOcean Club (a gathering of the 30 most senior business and investment representatives at the SOS), the Young Ocean Professionals and Ocean Women: Blue Economy Networking Social Event, and Lunch and Learn – What Value can a "Digital Ocean" Bring to Marine/Maritime Activity? – organized by WOC Member Mercator Ocean International.

"Get the balance right between production and protection. Business is the engine to make this happen." – Peter Thomson, Special Envoy for the Ocean, United Nations

"You are the solution towards how we can survive, thrive and prosper in a sustainable manner – by nurturing our fragile ocean environment through investing time, resources and effort in collective and collaborative ways." – Kenneth Koo, TCC Group Chairman and CEO, SOS 2018 Conference Chair

"The Sustainable Development Goals are great guidance but they're not specific to one of us. The ocean industries need to play a collaborative role – and we will." – Despina Panayiotou Theodosiou, WISTA International President

"Top leaders and representatives from different sectors are gathered here for an enlightening experience. The participation of government officials is likewise crucial. We have a macro picture here." – Simon Kuik, Vice President and Head of Research and Development, Sembcorp Marine

"The SOS 2018 was a terrific learning experience. The knowledge shared was rich and informative. It's wonderful to know that we are pushing the frontiers – priotizing beyond development and economic frontiers and building future performing forums." – Cary Anne Cadman, Environment Sector Coordinator, World Bank

Click here to revisit the SOS 2018 Program.



#### **Thematic Outcomes**

#### The Economic Perspective

Population growth has been a key driver of economic demand and infrastructure development. Ocean industries are rising to the challenge, and are forecasted to double their contribution between 2010 and 2030. Government commitment will be critical to ensuring industry growth, as well as encouraging innovation and collaboration between public and private stakeholders.

While the rise of consumerism has opened opportunities for industry, the private sector and governments need to acknowledge that by bringing these products in, they have become part of the problem – and need to be part of the solution – not just because it is the right thing to do, but also because it makes good commercial sense.

The potential of ocean-centric innovation space to improve environmental outcomes is enormous, and will be achievable through collaboration with corporations, banks, foundations, sustainable impact and long-term thinking sovereign wealth and pension funds. Ultimately, private sector financing requires from complex blue projects an element of pipeline replicability and scalability – to the extent that they serve not just one but multiple returns in terms of sustainability.

#### **The Social Perspective**

Sustainability is not just an economic and ecological concept – rather, it's a social movement that affects us all. Competing interests between sectors and communities require mutually beneficial solutions overseen by regulatory bodies and facilitated by dialogue with relevant stakeholders. To bring research to reality, assessments of ethics, social license and governance will be necessary.

The development of new technologies for the Digital Ocean has at times necessitated a need for community consent. That said, data applications by ocean industries hold much promise for raising awareness of conservancy and engaging the younger generation.

#### The Environmental Perspective

In face of today's unprecedented rates of planetary change, there can be no more "business as usual". Ocean industries have a responsibility to contribute to the livability of our planet while there is still an opportunity. Regulations and guidelines continue to be developed to ensure industries comply with the highest standards.

Environmental impact has become a risk in financiers' lens of "risk and return". It is important that investors take the ESG parameters a step further by measuring "additionality" in terms of the SDGs when investing in sustainability projects. While a lot of marine environment data, and applications to use these data, have been made available, the next step is for stakeholders to capitalize on this availability and drive policy and business decisions in the right direction for a sustainable future.

The SOS 2018 brought to the fore the benefits of business alliances/clusters and cross-sectoral collaboration, which have created common research programs, facilitated funding, empowered industries to advocate for regulatory changes, and disseminated knowledge and best practices. The WOC, as a global cross-sectoral alliance aimed at facilitating "Corporate Ocean Responsibility", represents the ideal platform to further these collaborations.



#### **Asian Shipping and Shipbuilding**

New environmental regulations have generated additional expenses for the sector, as well as an urgent need for investment in technical innovation to comply with revised standards on the design and management of engines, fuel processes etc. There is much concern that failure to do so would cause infrastructure issues leading to inefficiencies and unforeseen losses in the near future.

The conservative mindsets of shippers, as well as a lack of young talents, have impeded efforts in industrywide decision-making on innovation. Technical synergies will serve much to improve safety in navigation and cover lack of experience, as well as fulfill demands on transparency from the wider community.

#### **Biofouling and Invasive Aquatic Species**

Biofouling currently accounts for a third of invasive species being transported globally, and increased drag and fuel consumption have seen increased CO2 emissions from travelling vessels. That said, anti-fouling products that have been developed come with their own environmental issues. Responses by governments and NGOs have seen the implementation of new guidelines and targets for anti-fouling systems to ensure that they comply with global sustainability objectives.

The dual necessity of biofouling prevention and cleaning to avoid pertinent environmental and economic ramifications is eminent. The GEF-UNDP-IMO GloFouling Partnerships Project has now launched with WOC as one of the lead implementers for engaging ocean industry action with key organizations and leadership companies.

#### U.N. Law of the Sea and the BBNJ Agreement

Private sector input is urgently needed to ensure the BBNJ agreement will be adapted to future economic activities. At the present stage, companies are encouraged to invest resources in understanding the impact of the agreement on business plans and operations, to identify the associated risks and opportunities, and to share their views with their governments, the actual negotiators of the agreement.

The WOC has been developing the "BBNJ Business Coalition" as a means for coordinated industry involvement in the BBNJ process. This will advance interaction both: a) among the sectors of the diverse ocean business community and b) between the private sector and other stakeholders. The Coalition will seek to develop coordinated industry input to ensure that the BBNJ will be practical, implementable and engender constructive ocean business community engagement in the conservation and sustainable use of marine life in international waters.

#### A 2-page WOC briefing on the BBNJ and implications for ocean industries can be found here.

#### **Responsible Marine Mining**

Growing populations and clean energy development have continued to demand for metals and minerals. Due to the many uncertainties of deep sea mining, regulators are often in favor of the precautionary, or "no mining", approach. The industry is pushing for innovation in risk minimization through technology, financing and market analysis.

Despite the societal advantages of marine mining (relative to terrestrial mining) such as no social displacement and no child labor, negative public perceptions of the industry persist. It is important to note that regulators are not the only stakeholders – social media, campaigners and NGOs all have the power to influence project assessments.



#### Plastics/Waste Removal from Ocean and Island Areas

While the rise of consumerism has opened opportunities for industry, the private sector and governments are acknowledging that by bringing products like plastics in, they have become part of the problem – and need to be part of the solution – not just because it is the right thing to do, but also because it makes good commercial sense.

For clean-ups to be of impact, attention must be given to three source areas simultaneously: inland waters, coastal and island areas, and the open sea. Likewise, the power of private-public partnerships needs to be better realized for the mutual and extensive benefits they bring.

#### **SMART Ocean-SMART Industries and the Arctic**

The Arctic is one of the fastest changing regions on Earth, with rapid declines in ice extent resulting in rising global temperatures as well as increases in vessel traffic from a range of domains. Economic development in the Arctic has been largely driven by its petroleum, mineral and biomarine resources as well as its opening of shipping routes.

There remains, however, an inadequacy of data on climate patterns and sea ice interaction. Quality data coverage is much needed by business and research communities to better forecast environment dynamics, in turn improving the sustainability and safety of operations.

The WOC has been working as a partner in the EU-funded H2020 EU-PolarNet and ARICE projects to identify key industry stakeholders with operations in the Arctic Ocean, i.e. those who are able to deploy instrumentation or collect environmental data in the region, and develop the dialogue between science and industry by implementing an Industry Liaison Panel (ILP).

#### One Belt, One Road, One Ocean

The development of the 21<sup>st</sup> Century Maritime Silk Road (MSR) must focus on three key strands in order to realize its economic potential: 1) New needs – the transformation of ports and canals and establishment of "information ports"; 2) New realms – the Arctic, finance and tourism services, such as RMB offshore centers, maritime banks – from trade to finance; 3) New thoughts – collaborative discussions and development of marine resources, the sustenance of maritime security, and the innovation of maritime regulations.

The aim to promote infrastructure development, institutional linkage and people connectivity for ocean industries draws linkage to the SDGs and Agenda 2030. However, it may still be too early to judge whether the MSR will become a true enabler for the SDGs. Rather, efforts at this point in time should focus on getting MSR planners and implementers to become more engaged in existing global governance of the oceans, in order for opportunities in sustainable business operations to materialize in the future.

#### **Ocean Business Action on Climate Change**

In face of today's unprecedented rates of planetary change, there can be no more "business as usual". Once temperatures slip past the point of no return, the planet will reach a "stable" state of "hothouse". The only thing that remains to be done is to reduce emissions as rapidly as possible, and at the same time start to deploy mitigation measures (NETs, seaweed plantation, port resilience) at scale.

The magnitude of recent climate threats has been increasing port vulnerability and impacting access routes and terrestrial connections, supply chains, energy suppliers and third parties such as insurers. With 9/10 of the world's top ports (in terms of capacity) being in APAC, the continued functionality and growth of Asian



ports will be critical for global economic development.

#### Sustainable Aquaculture in Crowded Seas

With increasing world populations and rising seafood consumption, intensification is the only way forward for the global aquaculture industry. The private sector and science community have been working on several fronts to develop the technology required for implementation of sustainable production.

With the rapid rise in demand and production of farmed fish (especially in Asia), responsible management will be crucial to minimize negative impacts on local communities.

#### The Role of the Ocean/Maritime Legal Community

There is a real need for the legal community to engage in ocean sustainability issues, in view of recent environmental compliance measures (such as on sulfur emissions, ballast water management, vessel speeds) that are exerting increasing regulatory pressures on maritime industries. Notably, this requires legal practitioners to move away from being "reactive" to being more "proactive" by becoming partners in business development strategy and risk management.

Legal advisors have a mandate to point out legal, governance, compliance and strategic issues that are coming up clients' way – including on SDG 14 commitments. In general, clients are receptive and engaged because they understand from past experience the potential risks of trends breaking up business models (e.g. geopolitics and cybersecurity).

#### LNG as a Marine Fuel

Compared to its more polluting counterparts, LNG allows for up to 20% less CO2 (greenhouse gas), 99% reduction in SOx (respiratory/health), 80% reduction in NOx (ozone depletion) and 100% reduction in particulates (carcinogen). It is also proving to be an increasingly competitive alternative fuel. No doubt LNG development will play a significant role in achieving IMO's goals.

At the same time, blockchain software is being brought into the industry to facilitate automation of sourcing, procurement and delivery of bunkers, in turn reducing operating costs and increasing port capacity.

#### The Digital Ocean, Big Ocean Data and the Ocean Cloud

Data has become an asset in itself – the new raw material for businesses, providing macro as well as micro applications to facilitate transparency and investments. The increasing availability of data is opening up new opportunities in ocean space through reducing costs and increasing capacity and connectivity. Data is one of the few areas that we can experiment with the notion of limitless resources.

While a lot of marine environment data, and applications to use these data, have been made available, the next step is for stakeholders to capitalize on this availability and drive policy and business decisions in the right direction for a sustainable future.



#### **Ocean Investment Platform**

The potential of ocean-centric innovation space to improve environmental outcomes is enormous, and will be achievable through collaboration with corporations, banks, foundations, sustainable impact and long-term thinking sovereign wealth and pension funds. Ultimately, private sector financing requires from complex blue projects an element of pipeline replicability and scalability – to the extent that they serve not just one but multiple returns in terms of sustainability.

Environmental impact has become a risk in financiers' lens of "risk and return". It is important that investors take the ESG parameters a step further by measuring "additionality" in terms of the SDGs when investing in sustainability projects.

The WOC "Ocean Investment Platform" aims to provide a global structure and process to bring together the investment community and ocean industries providing technological solutions for ocean sustainable development challenges.

#### SOS 2018 Statistics

The SOS 2018 was very well attended, with over 250 delegates from 30 different nationalities and representing all key ocean sectors coming together over the course of 2.5 days to identify shared work plans and solutions to ocean sustainable development challenges. Delegates were primarily C-Suite executives and senior officers from the Ocean Business Community. Representatives of international organizations, government agencies and academic/research institutions were also in attendance. Note that in the "Sector Representation" chart below, Media and Ocean Ambassadors are categorized as "Other – Non-industry" participants.







#### Thanks to our Sponsors

The Sustainable Ocean Summit 2018 was a **Climate Neutral Event** thanks to <u>RightShip</u>. Event emissions will be offset by investing in a South Pole emissions reduction project.





### BRONZE



## **ADDITIONAL SPONSORS**





## DAY 1

#### 14 NOVEMBER 2018

#### **1.1** Ocean Executive Forum: The Signature SOS Multi-Sector Panel of CEOs PLENARY SESSION 08:30-10:00 Grand Ballroom

- What is the ocean industry CEO perspective on ocean economic activity to 2030, especially in relation to Asia's role in the ocean economy?
- What opportunities and risks do ocean industry CEOs think that these scenarios create for each sector, for the ocean economy and ocean business community overall, and for the ocean itself?
- How do ocean industry leaders view the Sustainable Development Goals (SDGs) in relation to projected ocean economic activity and future risks and opportunities?

#### **Chair/Moderator**

• Paul Holthus, Founding President and CEO, World Ocean Council

#### **Speakers/Panel**

- Shipping: Kenneth Koo, Group Chairman and CEO, TCC Group
- Submarine Cables: Mike Constable, CEO, Huawei Marine Networks
- Oil and Gas: Mary Hackett, Former CEO, Baker Hughes (BHGE), Australia, NZ, PNG
- Aquaculture: Farshad Shishehchian, CEO, Blue Aqua International
- Fisheries: John Keeler, CEO, Blue Star Foods
- Cruise Tourism: Gerry Larsson-Fedde, Vice-President, Marine Operations, Costa Asia Group
- Ocean Energy: Ali Baghaei, CEO, Aquanet Power

#### Discussions

WOC CEO **Paul Holthus** and Board Chairman **Henk van Muijen** welcomed delegates to the annual gathering of the global Ocean Business Community focused on "Corporate Ocean Responsibility" that is the SOS 2018, and expressed their hopes for dialogues at the SOS to blossom into concrete collaborations amongst key sectors that address sustainability in the context of business development as well as ocean health. Special thanks were given to the WOC Secretariat, Ocean Ambassadors and Sponsors whose support made the conference possible.

**Kenneth Koo**, SOS 2018 Conference Chair and TCC Group Chairman and CEO, offered introductory remarks on the environmental ramifications of mankind's breakneck but unsustainable progress, and the role of Asia as the "provider as well as sufferer" by reason of its diverse resources and vibrant maritime economies, including shipping, oil and gas, fishing and aquaculture. He relayed his wishes for participants to develop an Asian voice to give back to the ocean which has given unconditionally but is suffering because of this generosity. "You are the solution towards how we can survive, thrive and prosper in a sustainable manner – by nurturing our fragile ocean environment through investing time, resources and effort in collective and collaborative ways."

Describing the shipping industry, Kenneth began by highlighting Asia's significant role – Shipping accounts for 90% of the world's trade, and of this astronomical amount, one third, if not close to a half, is delivered to Asia. Over 50% of the world's merchant fleets are owned, managed and operated in Asia. Asia also represents the standard for building all types of ships, as established by shipbuilding nations such as China, Japan and Korea. Such developments are intrinsically linked to the phenomenal infrastructure growth in the region over the past decade. Looking into the future, however, Kenneth voiced his concerns at seeing more



risks than opportunities in terms of "closing windows" for private sector involvement in large-scale infrastructure projects such as the Belt and Road Initiative. On the topic of environmental stewardship, attention was drawn to the use of innovative, clean energy sources for future ship propulsion, as well as the cost and technical limitations of retrofitting such innovations to existing fleets. That said, efforts to encourage green practices by the shipping and shipbuilding industry are ongoing and various: on the regulatory front, the administration of regulations that ensure the highest compliance (including capacityrefining and consideration for fellow ocean users) by global bodies such as INTERTANKO and the International Chamber of Shipping; on the performing front, the introduction of anti-fouling coatings for hulls to eliminate toxic discharge and of ballast water management methodologies; and on the financial front, green lending policies with banks. In all these efforts, dialogue with government and relevant stakeholders will be key.

Huawei Marine Networks CEO **Mike Constable** spotlighted the significance of the submarine cable industry to the Internet and global communications – the fiber optic cables that criss-cross the oceans provide 98% of the world's connectivity. Although the industry has a substantial footprint on the seabed – 1.3 million kilometers of fibre optic cables – environmental impact is believed to be minimal due to the makeup and size of these cables (1-2 inches in diameter). Country-specific permits are required where cables transcend jurisdictions, e.g. environmental impact assessments and operational permits. On the high seas, the industry is regulated only to a certain extent by the UN Convention on the Law of the Sea. In recognition of the competing interests of other sectors such as seabed mining, fisheries and oil and gas, self-regulation is conducted through the International Cable Protection Committee. In recent years, commercial models to recover old coaxial cables and recycle their components have sprung up, in conjunction with talks at the International Telecommunication Union for additional sensors to be placed in cable networks to acquire ocean data for early warning systems and research purposes.

**Mary Hackett**, Former CEO of Baker Hughes (BHGE), Australia, NZ, PNG, spoke about the impetus the International Maritime Organization's 2020 Sulphur Cap has provided to the development of LNG as a marine fuel that can deliver significant cost and emissions reductions. A Board Member of the LNG Marine Fuel Institute, Mary provided insight into the organization's three premises for an industry-wide transition to LNG fuelling: "Regulations" (in addition to Sulphur Cap and its illegalization of vessels not equipped with scrubbers, LNG talks have allowed the setting of renewed targets for CO2 reduction and the strengthening of Emission Control Areas), "Infrastructure" (the growing investment in LNG bunkering vessels) and "Ships" (the interest in scrubber installations and pilot projects on LNG by big names such as CMA CGM and Costa).

**Farshad Shishehchian**, CEO of Blue Aqua International, emphasized the role of aquaculture in addressing global food security issues. There is a real need for humans to expand food supplies, in view of growing populations and buying power. Humans have traditionally turned to the oceans as a solution, yet overconsumption has subjected our seafood supplies to vast pressure. It is thus important that the industry makes smarter use of oceanic space and resources through technological advances. Aquaculture, according to Farshad, is 60% science and 40% art, the latter of which is experience and takes years to master. Technology, on the other hand, where utilized well in all parts of the supply chain, can significantly improve production and selection. In particular, the use of artificial intelligence and blockchain to ensure traceability of seafood will become all the more crucial as demands for food quantity and quality continue to rise.

**John Keeler**, CEO of Blue Star Foods, focused on two key questions: What does sustainability mean for smallscale fisheries in developing countries? How will the fisheries industry deliver the Sustainable Development Goals from now till 2030? The first question was answered with reference to SDGs 1, 2 and 3 – namely: "No Poverty", "Zero Hunger" and "Good Health and Well-being" – as well as the vast number of traditional fishers, traders and transporters whose quality of life is "unsustained" by phenomena beyond their control, such as climate change. To the second question, of the 17 SDGs, John highlighted seven that are of direct relevance to the fisheries sector – SDGs 1, 2, 5, 8, 12, 14 and 15 – and drew on the need for responsible



consumption to ensure sustainable fish production and food security. Mention was also given to fisheries subsidies, which have impeded fulfillment of the SDGs by encouraging IUU fishing and modern-day slavery. To John, sustainability is not just an economic and ecological concept – rather, it is a social movement that affects all on Earth.

**Gerry Larsson-Fedde**, Vice President of Marine Operations at Costa Asia Group, provided perspective on the expeditious growth of the cruise tourism industry in the Asia Pacific region, particularly in China, and the strategic steps that Costa Cruises has been taking to satisfy this demand over the past decade. These opportunities have come with problems of overcrowding at port cities, however, which require that the industry and governments collaborate to reach mutually beneficial solutions for consumers and the local environment. With a strong belief that the economic growth of ocean economies will surpass that of land economies by 2030, Gerry recognizes the need to maintain growth at a sustainable speed while ensuring corporate value. Costa's usage of clean fuel and recycling of wastewater are examples of measures the company has taken to push for sustainable development of the Blue Economy.

Ali Baghaei, Aquanet Power CEO, provided a compelling example in demonstration of the potential of wave energy conversion technology in the global renewable energy mix – Aquanet's airWAVE Turbine, aquaWAVE and other products each integrates cross-purpose applications in recognition of the interdependencies of activities in the ocean economy. A standardized system can be applied to multiple energy production processes and infrastructure e.g. oil and gas platforms, seawater desalination plants, breakwaters and coastal protection sea walls. In order to realize the market potential of clean wave energy, which is estimated at 4 trillion USD per annum based on current technology, maritime sectors need to promote innovation through industry clusters and technology incubators, as well as encourage ocean economy foresight. Likewise, technological and non-technological barriers (such as costs and lack of technical expertise in government funding and policy-making bodies) need to be addressed in tandem by stakeholders of all levels. With a strategic roadmap comprising viable solutions to these problems, clear industrial development milestones and support by government institutions, the ocean energy sector holds much promise to the advancement of environmental stewardship.

Economic	Infrastructure growth, particularly in Asia as exampled by the Belt and Road Initiative, has been a key driver of opportunities for businesses. To ensure continuity, however, technology incubators and industry clusters will need to play a more collaborative role to encourage innovation and economy foresight.
Social	Sustainability is not just an economic and ecological concept – rather, it's a social movement that affects us all. Competing interests between sectors and communities require mutually beneficial solutions overseen by regulatory bodies and facilitated by dialogue with relevant stakeholders.
Environmental	Regulations continue to be developed to ensure industries comply with the highest standards (e.g. Sulphur Cap). There is much potential for green practices to bring increased profitability if the appropriate infrastructure is put in place via investment and technological innovations.
What does it mean for the World Ocean Council?	The WOC provides a structure for multi-stakeholder collaboration through its networks, the Sustainable Ocean Summit and other projects and platforms, and assists businesses in becoming more invested in innovation and foresight.



## **1.2** Asian Shipping and Shipbuilding: Leadership and Challenges in Connecting Asia and the World

PLENARY SESSION 10:30-12:00 Grand Ballroom

- With the significant growth in Asian shipping over the past several decades, what will the development of Asian shipping look like through 2030?
- What are the main challenges for Asian shipping in addressing sustainable development, and what can Asian shipowners do to best collaborate with each other and with other ocean industries in the region and globally to help advance "Corporate Ocean Responsibility"?
- What opportunities does sustainable development create for the shipbuilding industry, especially in Asia? Are there possible sustainable development synergies across the sectors, e.g. shipping, fishing, offshore energy, and is there sufficient cross-sectoral interaction to identify and achieve synergies?

#### **Chair/Moderator**

• Kenneth Koo, Group Chairman and CEO, TCC Group

#### **Speakers/Panel**

- Jack Hsu, Managing Director, Oak Maritime; Chairman, Hong Kong Shipowners Association (HKSOA)
- C.K. Ong, President, U-Ming Marine Transport Corporation
- Wellington Koo, Executive Director, Valles Steamship
- Naoki Ueda, Senior Vice President, Senior Chief Engineer, Mitsubishi Shipbuilding
- Pier Carazzai, ABS Global Business Development, Director, ABS Hong Kong

#### Discussions

According to **Kenneth Koo**, TCC Group Chairman and CEO, while traditional shipowners are keen to invest in accountability tools to ensure the environment is not affected by shipping activities that merit continuance by reason of the service they provide to global trade, the over-commodification of the market has become a real handicap. The collapse of entry barriers to shipping has resulted in a disconnect between shipowning as a traditional industry/service and traders who buy and promptly sell ships as a commodity, the latter of which have clearly less commercial interest in investing in systems to contribute to a cleaner environment.

**Jack Hsu**, Managing Director of Oak Maritime and Chairman of the Hong Kong Shipowners Association, began by explaining what a traditional shipowner does – the possession and trade of a portfolio of ships as assets, the need for bank loans, risk management of cash flows via long-term contracts that lead to capital gains. Jack went on to highlight the pivotal role of the industry as the "globe's workforce" – the 69,000 cargo ships in operation carry 90% of the world's physical goods. However, with the introduction of the Sulphur Cap in 2020, ships, particularly those in the tramp trade without fixed schedules and pre-determined ports of destination (as opposed to freight liners), will be going from a regime that is the global standard to one that has no standard, in terms of design and management of engines, fuel processes and personnel. When applied to the entire range of existing fleets, there is much concern that the new fuel requirement will cause infrastructure issues leading to inefficiencies, mechanical failures and unforeseen losses.

**C.K. Ong**, President of U-Ming Marine Transport Corporation, started on an optimistic note opining that opportunities are forthcoming especially in Asia, with its region-wide urbanization, relocation of supply chains and the Belt and Road Initiative. Hastened growth brings with it the question of whether this progress is sustainable, however. As Asia continues to develop, the escalating population, trade and networking will demand further transparency and accountability on sustainability from business corporations and stakeholders. The road to sustainability is a complex one that cannot be accomplished by one single entity;



hence the reason for C.K.'s company in participating in the Sustainable Shipping Initiative. Through the initiative, he hopes that alternative solutions (e.g. Eco-Ships, LNG) can be reached via dialogue across sectors that foster long-term, rewarding investments in clean technology.

**Wellington Koo**, Executive Director of Valles Steamship, focused on the plentiful challenges that the global shipping industry is facing. First, shipping companies that operate time charters such as Valles Steamship are expending more efforts in assuring that the fuel supplied by charterers is compliant and compatible. With the emergence of new environmental regulations, additional expenses do not necessarily get passed on to the end users/consumers, unlike the aviation industry. Further challenges include a lack of human resources due to the industry's lack of appeal to young talents, especially seafaring crew, as well as the label of "bad guys" in regulatory discussions. "Corporate Ocean Responsibility" needs to be acted on by all stakeholders, not just the shipping sector.

**Naoki Ueda**, Senior Vice President and Senior Chief Engineer of Mitsubishi Shipbuilding, introduced two technical revolutions eyed currently by shipbuilders: 1) IMO's GHG Zero Emission; and 2) Autonomous Ships. In response to IMO's target to reduce carbon intensity by 40% in 2030 and 70% by 2050 compared to 2008, Mitsubishi has proposed a "Life Cycle CO2 Zero Emissions Plan", featuring carbon capturing onboard, methanol/LNG fuel usage, methanation (fuels made by hydrogen and captured CO2), and hydrogen electrolyzed of water by renewable energy. Likewise, the development of Autonomous Ships is a current focus of Mitsubishi. This type of ship makes use of software decision and system action, allowing for improved safety in navigation and reduced costs for manning, and covering lack of expertise and experience. The same technical synergies could be applied just as well to other ocean sectors (e.g. fisheries, ports, oil and gas) and coastal communities. Mention was also made of the ASEF (Active Shipbuilding Experts' Federation), whose members include Asian shipbuilding powerhouses responsible for building 90% of the global fleet, and which advances technical expertise alongside industry players.

According to **Pier Carazzai**, ABS Global Business Development Director, Hong Kong and Taiwan, new environmental regulations are calling for investments in futuristic technology, especially in Asia with its extensive portfolio of shipyards, shipowners, ship management companies and operators. Challenges remain, however, with the education of investors on the importance of the industry, as well as the conservative mindsets of the shipping community in pursuing collective decisions and actions based on risk analyses. Two cross-sectoral synergies were brought to the fore: 1) The development of LNG technology and infrastructure; and 2) the "Just in Time" operation, which aims to reduce emissions during the time a ship is anchored until receipt of a berth.

Economic	New environmental regulations have generated additional expenses for the sector, as well as an urgent need for investment in technical innovation to comply with revised standards on the design and management of engines, fuel processes etc. There is much concern that failure to do so would cause infrastructure issues leading to inefficiencies and unforeseen losses in the near future.
Social	The conservative mindsets of shippers, as well as a lack of young talents, have impeded efforts in industry-wide decision-making on innovation. Technical synergies will serve much to improve safety in navigation and cover lack of experience, as well as fulfill demands on transparency from the wider community.



**Environmental** There is a disconnect between traditional shipowners, who are keen to invest in accountability tools to ensure the environment is not affected by shipping activities, and traders who buy and promptly sell ships as a commodity and therefore do not see the commercial interest of such investment. On the positive side, solutions such as LNG fuel, Eco-Ships, Autonomous Ships and the "Just in Time" operation are already in talks and hold much promise for clean technology development.

What does it meanThe WOC will work to weave the shipping and shipbuilding community into its fabricfor the Worldof platforms, with the aim of drawing on synergies and kick-starting collaborationsOcean Council?that can lead to concrete solutions.

# **1.3** Women's Leadership in Ocean and Coastal Business and Advancing Sustainable Development

PLENARY SESSION 13:30-15:00 Grand Ballroom

- How well is women's leadership in the ocean and coastal business community advancing, and what must be done to improve this?
- How does this relate specifically to ocean sustainable development and the Blue Economy?
- What are the challenges and opportunities for better advancing leadership by women in the ocean and coastal industries, especially regarding sustainable development, and particularly in the Asia-Pacific region?

#### **Chair/Moderator**

 Despina Panayiotou Theodosiou, CEO, Tototheo Maritime; President, Women's International Shipping and Trading Association (WISTA International)

#### **Speakers/Panel**

- Oil and Gas: Mary Hackett, Former CEO, Baker Hughes (BHGE), Australia, NZ, PNG
- Fishing: Lori Kennedy, CEO, Louisbourg Seafoods
- Aquaculture: Donna Lanzetta, CEO, Manna Fish Farms
- Cruise Tourism: Helen Huang, President, Greater China, MSC Cruises
- Offshore Renewable Energy: Alla Weinstein, Founder and CEO, Trident Winds

#### Discussions

As noted by **Despina Panayiotou Theodosiou**, Tototheo Maritime CEO and WISTA International President, today's ocean and coastal industries are set to expand, shaped around accessible data that makes operations stricter, safer and more efficient. The next generation taking over business decisions is a group that is less restricted by customs, and more digital savvy and accepting of the need for a sustainable approach. New decisions leading to new traditions will emerge in due course.

**Mary Hackett**, Former CEO of Baker Hughes (BHGE), Australia, NZ, PNG, emphasized that sustainability calls on people to step up and do something different and disruptive, and that workforce diversity plays a crucial role in building this momentum. Those companies that are charging ahead are those that value gender balance and encourage risk-taking from their workforce. On the other hand, companies that adhere to traditions due to fears of low profits and regulations almost become a self-fulfilling prophecy. Regulations will only come if industries are not doing the right thing. It is thus crucial that ocean industries provide an



environment where their players can make bold decisions (especially with developing technology), affect public perception and push for change that will lead to better outcomes for our future generations.

**Lori Kennedy,** CEO of Louisbourg Seafoods, witnessed first-hand the ramifications on local communities caused by the collapse of fish stocks. Thanks to the collaborative efforts of the government and society over the past few decades, the fishing sector in Canada now has the capacity to self-regulate and thrive. In return, players in the fishing industry must conduct themselves sustainably – at sea and on land – in order to give back and support a healthy community. Lori recommended building a knowledge-based platform to facilitate such efforts and monitor developments in workforce demographics. As the current custodians of the ocean, respect and care must be accorded to the ocean until the future generation takes over our role.

**Donna Lanzetta**, CEO of Manna Fish Farms, believed that in order for women to excel at leadership positions within aquaculture, perceptions must be challenged. Through engaging organizations such as the World Ocean Council and Global Aquaculture Alliance, Manna Fish Farms is working with local politicians and community leaders to facilitate new thinking through education centers and training programs. Donna referred to an FAO report published in 2018, which noted that one of the biggest barriers for women's advancement in aquaculture is in fact their own bias – their belief that women are meant to be in a subservient position in the industry. Donna believed that the solution to negative perceptions lies in commitment by industry leaders to 100% transparency and sustainability – people will see when you are walking the talk.

According to **Helen Huang,** President of MSC Cruises Greater China, the cruise industry is seeing a change in workforce diversity with more women leaders, not only in China but around the globe. The same is observed of the general tourism industry. As technology advances, operations (e.g. at ports and terminals) will become less physically demanding, thus creating opportunities for women to rise to the challenge. Helen offered two suggestions for improvement: 1) Women leaders should show more appreciation towards fellow female colleagues and encourage them to step up in their career ladders; 2) NGOs and relevant organizations could organize training and mentoring programs to allow young managers to work with women leaders, learn from them and build on their efforts. She laid emphasis on the importance of workforce empowerment and passion in order to improve business efficiency, diversity and hence sustainability.

**Alla Weinstein,** Founder and CEO of Trident Winds, reminded the delegation of the ultimate purpose of their respective fields of work – to implement something while there is still an opportunity to ensure the livability of the planet for generations to come. In response to this calling, Alla founded Trident Winds to pursue offshore wind projects in North America and other markets. She reflected on the encouragement she obtained throughout her advancement in an industry dominated by males, and stressed that employment and training opportunities are what women will need to progress and make significant contributions to their respective fields. Having this diversity is crucial for business sustainability.

Economic	Companies that value workforce gender balance and diversity and empowerment understand these as crucial elements to business efficiency and success. Companies that adhere to traditions due to fears of low profits and regulations almost become a self-fulfilling prophecy.	
Social	Perceptions must be challenged in order for women to excel at leadership positions in ocean industries. In aquaculture, for example, one of the biggest barriers to women's advancement is their own belief that they are meant to be in subservient positions. The righting of such perceptions requires industry leaders to show further	



	acknowledgement of the contributions made by their female workforce, and to proactively offer them employment and training opportunities. Sustainability calls on people to step up and do something different and disruptive, and workforce diversity will play a crucial role in facilitating this momentum.	
Environmental	Ocean industries have a responsibility to contribute to the livability of our planet while there is still an opportunity. It is optimistic to note that the next generation of managers is a group that is less restricted by customs, and more digital savvy and accepting of the need for a sustainable approach.	
What does it mean for the World Ocean Council?	The WOC is in talks to sign a MOU with the Women's International Shipping & Trading Association (WISTA), which is hoped to facilitate gender balance and women's involvement in the collaborative implementation of the U.N. Sustainable Development Goals by ocean industries.	

## 1.4 Part 1 – Biofouling and Invasive Aquatic Species: The GEF-UNDP-IMO GloFouling Partnerships Project – Opportunities for Business Collaboration and Implementation

PARALLEL SESSION 15:30-17:00 Grand Ballroom

- What is the GEF-UNDP-IMO GloFouling Partnerships Project?
- How can the business community, investors and innovators engage in addressing the shared problem of biofouling and the introduction of invasive species?
- How is the issue of biofouling and invasive species being addressed in China?

#### **Chair/Moderator**

• Henk van Muijen, Managing Director, IHC Mining; Chair, World Ocean Council

#### **Speakers/Panel**

Introducing the GloFouling Project and Biofouling Risk

- Christine Valentin, COO, World Ocean Council
  - Engaging the Ocean Business Community, Investors and Innovators in Tackling Biofouling and Invasive Species
- Guillaume Drillet, Chairman, Global TestNet
  - Updates from Global TestNet
- Aurore Trottet, Senior Environmental Scientist, Water and Environment, DHI
  - Biofouling: New Tools for Risk Minimization and Compliance

#### Addressing Biofouling and Invasive Species in China

- Jian Wang, Technical Director, Jotun COSCO Marine Coatings Co.
  - Recent Development of Regulatory Issues in China Marine Coatings
- Gui Taijiang, Chief Engineer, Marine Chemical Research Institute
   The R&D Activities of Antifouling Coatings in China
- Gong Xuanwei, Senior Surveyor, China Classification Society
  - Management and Control of Active Substances in Antifouling Paints Under the AFS and POPs



#### Discussions

**Henk van Muijen**, Managing Director of IHC Mining and Chair of World Ocean Council, opened the session and drew attention to its three focus points: the GloFouling Partnerships Project, biofouling risk management and compliance, and developments in China.

#### Introducing the GloFouling Project and Biofouling Risk

World Ocean Council COO **Christine Valentin** remarked that solutions to biofouling must take into account the parallel need for cleaning *and* prevention (e.g. via new coatings technologies), as well as the numerous vectors by which invasive species are now transported, such as recreational crafts, oceanographic and marine energy instruments, and marine debris. In recognition of the need for cross-sectoral and institutional resolutions, the GEF-UNDP-IMO GloFouling Partnerships Project was launched in early 2019. The project aims to draw on the expertise of its regional organization partners (including PEMSEA, SPREP, CPPS, PERSGA, SACEP), 12 lead partnering countries spanning seven regions, and strategic partners (e.g. WISTA) in implementing the IMO 2011 Biofouling Guidelines at global, regional and national levels. Key outcomes include: 1) Driving policy-making in developing countries; 2) Building capacity through technical assistance and awareness raising; 3) Encouraging industry participation and technology adaptation; 4) Increasing stakeholder cooperation and knowledge sharing. The WOC will be facilitating such efforts as one of the lead private sector partners, ensuring contribution from all key industry players, including non-shipping, over the next five years.

**Guillaume Drillet,** Chairman of Global TestNet, provided an overview of past and current developments of the organization. Global TestNet was created in 2010 under the framework of the Global Industry Alliance (GIA) of the GloBallast Partnership, with the aim of ensuring that type approval testing of ballast water treatment systems is universally accurate, robust and comparable. It has since extended its working scope to all sources of bio-invasions generated by shipping, through opening its membership to experts dealing with bio-fouling issues, and signifying its support for the GloFouling Partnerships in May 2018. Global TestNet is currently seeking new members to support its development of guidelines for testing anti-fouling systems as well as underwater cleaning and grooming devices, and to ensure that these guidelines are universally recognized for meeting environmental sustainability objectives.

According to **Aurore Trottet**, Senior Environmental Scientist of DHI Water and Environment, biofouling currently accounts for a third of invasive species being transported globally (with the remaining two-thirds accounted for by ballast waters and aquaculture). Two types of biofouling were highlighted: calcareous fouling – which contributes most to resistance and requires mechanical removal – and "slime"/biofilm – which contributes less to resistance and is more dynamic. DHI has now developed a Biofouling on vessel hulls based on a ship's whereabouts. Through statistical modeling of key variables, such as the efficiency of coatings, time since the previous cleaning/painting, temperature, salinity, chlorophyll, vessel speed and depth, the API is able to provide calcareous and biofilm cover calculations, and hence estimates on fuel efficiency and penalty. With fuel savings of up to 5%, the system has been well received thus far, and has allowed for more efficient scheduling of diver inspections and hull cleaning.

#### Addressing Biofouling and Invasive Species in China

In explicating China's regulations on marine coatings, **Jian Wang**, Technical Director of Jotun COSCO Marine Coatings Co., drew attention to three strands of legislation: 1) National (fundamental policies); 2) Industry (sectoral standards); 3) Location (provincial regulations). In China, regulatory changes are often unpredictable – announcements of new laws are frequent, and often call for immediate implementation. The varying standards between cities and provinces create further complications for compliance. Recent



years have seen China enforcing stricter environmental standards, as exampled by the 13<sup>th</sup> "Five Year Plan" that requires a 10% reduction in total VOC (volatile organic compounds) emissions, and a 20% reduction in VOC emissions from industry coatings, by the end of 2020. In January 2018, the Environmental Protection Tax Law replaced VOC emissions fees with an air pollutant tax. This has resulted in the emergence of industry solutions (e.g. high solids/solvent-free and waterborne coatings) with potential to substantially reduce VOC emissions and hence environmental tax. As China continues to tighten control on environmental standards, VOC reductions are predicted to become a key theme in marine coatings development.

**Gui Taijiang,** Chief Engineer of Marine Chemical Research Institute, reinstated the two fundamental issues of marine fouling organisms – fouling causes roughness on vessel surfaces that results in increased drag and fuel consumption and hence CO2 emission, as well as the invasion of organisms in alien environments. In response, China's research of antifouling coatings has focused on four key areas: binder, antifoulant as a natural product, fouling release coatings and biomimetic solutions. Products under development at universities and research institutes are various, and include, amongst many others, TBT free self polishing coatings, dynamic surface antifouling using biodegradable polymer, self-repairing silicone antifouling coatings, and polymer brush from nanoscale to macroscale. In recent years, researchers have noted a change in components used in antifouling coatings: from tin-free to low copper material, and thereafter to heavy metal-free and biocide-free material.

According to **Gong Xuanwei**, Senior Surveyor of China Classification Society, CCS has been managing antifouling paints through implementing key international conventions in China, including the 2001 International Convention on the Control of Harmful Anti-fouling Systems on Ships, the 2009 Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, and the 2004 Stockholm Convention on Persistent Organic Pollutants. Significant progress has been made through surveys and the issuance of certificates during all stages of shipbuilding, ship operation and product manufacturing. Worthy of mention is CCS' introduction of a risk assessment method, which strengthens the certification of anti-fouling products and establishes a long-term fulfillment mechanism to ensure that no DDT, TBT and other prohibited substances will enter the market, in protection of the marine environment and human health. While CCS has no legal binding force, the guidance they provide is highly valued by the industry.

Cognizant of the economical implications of fouling – increased roughness of vessel surface leads to increased drag and fuel consumption – industry players have begun investing in products to mitigate impacts. Examples include antifouling paints and APIs that provide estimates of fouling cover and fuel efficiency, which in turn allow for more cost-efficient scheduling of diver inspections and hull cleaning.
In China, CCS has been working to strengthen the certification mechanism of anti- fouling products to ensure that no DDT, TBT and other prohibited substances will enter the market, in protection not only of the environment but also of human health.
Biofouling currently accounts for a third of invasive species being transported globally, and increased drag and fuel consumption have seen increased CO2 emissions from travelling vessels. That said, anti-fouling products that have been developed come with their own environmental issues. Responses by governments and NGOs have seen the implementation of new guidelines and targets for anti-fouling systems to ensure that they comply with global sustainability objectives.



What does it mean<br/>for the WorldThe GEF-UNDP-IMO GloFouling Partnerships Project has now launched with WOC as<br/>the lead private sector partner for engaging key industry players, including non-<br/>shipping industries, into action to accelerate the development of solutions to<br/>biofouling and the spread of invasive species.

### 1.5 UN Law of the Sea: New Legally Binding Instrument on Biodiversity in Areas Beyond National Jurisdiction (BBNJ) and Ocean Industries

PARALLEL SESSION 15:30-17:00 Garden Room C-D

- What does the draft legally binding BBNJ agreement consist of after the first round of negotiations in 2018?
- What reaction and input do ocean business community representatives have to the draft agreement?
- What is the process for formal consideration and adoption of the BBNJ agreement by the U.N. General Assembly (UNGA), and how can and should ocean industries engage with other ocean stakeholders, including governments, as the BBNJ agreement moves forward?

#### **Chair/Moderator**

• Serge Segura, Ambassador for the Oceans, France

#### **Speakers/Panel**

- Serge Segura, Ambassador for the Oceans, France
- Gabriele Goettsche-Wanli, Director, U.N. Division for Ocean Affairs and the Law of the Sea (DOALOS)
- Virginie Tassin, Ocean Policy and Governance Expert Advisor, World Ocean Council
- Andreas Kaede, Attorney, Haver & Mailänder Rechtsanwälte
- Paul Holthus, Founding President and CEO, World Ocean Council

#### Discussions

According to **Serge Segura**, Ambassador for the Oceans of the French Republic, 2018 marked the entry of the BBNJ discussions into a definitive phase since their inception in 2007, with the beginning of formal negotiations on the draft agreement. As indicated by the agreement's full name – an international legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS) on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction – the balance between "conservation" and "sustainable use" will form the foundation for negotiations. Serge voiced his hopes for the session to improve understanding and input from private sector representatives and stakeholders in forthcoming meetings.

**Gabriele Goettsche-Wanli**, Director of the U.N. Division for Ocean Affairs and the Law of the Sea, was unable to attend personally but shared her observations through a pre-recorded video. She began by spotlighting the breadth of UNCLOS – the Convention sets out the legal framework within which all activities in the oceans must be carried out, as well as the principles of the freedom of the high seas. In response to the need to address manifesting gaps in governing marine biological diversity of areas beyond national jurisdiction, in 2017 U.N. Member States decided in General Assembly Resolution 72/249 to convene an intergovernmental conference, with a mandate to address a package of cross-cutting issues in the draft text of the BBNJ agreement (including the conservation and sustainable use of marine resources, area-based management



tools such as MPAs, EIAs, capacity building and transfer of marine technology, institutional arrangements, funding, liability, review and compliance etc.) and for the conference to meet for four sessions from 2018 to 2020. Following the first session in September 2018, the second session will take place in late March to early April 2019. As negotiations move forward, it is important that all voices and perspectives, including those of ocean industries, are heard. Notably, the World Ocean Council has "observer" status at the conference, and has been able to participate, monitor and report on BBNJ developments on behalf of the ocean business community, as well as to highlight to the delegation the importance of private sector involvement and input.

**Virginie Tassin**, WOC Ocean Policy and Governance Expert Advisor, began by providing perspective on the broad geographical and definitional scope of "biodiversity beyond national jurisdiction". The BBNJ discussions have come a long way, with progress initiated by a U.N. Working Group (2004-2015) and furthered by a preparatory committee (2015-2017) that culminated in the start of formal negotiations in September 2018. The two main forces of push have been the G77 and China, concerned about access and benefit-sharing of marine genetic resources, as well as the European Union and NGOs, concerned about strengthening the conservation aspects and ensuring the sustainability of activities in the high seas. So far there has been considerably greater interest in the "conservation" aspect of the agreement than in "sustainable use", which urgently calls for private sector input to ensure the new agreement is adapted to future economic activities. There is much that the Ocean Business Community can do right now to contribute to the BBNJ progress: 1) Understand the impact of the agreement on their activities and business development plan; 2) Identify the impact and associated risks and opportunities; 3) Share their views with their governments (the actual negotiators of the agreement) and use the WOC as a platform; 4) Get prepared for the changes ahead of the adoption of the agreement, such as the specifics of the EIAs (thresholds, types, timelines, locations etc.) that are sure to impact industry players in various capacities.

Andreas Kaede, Attorney of Haver and Mailänder Rechtsanwälte, opined that neither the principle of "Freedom of the High Seas" nor "Common Heritage of Mankind" give anyone rights to claim any part of the open seas as their own under exclusion of others. Rather, both principles impart a common responsibility on all for the future of the ocean. One means of living up to this responsibility is technology transfer (TT) – the sharing of technology between states that enables the simultaneous exploitation of resources and preservation of the environment to the largest extent possible – the importance of which is increasingly observed in the wording of principles/draft legal instruments, such as the BBNJ agreement, the Draft Regulations on Exploitation of Mineral Resources in the Area, and SDG14a. While the first session of the intergovernmental conference in September 2018 has yet to culminate in a "zero draft", it instigated a range of TT-relevant discussions, including the requirement for a needs assessment to address regional characteristics, the opportunity to draw on UNCLOS Part XIV and the IOC Guidelines, the need for a clearinghouse and adequate and sustainable funding mechanism etc. Andreas believed that for TT to serve its sustainability purpose, TT compliance and execution should be encouraged but voluntary, tailored to demand, based on explicit contractual delimitations, restricted to mature technology, directed to educated and motivated recipients, and transacted between commercial entities, not states other than state enterprises. By reason of TT's importance for future economic assets – both for owners/transferors or users/transferees - it is paramount that realistic treaty language is proposed in the current stages of early drafting to ensure TT-relevant provisions "survive" negotiations.

**Paul Holthus,** Founding President and CEO of World Ocean Council, provided an update on the WOC's continued involvement in the BBNJ discussions. For the past five years, the WOC, as one of the few voices offering private sector input, has been working persistently to raise awareness amongst government delegations and other observers of the presence of a strong and diverse ocean economy, and of the importance of industry engagement in the negotiations. The International Chamber of Commerce (ICC) currently acts as the overall representation for the business community, with the WOC providing advisory support with its maritime expertise. Other efforts by the WOC in furthering the above message include the development of an industry coalition (with members including the International Chamber of Shipping and



CLIA), as well as the hosting of side events in partnership with the ICC during preparatory committee meetings in 2015-2017. Likewise, the WOC has been working to raise awareness within the business community about the BBNJ process. Paul admitted, however, that it has been difficult to create a sense of urgency at the level of individual companies. He voiced his hopes for industry players to fully understand the significant stakes on their activities, as exampled by the EIAs that will require companies to justify the environmental impact of business operations in the high seas. It is thus crucial that affected industries provide input to the negotiations process. The WOC will continue to do its best to facilitate this involvement.

Economic	Private sector input is urgently needed to ensure the BBNJ agreement will be adapted to future economic activities. At the present stage, companies are encouraged to invest resources in understanding the impact of the agreement on business plans and operations, to identify the associated risks and opportunities, and to share their views with their governments, the actual negotiators of the agreement.	
Social	Neither the principle of "Freedom of the High Seas" nor "Common Heritage of Mankind" give anyone rights to claim any part of the open seas as their own under exclusion of others. Rather, both principles impart a common responsibility on all for the sustainable usage of the ocean.	
Environmental	mental "Conservation" and "sustainable use" of marine biological resources will form th basis of BBNJ negotiations. Companies should prepare themselves ahead of th adoption of the agreement, such as with the EIAs that will require them to justify th environment impact of business operations in the high seas.	
What does it mean for the World Ocean Council?	The WOC is working to grow the "BBNJ Business Coalition" as a means for coordinated industry involvement to ensure that the BBNJ will be practical, implementable and engender constructive ocean business community engagement in the conservation and sustainable use of marine life in international waters.	



## 1.6 Part 2 – Biofouling and Invasive Aquatic Species: The GEF-UNDP-IMO GloFouling Partnerships Project – Opportunities for Business Collaboration and Implementation

PARALLEL SESSION 17:30-19:00 Grand Ballroom

- For advancing the role of coatings in biofouling prevention, what are the state of the art, trends, challenges and opportunities?
- For the cleaning of hulls and other surfaces, what are the state of the art, trends, challenges and opportunities?
- What is the future for a comprehensive, global ecosystem of biofouling prevention and treatment, especially in reducing the introduction of invasive species?

#### **Chair/Moderator**

• Julian Hunter, Director, Sustainable Value, AkzoNobel

#### Speakers/Panel

- Neil Oxtoby, Section Leader Fouling Control, AkzoNobel
  - Role of Coatings in GHG Reduction/Green Shipping
- Neal Blossom, Director of Global Regulatory Affairs, American Chemet - The Science and Regulation of Antifouling Biocides
- Laurance Langdon, General Manager, HullWiper
  - Biofouling Treatment: State of the Art, Trends, Challenges and Opportunities
- Roger Dyhrberg, Chairman, CleanSubSea
  - Practical Biofouling Solutions for International Vessels: Innovation for the Future

#### Discussions

**Julian Hunter**, Director of Sustainable Value at AkzoNobel, opened the session by spotlighting the dual necessity of biofouling prevention and cleaning in order to reduce fuel consumption and subsequent CO2 emissions in line with SDG 13 on climate change, as well as to counter the transportation of invasive species. He drew attention to the variety of perspectives presented by this panel by reason of their backgrounds: antifouling paint manufacturer, biocides manufacturer and hull cleaning companies.

**Neil Oxtoby,** Section Leader Fouling Control at AkzoNobel, noted if shipping were a country, it would rank among the world's top ten emitters of greenhouse gases (GHG). CO2 emissions from shipping have reached an annual high of 800 million tonnes (2.2% of global total), and are predicted to grow by 50-250% by 2050. In response to IMO's targets of reducing GHG to 50% of 2008 levels by then, and to the ecological and economical concerns of translocation of invasive aquatic species via fouled hulls, the coatings industry has been working to develop high-performance products that reduce fouling and hence hull resistance, fuel use and emissions. Two such products are biocidal antifouling coatings and fouling release coatings, which are regulated to ensure safe environment and human exposure. Factors impacting fouling control coating choice are various, and include global and regional regulations, cost-benefit analyses, operational efficiency and trade flexibility. AkzoNobel is currently partnering with PHILIPS in testing the alternative technology of UV-C, which has been proven to provide total fouling control and is on target to be marketed in 2023.

**Neal Blossom,** Director of Global Regulatory Affairs at American Chemet, remarked that with over 1,500 fouling organisms identified, shipping industries are faced with the tremendous challenge of devising sufficient options to prevent biofouling in varying ecosystems and with varying use patterns. The extensive research that has gone into antifouling coatings has ensured that active ingredients contained therein are at



levels that provide performance and technical compatibility, favorable price performance ratios, and favorable health and environment profiles – with efficacy only at the hull surface (effects from the hull are minimal and short-lived), minimal leaching to provide for extended effectiveness of the coating, and the ability to repel specific fouling organisms. Examples of actives include cuprous oxide, copper thiocynate and zinc pyrithione. Antifouling active ingredients are currently regulated on international, regional and country levels through hazard assessments (toxicity to humans and non-target organisms), human exposure assessments (which cover the full use cycle of antifouling products) and environmental exposure assessments (which recognize regional differences in geography, climate etc.). Notably, assessments are conducted based on the precautionary principle, i.e. worst case scenarios. With this in mind, the industry reassures that rigorously approved antifouling coatings are safe, environmentally sound and sustainable.

**Laurance Langdon**, General Manager of HullWiper, reflected on the history of biofouling, noting that invasive species is an issue raised as early as 1836 by Darwin, at a time when there were few ships and no GHG emissions. He highlighted three modern challenges: 1) Invasive species, which now account for the largest percentage of bio-invasions (compared to ballast water and aquaculture) and which have resulted in significant losses for ecosystems, human lives and businesses; 2) GHG – 1% increase in resistance can lead to 3% increase in fuel burn and ensuing rise in CO2 emissions, in turn impacting ocean acidification and ecosystem wellbeing; and 3) Diver safety. HullWiper has been developing underwater robotics as a solution, with the advantages of zero downtime and safer operations (no damage to coatings, no risk to divers, 24/7 operation). Research and initiatives by BIMCO and IMO (e.g. SEEMP) have done much to focus the industry on needed improvements in technology and hull-cleaning management. That said, challenges remain on two fronts: 1) Change has been slow due to costs; 2) Niche areas still require divers to clean, such as bow thrusters and external cooling pipes. Nonetheless, opportunities are plentiful, especially in mandatory port regulations and in pushing for more autonomous, cost-efficient and environmentally compliant innovations.

**Roger Dyhrberg**, Chairman of CleanSubSea, laid emphasis on the gravity of the issue: biofouling is a US\$150 billion problem that has become contained within its own vicious cycle, as fouling removal efforts have come with their own problems. Uncontained abrasive cleaning has led to the release of heavy metals from antifouling coatings into the marine environment (2kg per day), as well as damage to the coatings themselves and dispersal of invasive species (and pertinent economic and biodiversity impacts). In the Black Sea, for example, an invasive comb jelly has been blamed for the collapse of coastal fisheries worth millions of dollars annually. Likewise, there has been a lack of maturity and alignment of international legislation regarding the risks of uncontained cleaning. That said, much work is currently being done by regulators and technology developers to counter these challenges, particularly in the shipping, oil and gas, insurance and biosecurity sectors, assisted by governmental and international initiatives such as the IMO GloFouling Project. An example would be CleanSubSea's "Envirocart", which comprises a multi-stage filtration system and is able to remove and re-capture micro and macro biofouling using flexible blades that do not cause damage to antifouling paint. Roger recommended the establishment of a global regulatory body for antifouling compliance and to facilitate comparison of technology options.

#### **Key Takeaways**

**Economic** Biofouling is a US\$150 billion problem that has become contained within its own vicious cycle. The translocation of invasive species has resulted in substantial losses for businesses such as fisheries, and increased roughness on vessel surface has led to increased hull resistance and fuel consumption. Antifouling products are currently being developed with operational efficiency, trade flexibility and price-performance ratios in mind.



Social	In recent years, underwater robotics have emerged as a solution to the health hazards posed to technical divers who conduct biofouling removal work. However, for niche parts of the vessel such as bridge keels and sea chests, diver assistance is still needed.
Environmental	Biofouling poses ramifications for ecosystem wellbeing and climate health with its transportation of invasive aquatic species and incidental GHG emissions. Industries are pushing for environmentally compliant and cost-efficient antifouling innovations, with hazard assessments in place to regulate impacts on surrounding habitats and regional geographical differences.
What does it mean for the World Ocean Council?	The dual necessity of biofouling prevention and cleaning to avoid pertinent environmental and economic ramifications is eminent. The GEF-UNDP-IMO GloFouling Partnerships Project has now launched with WOC as one of the lead private sector partners for engaging industry action to accelerate the development of solutions to biofouling and the spread of invasive species.

## 1.7 Responsible Marine Mining: Leadership and Collaboration for Accountable Ocean Mining – from Nearshore to the Deep Sea

PARALLEL SESSION 17:30-19:00 Garden Room C-D

- What are the opportunities and challenges for advancing responsible marine mining (nearshore, within national waters, in international waters)?
- What has been the experience from nearshore mining and terrestrial mining, and can this help ensure that marine mining addresses these challenges and is responsible as it moves further offshore?
- Is there a value in having an international "platform" to bring together the marine mining industry to catalyze collaboration within the sector and facilitate interaction with other stakeholders, coordinate development of shared priorities and agenda for action, and work to advance practical, cost-effective solutions, practices, policies and regulation to address marine mining based on good science?

#### **Chair/Moderator**

• Peter Glazebrook, Regulatory Advisor, Environment Science and Law, Adjunct Professor, Sustainable Minerals Institute, University of Queensland

#### Speakers/Panel

- Samantha Smith, Director, Blue Globe Solutions
- Henk van Muijen, Managing Director, IHC Mining
- Renee Grogan, Director, Gro Sustainability

#### Discussions

**Peter Glazebrook**, Regulatory Advisor in Environment Science and Law and Adjunct Professor at the Sustainable Minerals Institute of the University of Queensland, reminded the delegates of the many uncertainties of marine mining by reason of its novelty relative to other maritime industries. Much remains unknown about the deep sea environment, for which regulations are still in early stages of development. SDG 14 lays emphasis on the full implementation of international and regional regimes (including by the International Seabed Authority (ISA)) for the conservation and sustainable use of ocean resources. To some,



the BBNJ agreement being drafted (and discussed in an earlier session) would seem to be in conflict with marine mining, and draws on the question of whether environmental protection and development are mutually exclusive.

Samantha Smith, Director of Blue Globe Solutions, began by reinstating the world's continuous demand for metals and minerals: 1) Growing population, a key driver for economic demand; 2) Development of clean energy sources itself requires metals from conventional sources (a 5 MW wind turbine alone requires 15 tonnes of manganese, 5 tonnes of copper and 5 tonnes of nickel); 3) Development of electric vehicles, in response to the need to mitigate transportation emissions, itself requires metals for the production of lithium-ion battery packs. Emphasis was laid on the social and environmental advantages of marine mining relative to its land-based counterpart: minimal waste (as multiple metals are found in each mine), clean mineral processing, no land-use conflicts, no child labor, no deforestation, no pressurization issues with the ore etc. Samantha called attention to the need for industry-academia collaboration in marine mining, citing a past project titled Solwara 1 in Papua New Guinea, in which potential conflicts with local hydrothermal vent scientists were avoided through consultations with top academics on responsible operations that emphasized the maintenance of ecosystem health, early and inclusive stakeholder engagement, and "getting the science right" via publication of findings for transparency. The project notably designed the world's first permitted EIA/EIS for deep sea mining, developed impact avoidance and minimization strategies, and increased global knowledge via international publication of over 40 studies. Industry-academic collaboration is likewise essential for projects in areas beyond national jurisdiction, as has been demonstrated by the sharing of standards, regional management plans and environmental studies (e.g. on species distribution) among contractors, facilitated by expanding scientific research on deep sea mineral fields in recent years.

Henk van Muijen, Managing Director of IHC Mining, remarked that the industry has been pushing for innovation in risk minimization on numerous fronts: technology, ecology, market analysis, financing and legislation. The total mining life cycle begins with exploration management (identification and assessment of mineral resource potential, coordination of site surveys, mapping and sampling programs) and evaluation studies (reviewing mining methods, costs, equipment designs, the technical and financial aspects of due diligence). Upon completion, the construction stage (equipment procurement and mine construction) and subsequently the operation stage are initiated, which can last between 10-30 years depending on the difficulties/depth of the project. Concerning nearshore marine mining, which aims to extract drowned placer deposits such as tin, gold and diamonds, opportunities are plentiful. These include the ability to replace mined-out land deposits, adequate legislation, the availability of benchmark practices and state-of-the-art dredge mining equipment. While these opportunities apply equally to the mining of deep deposits with precipitation origins such as PM nodules, mineral muds, SMS and brines, deep sea mining currently come also with the challenges of financing, legislation, public opinion, environment sensitivity and complex technology. Henk stressed on the need to review lessons learnt and adopt best practices from terrestrial and nearshore mining, as deep sea mining is a field that requires geopolitical considerations on resource scarcity and environmental/societal constraints. Close cooperation between all stakeholders (public/private license holders, technical service providers, contractors, financial institutions) will be crucial to ensure the sustainability of operations.

**Renee Grogan,** Director of Gro Sustainability, provided perspective on leadership and adaptive management in deep sea mining. The problem of marine mining is threefold in the context of management approach: 1) Industries such as terrestrial mining and commercial fishing have caused significant environmental damage, hence the negative public perceptions on marine mining; 2) Seabed mining itself comprises numerous inherent uncertainties; 3) The regulator is not the only stakeholder – social media, campaigners and NGOs all have the power to influence project assessments. The need for senior management to adapt their organizations to deal with changing circumstances is thus apparent. However, adaptive management, while effective and flexible, can be inherently unpopular with mining regulators due to the many uncertainties of deep sea operations: the extent and duration of mining impacts, oceanographic conditions at depth,



performance of positioning and monitoring systems at depth, maintenance and engineering regimes etc. To counter these uncertainties, it is crucial that leaders "put their money where their mouths are" – the honoring of promises when suspension needs to occur due to breaching of environmental regulations. Successful implementation of adaptive management will require fast internal communication (e.g. between vessel teams and mining teams), rapid data dissemination, high levels of accountability and procedural support. Adaptive management will also require a culture of transparency in reporting, in order for stakeholders to gain insight into the industry and to reduce the likelihood of non-compliance.

Economic	Growing populations and clean energy development have continued to demand for metals and minerals. Due to the many uncertainties of deep-sea mining, regulators are often in favor of the precautionary, or "no mining", approach. The industry is pushing for innovation in risk minimization through technology, financing and market analysis.
Social	Despite the societal advantages of marine mining (relative to terrestrial mining) such as no social displacement and no child labor, negative public perceptions of the industry persist. It is important to note that regulators are not the only stakeholders – social media, campaigners and NGOs all have the power to influence project assessments.
Environmental	Marine mining holds various advantages relative to its land-based counterpart, such as minimal waste, clean processing and no deforestation. While uncertainties remain concerning deep-sea mining, academic research is expanding piecemeal to improve global knowledge and environmental standards and legislation.
What does it mean for the World Ocean Council?	The WOC is developed by and for the private sector, with a unique and multi-sectoral approach to address cross-cutting issues affecting ocean sustainable development. There is potential for WOC to play a facilitating role in catalyzing collaboration between the marine mining industry and other stakeholders.



#### **1.8** Special Speech by James Michel, Former President, Seychelles SOS Reception and Dinner 20:00-20:15 Garden Room

#### The Business of the Sea: Making the Blue Economy Work

"This conference's agenda provides for discussions on a wealth of topics relating to the ocean; from business opportunities, climate change, food security, governance, Research and Development, to the health of the oceans. They are all heavily underlined by sustainability.

Sustainability is indeed the key approach to whatever we undertake in the oceans."

#### **Making Things Happen**

"Marine Industry operators have the corporate social responsibility to ensure that they conduct their activities in a sustainable manner not only for the protection of the natural environment they operate in but also to ensure the availability of the resources for continued economic prosperity of future generations in line with United Nations' Sustainable Development Goal 14.

The world needs a new breed of innovative entrepreneurs to tap into the potentials that the oceans present, be profitable but at the same time ensure that their own activities, that of their partners and suppliers are sustainable.

- Leadership businesses in maritime transportation technology sector should push the limits of engineering for the development of carbon efficient vessels and, at the same time, explore the possibility of making use of renewable energy sources to power as many facilities as possible on-board vessels. Why not entire vessels in the future.
- Some current practices in industrial fishing like the use of Fish Attracting Devices (FAD) continue to have negative impact on fish stocks as they are indiscriminate of the species and sizes of seafood they attract, and which are eventually caught in the nets. Operators in the fishing business need to adopt sustainable fishing methods which are more selective. The use of FADS should be discouraged or even banned. The fishing industry can tap into technological advances in satellite and other communications platforms instead which are enabling the development of systematic observations in the deep oceans and even under the ice.
- In the meantime, let us borrow from the Iceland model. The country has a very modern and progressive fishing industry with a new and growing generation of forward thinking and innovative operators. The ultimate goal is to maximize the value of every catch. There is hardly a part of a fish landing in Iceland that is not turned into products in one way or another, contributing not only to food security but also into high value designer goods and skin care products to name just two; which contributes to the country's prosperity. Fisheries in Iceland have become streamlined and integrated as catching, processing, export and marketing have learned to work closely together. The approach not only reduces wastage but also helps in producing more food.

Plastic and micro plastics are enemies of our oceans. Some 8 million tons of plastics enter our oceans every year. The gigantic plastic currents that we see on the surface represent only 5% of plastics that are in the ocean. The rest or 95% are in the form of micro beads and broken down particles of plastic that are easily ingested by sea creatures and are impossible to move. There are fears that should the current trend continues there will be three times more plastics in the sea than fish by the year 2050.



Along with the encouraging wave of bans on single use plastic bags and straws, the business community through corporate social responsibility should consider supporting the establishment of waste treatment facilities as well as clean-up operations especially on islands and coastal areas. This will help prevent large amount of plastics and waste from making it to the ocean. This in itself presents great business opportunities.

The shipping, fishing and oil industries should also be more considerate of the ocean which is the basis of their existence as large amounts of waste in the ocean are dumped by vessels themselves and offshore platforms.

There is no shortage of business opportunities for serious and committed entrepreneurs. Whilst they have to be profitable, they will at the same time contribute to healing the oceans. They should be supported through innovative financing schemes and benefit from special schemes like Corporate Social Responsibility tax breaks and public private partnerships incentives.

For instance, the Seychelles Sovereign Blue Bond launched recently at the 5<sup>th</sup> Our Ocean Conference in Bali is another example of innovative approaches towards improving conservation of the country's marine resources. It is a first in the world and is being supported by the World Bank, the Global Environment Facility (GEF) and the International Bank for Reconstruction and Development (IBRD). It mobilises public and private investments to finance the transition to sustainable fisheries in Seychelles and contribute to achieving the country's Blue Economy strategy which aims at sustainably managing and protecting our marine resources, ensuring food security, diversifying the economy and creating high value jobs.

We must also do what we can as individuals to make connections. As a newly appointed Ocean Ambassador, a new group instituted by the Pew Bertarelli Ocean Legacy, and an advocate of ocean conservation, I would like to call on maritime businesses to join us and take the lead in promoting the development of large-scale marine protected areas (MPAs). Businesses should not see that as against their interests but rather as a guarantee for their long term profitability and survival, as the ultimate aim of MPAs is to protect biodiversity for the sustainability of ocean resources as illustrated by the Seychelles' model.

The Seychelles Marine spatial planning initiative is a process focused on planning for and management of the sustainable and long-term use and health of the Seychelles exclusive economic zone which encompasses over 1.3 million square kilometres and 115 islands. The initiative is a government-led process, with planning and facilitation managed by The Nature Conservancy (TNC) and TNC Canada and UNDP GEF programme. The MSP is an integrated and multi-sectoral approach to address climate change adaptation, marine protection and support the Blue Economy and other national strategies. The process includes inputs from all major sectors including commercial fishing, tourism, biodiversity conservation, renewable energy, port authority, maritime safety, and non-renewable resources in order to develop a comprehensive marine plan.

The plan will guide the strategies and decisions of the Seychelles Conservation and Climate Adaptation Trust established as part of the Dept-for-Climate-Adaptation swap."

#### The Time for Innovation

"I would like to conclude with six ideas for practical steps that would mark progress, concentrating at this stage on the role of small island states:

1. Create a 'one-stop' global shop window for good ideas and practical projects that will further the cause of the Blue Economy. Just as we now see a proliferation of online websites for consumers, individual states need good and accessible advice on what is effective and what is reliable. This is a simple and achievable target, where the basic software already exists. If it works when an individual wants to buy a



car why not for states wanting to invest in renewable energy? An organization like WOC could help by providing the know-how to develop this facility for buyers.

- 2. Encourage small island states to develop centres of excellence for one specific activity. To offer some examples, Seychelles could be the home of progressive Blue Economy management schemes; Samoa, say, could offer to the world working examples of ocean waste management; Cape Verde could be the centre for tidal energy and so on. The idea is that the enormous challenge of making better use of the ocean can be broken down into manageable, 'bite-sized' chunks, each of which is within the capability of individual states. And with the added attraction that the rest of us will know where to go for advice and demonstration activities.
- 3. Following the example of some initiatives in Africa, ideas can be generated to bring more women into the maritime workforce and to encourage new ideas for sustainable development. It has been estimated by the International Transport Workers' Federation that only 2% of the world's maritime workforce is presently made up of women. Can we really afford to exclude nearly half of the population from an exercise that should involve us all? Changing the balance would not simply add to the number of ideas but it would undoubtedly encourage new perceptions too.
- 4. Invite the United Nations to design and fund a programme of annual awards for the greatest contributions to the sustainable use of our shared ocean. This would encourage competition and highlight some of the excellent work that is already underway. The whole emphasis would be on practical achievements.
- 5. There is of course my proposal for a global movement lobbying for parts of the high seas declared "no go" zones Marine Protected Areas.
- 6. Finally, let us see if we can come away from this event with something practical in our conference bags. The World Ocean Council has brought us together but what more might now be done? Borrowing an idea from the President and CEO of this organization, Paul Holthus, is this not the time to create a small but focused business leadership group, concentrating on developing the Blue Economy in Small Island States? This cannot be just another committee but a high-profile group with specific targets. When it next reports to the organization as a whole there should be evidence of practical achievements. It is a demanding challenge but can we any longer call for anything less?

Ladies and gentlemen, there is no time to waste. There has been enough talking already. The time for action is overdue. Ideas must now become reality. The caterpillar must break out of its comfort zone and fly!

Thank you."

The full speech is available at the following link:

http://www.jamesmichelfoundation.org/speeches/121/the-business-of-the-sea:-making-the-blueeconomy-work



## DAY 2

#### 15 NOVEMBER 2018

## 2.1 Ocean 2030: Global Projections for Ocean Industry Activity (covering ocean transportation, energy, food, tourism and minerals)

PLENARY SESSION 08:30-10:00 Grand Ballroom

- What is the future of industry activity in key ocean economic sectors, with a focus on Asia?
- What are the key trends, geographies, assumptions, opportunities and constraints for each sector through to 2030, 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? Especially in Asia.

#### **Chair/Moderator**

• Christine Valentin, COO, World Ocean Council

#### Speakers/Panel

- Shipping: Kathi Stanzel, Managing Director, INTERTANKO
- *Ports:* Patrick Verhoeven, Managing Director Policy and Strategy, International Association of Ports and Harbours (IAPH)
- Aquaculture: Guillaume Drillet, Past President, World Aquaculture Society, Asian Pacific Chapter
- *Fisheries:* Paul Lansbergen, President, Fisheries Council of Canada; Member, International Coalition of Fisheries Associations (ICFA)
- *Cruise Tourism:* Dimity McCredie, Advocacy Director, Cruise Lines International Association (CLIA) Australasia
- Seabed Mining: Samantha Smith, Director, Blue Globe Solutions
- Offshore Wind Energy: Kevin Banister, Vice President, Business and Government Affairs, Principle Power
- Ocean Energy: Ji Wang, National Ocean Technology Center, State Oceanic Administration, China

#### Discussions

**Christine Valentin,** COO of World Ocean Council, commenced Day 2 of the SOS by providing perspective on the substantial growth of marine sectors – the ocean economy is forecasted to double its contribution between 2010 and 2030 – and their relevance for Asia. Despite the many challenges facing sustainable development of the ocean, the growth of marine industries is opening up opportunities that will necessitate firm commitment from public as well as private sector players in the decade leading up to 2030.

According to **Kathi Stanzel**, Managing Director of INTERTANKO, the future of shipping is being shaped by three trends: 1) Societal demands, from global market demands for transport to environmental goals for the planet; 2) Protectionism and geopolitics; 3) Unilateralism and governance. While shipping is an industry that is regulated by a range of regional laws by reason of its transnational nature, it is one that really necessitates global regulation to ensure integrated compliance. At the operational level, fleets are undergoing redesigns to meet future demands: to increase vessel efficiency and reduce emissions through scrubbers, multi-fuel engines and other low-carbon options (in view of the SulphurCap and IMO's 2050 target to reduce 50% of GHG emissions), to improve vessel monitoring systems (e.g. fuel consumption), to tackle the issue of invasive



species resulting from ballast water management and hull biofouling, and to counter noise and waste pollution (with the assistance of reception and recycling facilities at ports and on board). Such redesigns are especially relevant for Asia in view of its shipbuilding expertise. Likewise, "Virtual Arrivals" systems have been launched with the aim to reduce fuel consumption, and hence emissions, by moderating the speed at which ships arrive at ports when delays are envisaged. Additional initiatives in the pipeline include "human element initiatives", such as engine room ergonomics and crew competence in vessel automation, and "systems initiatives", such as blockchain and ship-shore interfaces. In all, industry collaboration will be priority – amongst shipowners, class societies, shipyards, shipping associations and other stakeholders.

**Patrick Verhoeven,** Managing Director – Policy and Strategy, International Association of Ports and Harbours (IAPH), outlined five trends affecting ports globally: geo-politics, shipping strategies, digitalization, climate and energy, and sustainability. On the first, Patrick contrasted the challenges of government trade barriers and other forms of protectionism with opportunities created by infrastructure strategies such as the Belt and Road Initiative. He drew on the venue choice of the 2018 World Ports Conference in Baku, the capital of Azerbaijan which is rapidly developing as a logistics hub, to note that traditional definitions of marine-based ports, and the world port order in general, are witnessing novel developments. On shipping strategies, reference was made to a recent OECD report on the imbalance between the globalization of shipping and localism of ports, the latter of which is often subject to pressure from local communities and governments, e.g. concerning common pricing policies and closer collaboration among ports. Concerning digitalization, Patrick spoke of the need to change mindsets on the sharing of data that ports have been "sitting on" to improve efficiency and reduce emissions, at the same time ensuring that the industry is fully equipped in data security. In March 2018, IAPH launched a World Ports Sustainability Program, with the aim of helping ports share best practices and deliver an integrated governance strategy on resilient infrastructure, climate and energy, safety and security, community outreach and port-city dialogue, and government and ethics.

**Guillaume Drillet,** Past President of the World Aquaculture Society, Asian Pacific Chapter, quoted famed explorer Jacques Yves Cousteau, "With Earth's burgeoning human population to feed we must turn to the sea with understanding and new technology. We need to farm it as we farm the land." According to the FAO, feeding a world population of 9.1 billion people in 2050 would require raising food production by some 70% between 2005 and 2050. There is thus an urgent need to produce more with less, and to do so in a sustainable manner – to which aquaculture, as opposed to its land-based counterpart, represents a solution. At the outset, space is not an issue – the current total landings of wild-capture fisheries could be produced using less than 0.015% of the global ocean area. Aquaculture now provides half of all fish for human consumption (90% in China). Looking forward, opportunities for the next two decades are in South-east Asia and Australia, with South America also emerging as a big player, not only in food fish but also aquatic plants and non-food products, as evidenced by its growing profile among Silicon Valley venture capitalists. That said, opportunities for countries to develop aquaculture to support their economic, environmental and social objectives come with responsible governance. Asia alone is home to 18 million farmers. Sustainability education for all farmers will be a challenge; efforts should start with the average and low performers, who are generally economically sensible but lack knowledge-based approaches.

**Paul Lansbergen**, President of Fisheries Council of Canada, Member of International Coalition of Fisheries Associations, remarked that although two-thirds of global fish stocks are currently at sustainable levels, the proportion of overfished stocks is increasing, exacerbated by growing demand from rising populations and expanding affluence among emerging markets. Recognizing the variance in sustainability performance across regions, international regulatory instruments (such as the FAO Code of Conduct for Responsible Fisheries) and certifications have been introduced. There remains much room for improvement in the adoption of such instruments at the national level and consumer awareness, however. Notably, only 14% of the world's fisheries are certified. Looking forward, while fisheries will continue to play a critical role in food security and nutrition, there is an urgent need for growth to align with the three pillars of sustainable development: environment, economic and social. This will necessitate innovations in reversing the trend on unsustainable



fishing, and eliminating IUU fishing, slave labor and ghost gear. Recent FAO-led developments have included catch documentation schemes, the Port State Measures Agreement and the Global Record of Vessels. Climate change will make this task all the more challenging, but the need to manage fisheries sustainably within jurisdictions is acute in view of the sector's role as an economic engine, and of fish as a source of sustainable protein for all.

Dimity McCredie, Advocacy Director of Cruise Lines International Association (CLIA) Australasia, provided perspective on the magnitude of the cruise industry. The past ten years have witnessed a 64% growth in global passenger volume, with 2018 recording 28 million cruise passengers. By 2026, global passenger volume could reach 40 million. Asia currently accounts for 15% of passenger volume (with 60% of Asian passengers from Mainland China) and 10% of global cruise capacity. Last year alone, Japan recorded 2,601 port calls, followed by China with 1,012 calls. Growth in Asian markets has been encouraged in part by a rise in middle class populations, as well as the speed and scale of infrastructure developments. While limitations exist, such as port delays, regulations in China and crowding issues resulting in conflicts with local communities, the potential for the cruise industry is huge in the region. On the industry's commitment to the environment, Dimity remarked that few people know that the cruise industry is a highly regulated sector that invests heavily in innovative technologies. She illustrated with the example of the first LNG-powered cruise ship which was launched in 2018 in Europe, as well as the continual development of shore power facilities worldwide. Additional innovation commitments have included: 30% reduction in new ship CO2 emissions by 2025, zero discharge of untreated sewage, minimizing on board water use by capturing nonpotable water for use in toilets and deck washing, avoidance of vessel strikes with marine mammals etc. For industry players, sustainable and healthy development of the cruise sector's growth potential is priority.

**Samantha Smith**, Director of Blue Globe Solutions, pointed up the world's increasing demands for metals and minerals: 1) Population growth, in particular middle-class expansion, as a driver for economic demand; 2) The transition to clean, renewable energy sources, such as wind turbines which require 12 times more copper than conventional sources of power generation; 3) Development of electric vehicles to mitigate transportation emissions requires lithium-ion batteries that in turn necessitate substantial amounts of cobalt, copper, manganese and nickel. As land-based sources struggle to meet demands, polymetallic nodules on the seafloor are increasingly seen as a solution with a number of social and environmental advantages: minimal waste (multiple, high-grade metals are found in each mine), clean mineral processing (nodules are found on the surface of the seafloor), no land-use conflicts, no child labor, no deforestation, reusable production infrastructure. The Clarion-Clipperton Zone in the Pacific Ocean, access of which is governed by the International Seabed Authority, was illustrated as an example. Attention was also drawn to the relevance of the advantages to the 2030 SDGs, including SDG 1 (equitable sharing of benefits from mining in areas beyond national jurisdiction, and affordable development through lower metal costs), SDG 7, SDG 13, SDG 14 (scientific cooperation and responsible, transparent impact assessments and management) and SDG15, amongst others.

**Kevin Banister**, Vice President, Business and Government Affairs of Principle Power, provided insight into the breakneck pace of offshore wind growth. As of 2017, overall installed offshore wind capacity had reached 20 GW. Significant new capacity is being added, driven by Europe (CAGR of 8%), Asia (26%) and increasingly the USA. The UK and Germany are current market leaders, although it may not be long before China takes the top spot. Projections are for cumulative offshore capacity in APAC to reach 43 GW by 2027, with the Chinese market accounting for 85% of capacity. According to OECD, offshore wind represents the fastest growing of all renewable technologies at CAGR of 25%, due in part to its greater capacity factors (significantly higher than solar PV and onshore wind), scalability, utility size power generation, and limited visual impacts on landscape. Drivers for China's growth in particular include: supportive national and provincial energy targets and policies, established wind power supply chains, and proximity to load centers (with development concentrated in the northern South China Sea). As floating technologies mature, the industry has been able to go bigger and deeper, as exampled by the 400 MW of demo projects and 9 GW of



large-scale projects under development. Offshore wind is currently in a "Pre-Commercial" Phase, with work in progress to prove the bankability and technical viability of technologies, and for the "Commercial" Phase to become a reality by the end of the decade.

Ji Wang, National Ocean Technology Center, State Oceanic Administration, China, began with an introduction of the Ocean Energy Systems Technology Collaboration Programme (OES), which operates under the framework of the International Energy Agency. The OES vision is for the international deployment of 300 GW of ocean energy by 2050 (including tidal/ocean currents, waves, tidal rise and fall, thermal gradients and salinity gradients), in the process creating 680,000 direct jobs and saving 500 million tons of CO2 emission. Ocean energy technologies are currently at different stages of development, serving a range of purposes including utility-scale grid electricity generation, off-grid applications, islands electricity generation, heating, cooling and desalination. Developments have mainly occurred in Europe and Asia, and have focused on improving reliability and performance whilst reducing costs. Although technological challenges remain (such as in bearings, power take-off, failure modes and condition monitoring techniques), innovations are being adopted from other marine sectors such as oil and gas, offshore wind and shipbuilding. Notably, global installed ocean energy power doubled in 2017 compared to the previous year. Moving forward, government investment will be critical to making ocean energy technologies viable as well as encouraging larger contributions from public and private investors. There is much potential for ocean energy to contribute to the world's future sustainable energy supply and reduce emissions, whilst minimizing impacts on marine environments.

Economic	Population growth has been a key driver of economic demand and infrastructure development. Ocean industries are rising to the challenge, and are forecasted to double their contribution between 2010 and 2030. Government commitment will be critical to ensuring industry growth, as well as encouraging innovation and collaboration between public and private stakeholders.	
Social	Competing interests between sectors and communities require mutually beneficial solutions overseen by regulatory bodies and facilitated by dialogue with relevant stakeholders.	
Environmental	Regulations and guidelines continue to be developed to ensure industries comply with the highest standards. There is much potential for sustainability practices to bring increased profitability and social benefits if the appropriate infrastructure is put in place via investment and technological innovations.	
What does it mean for the World Ocean Council?	The WOC provides a structure for multi-stakeholder collaboration through its networks, the Sustainable Ocean Summit and other projects and platforms, and assists businesses in becoming more invested in innovation and foresight.	



# 2.2 Plastics/Waste Removal from Ocean and Island Areas: Maritime Industry Experience, Innovation, Practical Solutions

PARALLEL SESSION 10:30-12:00 Grand Ballroom

- How are vessels being used to clean up plastics and marine debris, and what are the opportunities to expand this?
- How can the maritime industry help keep plastics and other wastes out of the ocean by facilitating their removal from islands and coastal areas, especially in the Asia-Pacific region?
- How are ocean industries reducing plastic pollution in daily operations, and what are the lessons learned and future plans, e.g. in cruise tourism and aquaculture?

#### **Chair/Moderator**

• Aurore Trottet, Senior Environmental Scientist, Water and Environment, DHI

#### **Speakers/Panel**

- Mark Ko, Executive Director, Tian San Shipping
  - Marine Waste/Debris Clean up from Waterways, Coastlines and Island Areas: An Overview of the Waste Ecosystem, Solutions and Innovations to Clean Up the Seas
- Lara Tyrrell, Group Sustainable Business Manager, John Swire & Sons H.K. Ltd
  - Business and Governance Working in Partnership to Remove Waste Streams from Pacific Islands for Responsible Recycling Elsewhere
- Marcelo Hidalgo, Science and Standards Coordinator, Aquaculture Stewardship Council
  - How the Aquaculture Industry can Minimize the Negative Impact of Plastic Pollution into the Ocean A Practical Approach
- Yoshioka Tatsuya, Founder and Director, Peace Boat
  - Reducing Plastic Waste from Cruise Lines: Current Actions and Coming Innovation and Advances
- Germinal Bertrand, Area Director of Business Development, Hong Kong, Macau, Taiwan, Water Operations, SUEZ NWS
  - SUEZ's Commitment to Protect the Oceans: Solutions to Protect Coastlines and Build Sustainable Cities

#### Discussions

**Aurore Trottet,** Senior Environmental Scientist, Water and Environment, DHI, opened the session by providing perspective on the world's plastic problem. Every year some 300 million tonnes of plastic are produced. Half of this is single-use plastics. Less than 14% of this plastic is recycled, and the remaining 86% ends up in the ocean.

**Mark Ko,** Executive Director of Tian San Shipping, outlined the company's long-standing clean-up efforts in Singapore – Tian San collects over 5000m<sup>3</sup> (or two Olympic size swimming pools) of marine debris annually, half of which is single-use plastics and man-made waste – undoubtedly an outcome of the throw-away lifestyle that mankind has adopted. For clean-ups to be of impact, attention must be given to three source areas simultaneously: inland waters, coastal and island areas, and the open sea. Inland waters are typically less challenging environments to clean up. Water and trash flow are more predictable, and generally involve localized trash for which specialized solutions can be deployed, such as litter traps, conveyor belt systems, or a combination of both e.g. "Mr Trash Wheel". Innovations that aim to bring suspended plastics to the surface are currently in talks, such as the air bubble curtains used in oil spills. Coastal and island areas are more complex, in view of the many environmental factors that affect debris movement – tides, waves and



typhoons – and the variety of operating environments such as mangroves, swamps and man-made coastlines. In addition to a good understanding of local weather and geography, there needs to be a combination of generalized and specialized equipment that is able to adapt to non-localized debris and work in both freshwater and saltwater environments. Open seas undoubtedly offer the harshest of operating environments. While the technology to start cleaning up already exists, challenges remain with locating the debris itself, and with collecting plastic suspended in deep water. Moving forward, Tian San will be launching a new initiative to identify garbage hotspots in South-east Asia, in which interested members of the delegation were invited to participate.

Lara Tyrrell, Group Sustainable Business Manager, John Swire & Sons H.K. Ltd, drew on China Navigation's success story to illustrate the power of public-private partnerships in solving the many environmental problems of today. In December 2017, Simon Bennett, General Manager for Sustainable Development, attended the UN Environment Assembly-3 in Nairobi. Notably, in addition to science and policy personnel, industry representatives were invited with the hope of identifying opportunities for collaboration at a micro level. The UNEA-3 kickstarted a series of meetings between CNCo and Pacific Islands parties. These small island nations, home to 8 million people who manage 10% of the world's ocean, are heavily importdependent. While this has meant opportunities for the shipping industry, the ramifications of single-use imports are now being reflected on coastal environments and wildlife health. There is currently a huge imbalance between the locations of the vast quantities of waste and dedicated waste management plants. Governments and the private sector need to acknowledge that by bringing these products in, they have become part of the problem – and thus need to be part of the solution – not just because it is the right thing to do, but also because it makes commercial sense. As a result of those meetings, the Moana Taka Partnership ("Ocean, Circulate") was launched with SPREP in March 2018, which allows CNCo vessels to carry containers of recyclable waste from eligible Pacific Islands ports to be sustainably treated and recycled at suitable ports in the Asia Pacific region. Notably, the partnership was launched just three months after the initial meeting, illustrating the speed at which public-private partnerships can proceed when mutual interests are identified. As Erik Solheim, Head of UN Environment, noted, "We need to innovate, and this kind of public-private partnership is the way forward."

Marcelo Hidalgo, Science and Standards Coordinator at Aquaculture Stewardship Council, explicated ASC's efforts to transform aquaculture towards environmental sustainability and social responsibility – through setting measurable performance indicators that reflect best management practices, and ensuring conformance by farms via third party certification. Emphasis was laid on the magnitude of the plastic problem within the industry - oyster, trout, shrimp, tilapia, seriola, seabream, salmon farms onshore and offshore make use of plastic buoys, ropes, nets and cages that are often dumped into waters instead of being sent to disposal centers due to costs, regardless of whether these are recyclable or non-recyclable. In response to the problems of ALDFG (abandoned, lost or otherwise discarded fishing gear), in 2018 ASC joined the Global Ghost Gear Initiative and developed a set of 12 indicators to oversee management of aquaculture gear. These include "installing, controlling and recording plastic retention devices at the discharging point", "providing training about prevention of plastic contamination and corrective actions", "listing all plastics used at the farm operation and temporal operation (harvest)", amongst others. Following public consultation in spring 2019, the indicators are expected to be part of the standards and auditing process by winter. Global impact is anticipated - in addition to the 721 certified farms, 335 farms are currently under assessment. Marcelo concluded with the indicators' relevance for SDG 14, including surveys of aquaculture gear and plastic waste in farms and coastal zones, as well as increasing scientific knowledge, developing research capacity and transferring aquaculture technology to improve practices.

**Yoshioka Tatsuya**, Founder and Director of Peace Boat, began by prompting the delegation to recollect past experiences onboard cruises. Despite the beauty of these vacations, the reality is that cruise tourism has become a significant polluter of the ocean through their release of untreated waste into the waters. Recognizing the need for an industry-wide change, major cruise lines have in recent years stepped up efforts



for plastic reduction, such as pledging to eliminate plastic straws and other single-use plastics. In 1983, Yoshioka co-founded Peace Boat, an NGO which organizes global voyages on chartered passenger ships with the aim of developing travel as a tool for peace and sustainability – through hosting onboard and port education programmes with the help of esteemed guest speakers, and allowing for exchange of knowledge on these topics by passengers from all walks of life. Peace Boat's Ecoship project is currently under development to create a low-carbon cruising model for the industry and be the flagship for climate action around the world. Among its many energy-efficient and waste-reduction designs are solar farms on the top deck, kinetic dance floors, and self-sustained gardens that make use of recycled garbage and wastewater. The ship will also be capable of serving as a floating sustainability laboratory, helping in ocean-related research e.g. microplastics. Yoshioka ended with a proposal for a future edition of the SOS to be hosted onboard the Ecoship – where better to conduct discussions on ocean sustainability than out at sea!

**Germinal Bertrand**, Area Director of Business Development, Hong Kong, Macau, Taiwan, Water Operations, SUEZ NWS, provided an overview of SUEZ's commitment to protecting the ocean through researching and developing technological solutions on water management, recycling and waste recovery. The magnitude of the plastic problem was re-emphasized – there is currently 269,000 tonnes of plastic floating in the ocean, with 80-90% made of polyethylene, a type of plastic commonly used for packaging. Predictions are that by 2050, there will be more plastic than fish in the ocean. In 2016 SUEZ initiated a microplastic research program with the aim of: 1) Detecting, quantifying and modeling microplastics dispersion; 2) Studying the impact on ecosystems; 3) Testing treatment technologies. Current plans are for the deployment of MBR technology at a sanitation plant in Sète by 2022, which is hoped to achieve 95% of microplastics removal. In conjunction with its research efforts, SUEZ has launched a number of global initiatives to raise awareness on ocean health in recent years. Examples include #suez4ocean (which encourages collection of waste on shorelines and riverbanks by SUEZ employees), partnerships with haircare brands to produce shampoo bottles from recycled plastic, sponsorship of research expeditions, and partnerships with international institutions e.g. UNESCO-IOC.

Economic	While the rise of consumerism has opened opportunities for industry, the private sector and governments need to acknowledge that by bringing these products in, they have become part of the problem – and need to be part of the solution – not just because it is the right thing to do, but also because it makes good commercial sense.
Social	Recognizing the need for industry-wide changes in mindset, leadership companies have in recent years stepped up efforts to raise awareness for plastic and waste reduction – via pledges, research sponsorships, and internal and external initiatives.
Environmental	For clean-ups to be of impact, attention must be given to three source areas simultaneously: inland waters, coastal and island areas, and the open sea. Likewise, the power of private-public partnerships needs to be better realized for the mutual and extensive benefits they bring.
What does it mean for the World Ocean Council?	The WOC serves as a global platform for collaboration between leadership companies and the public sector on ocean sustainability including plastics/waste reduction, and will be working to identify and promote pertinent opportunities.



## 2.3 SMART Ocean – SMART Industries and the Arctic: Advancing Industry-Science Collaboration for Data Collection in Support of Safe and Responsible Arctic Development

PARALLEL SESSION 10:30-12:00 Garden Room C-D

- How can industry better engage in data collection in the Arctic to advance knowledge in support of safe and responsible shipping and other economic activity, as a regional WOC SMART Ocean – SMART Industries Program?
- What are the benefits and barriers to closer business cooperation with researchers, and specifically for greater industry involvement in data collection and how can benefits be accentuated and barriers addressed?
- What are the priority locations, topics and technology to engage more ships and platforms of
  opportunity in collecting data in the Arctic, e.g. for bathymetry, as part of the Seabed 2030
  Initiative?

#### **Chair/Moderator**

• Pierre Bahurel, CEO, Mercator Ocean International

#### **Speakers/Panel**

- Veronica Willmott Puig, ARICE Project Manager, EU-PolarNet, Alfred-Wegener-Institut, Helmholtz-Zentrium für Polar- und Meeresforschung
  - Making the Arctic Accessible for Excellent Science
- Paul Holthus, Founding President and CEO, World Ocean Council
- Establishing a Regular Dialogue with the Maritime Industry: Challenges and Opportunities
- Annu Oikkonen, Research Scientist, Marine Research, Finnish Meteorological Institute
  - Expanding the Observation Capacities in the Arctic Ocean by Cooperating with the Maritime Industry
- Karl Andreas Almås, Special Advisor, SINTEF Ocean; Chairman, Norwegian Center of Expertise, Aquatech Cluster
  - Technology for Arctic Data Collection from Ships of Opportunity

#### **Science and Industry Commentators**

- Sai-Tick Chan, Senior Scientific Officer, Hong Kong Observatory; Vice-Chair, Voluntary Observing Ships Panel (VOS), Ship Observations Team (SOT), WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM)
- Elisabeth Tørstad, CEO, Digital Solutions, DNV GL
- Kathi Stanzel, Managing Director, INTERTANKO

#### Discussions

**Pierre Bahurel,** CEO of Mercator Ocean International, reminded the delegation of the environmental stress and disruption that the Arctic is currently facing, and the need for more observation and data to advance knowledge in support of responsible shipping and other economic activities. Moving forward, how can industry and science work together to create the conditions for sustainable development in the region?

According to **Veronica Willmott Puig,** ARICE Project Manager, EU-PolarNet, Alfred-Wegener-Institut, Helmholtz-Zentrium für Polar- und Meeresforschung, the Arctic is one of the fastest changing regions on Earth, with rapid declines in ice extent resulting in rising global temperatures as well as increases in vessel traffic from a range of domains, including shipping and tourism. Due to an inadequacy of data on climate



patterns and sea ice interaction, however, vessel operations in the region are often dangerous and complex. ARICE – Arctic Research Icebreaker Consortium – was established in response to develop holistic strategies for meeting the needs of marine-based research in the Arctic. Supported by an EU fund of 6 million euros and a team of 16 partners from 13 countries (including the WOC), the project is scheduled to run for 4 years until 2021. The goals of ARICE are manifold: 1) Networking (which involves the harmonization of the European Arctic research fleet for better coordination of icebreakers with ice-strengthened vessels, the development of an international Arctic Research Icebreaker Consortium that shares and jointly funds shiptime on heavy icebreakers, and regular dialogue with the maritime industry to establish opportunities for cooperation); 2) Trans-national access (provided to six European and international icebreakers for European scientists based on scientific excellence of proposals); 3) Joint research activities (which expand the monitoring and observation capacities in the Arctic Ocean by partnering with the maritime industry on "ship of opportunity" programs, and exploring into new technologies that could lead to an improvement of shipbased and autonomous measurements).

**Paul Holthus,** Founding President and CEO of World Ocean Council, provided an update on the WOC SMART Ocean-SMART Industries (SO-SI) program, formed in 2011 in recognition of a need for a systematic and strategic process and network that can engage vessels and platforms, such as fishing boats, oil platforms, wind farms etc., in hosting and deploying instrumentation for data collection and research purposes. In the past, such engagement has been opportunistic at best, with research institutions approaching individual companies. Cognizant of the need for coverage to be comprehensive both sectorally and geographically, recent efforts of the SO-SI have included the installation of prototype equipment by Maersk Line to detect tsunamis at sea, and the sharing of bathymetric data by Crystal Cruises from their Northwest Passage trips. As a working partner of ARICE, WOC's role in the Arctic is threefold: 1) Provide the leadership and industry connection to develop an industry liaison panel that in turn identifies and engages key companies to be a part of this regular, structured process; 2) Identify research priorities to better understand responsible operations by industry in the Arctic; 3) Achieve technology development and transfer through the industry liaison panel and ARICE's projects, and to use the Arctic as a demonstration area for the global need to develop relationships between the science community, technology providers and industry operators.

Annu Oikkonen, Marine Research Scientist at the Finnish Meteorological Institute, presented the FMI's work on expanding observation capacities in the Arctic Ocean in partnership with ARICE. The lack of Arctic data has become an issue not only for scientists but also for industries operating in the region. With quality data coverage, industry and research communities can better understand and forecast dynamics in the environment, in turn improving the safety and sustainability of operations. The FMI is currently working to have more vessels navigating the Arctic waters to collect data with autonomous instruments, and to subsequently transfer and share this data. For this, new technologies featuring autonomous functions need to be developed. Likewise, a coalition with industry players needs to be established, hence the role of the WOC in developing such a panel. A survey on the existing observation systems deployed on vessels in the Arctic was recently conducted by the FMI. While results showed that basic methodological instruments are already in autonomous operation on most vessels, the usage and accessibility of collected data still require much follow-up work. Results also showed that vessels are lacking automated instruments for sea ice observation. That said, industries that took part demonstrated a positive response towards further collaboration with the science community on data collection.

**Karl Andreas Almãs,** Special Advisor for SINTEF Ocean, Chairman of Norwegian Center of Expertise, Aquatech Cluster, remarked that development of the High North has been driven by political factors (climate change, environmental concerns, international cooperation and regional development) and economic factors alike (petroleum, mineral and biomarine resources, and Northern sea routes). Looking more specifically at biomarine resources, Karl spotlighted recent trends in increasing food production from Arctic waters – as well as their benefits, such as seawater sufficiency and energy efficiency e.g. temperature, when compared to terrestrial food production. With fishing vessel traffic expanding in the region, how can



researchers and industry utilize this traffic and obtain data from fishing vessels? Karl outlined recent development of sensor platforms in the Arctic, with vehicles (ROV, AUV, USV, UAV) featuring a range of temporal and spatial resolutions and serving different purposes (climate, phytoplankton blooms, surface waves etc.). In line with this development, SINTEF has created a system for the collection of data by vessels on hydroacoustics, fishing vessel traffic, fishing gear and other environmental observations, which is directed to data centres for storage, management, visualization and analytics. The data is subsequently shared with stakeholders (via Internet), as well as third-party databases such as the Directorate of Fisheries, Herring Sales Association, International Council for the Exploration of the Sea, Norwegian Marine Data Centre etc. Moving forward, it is crucial that research institutes and the fisheries industry continue to foster cross-over possibilities and accentuate the benefits of 24/7 data for the sustainability of operations.

Sai-Tick Chan, Senior Scientific Officer at Hong Kong Observatory; Vice-Chair, Voluntary Observing Ships Panel (VOS), Ship Observations Team (SOT), WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM), introduced JCOMM SOT's work in overseeing three major ocean observation programs: 1) Voluntary Observing Ship Scheme (VOS), by which ships plying the various oceans of the world are recruited for taking and transmitting meteorological observations; 2) Ship of Opportunity Program (SOOP), which makes use of volunteer merchant ships that routinely transit strategic shipping routes, and in which ship officers are trained to deploy Expendable Bathythermographs (XBTs) at predetermined sampling intervals to acquire temperature profiles in the open ocean (that are later transmitted by satellites to shore centres, for insertion and exchange on the GTS, and assimilation into operational ocean models); 3) Automated Ship Board Aerological Program (ASAP), which generates upper air profile from data sparse ocean areas using automated sounding systems carried on board merchant ships plying regular ocean routes. Real-time data is shared with research communities and data centers around the world and assimilated into computer models - for the ultimate aim of enabling safer and more cost and time-efficient maritime operations. That said, there are gaps in data concerning the Southern Hemisphere, since most of VOS and SOOP observations have been confined to the Atlantic and Pacific Oceans. For this reason, industry interest is much welcomed to help improve ocean observation systems.

Elizabeth Tørstad, CEO of Digital Solutions, DNV GL, introduced the company's open industry platform Veracity, which provides data sharing and analytics services, and covers numerous datasets relevant for ocean industries and research institutions. The Arctic is offering ample opportunities for research, but speed in drawing conclusions from that research will be crucial for making decisions and changing industry behavior. The good news is that digitalization has led to reduced costs, increased connectivity, and improved gathering and computing of information – which means that we now have the opportunity to capture data from almost anything, anywhere, anytime at a rapid speed. That said, when we have big data, we also have big data quality issues. There are four Vs associated with big data: Velocity, Volume, Variability, Veracity. Data sharing is currently moving away from serving a single purpose to serving multiple purposes, which has prompted a need for standardization - common terminology, common quality criteria, and common specifics for collection and management. Notably, start-ups that offer big companies the opportunity to gain new insights from their operations have failed because their single purpose-data necessitates a lot of effort and resources to be manipulated into serving other purposes. While we have a fantastic opportunity to work together and make actionable conclusions based on research, we will need to treat data as a serious raw material, and to have the same dedication on how we manage and share data as with all other raw materials.

**Kathi Stanzel,** Managing Director of INTERTANKO, opined that there are a lot of voluntary programs that merchant fleets already contribute to, an example being AMVER (Automated Mutual Assistance Vessel Rescue System), which provides important aid to the development and coordination of Search and Rescue efforts in many areas of the world. Merchant vessels all over the world are encouraged to send movement reports and periodic position reports to the AMVER centre, assisting in the dispatch of best possible resources to a vessel in distress. Kathi emphasized that when scientists make a business case, the demands



and expected benefits need to be very clear. The shipping sector has long-term visions, and simply telling shippers that we need the data is not going to catch their attention. The interesting outcomes of the project that answer their questions need to be laid forward. Once they're engaged, they are going to ask about their expected commitment, and whether this commitment would be flexible. In this, it is important that we understand the pressures of the crew on board – they have a lot of other reporting duties to complete – as well as the different parameters and incentives of different vessel types. While there are currently few ships that travel the Arctic for merchant purposes, there are vessels that occasionally go into the Arctic; for this reason it is worth making the distinction. Notably, the WOC has a number of roles to play – inform the industry what projects are out there, what kind of sensors are needed etc. – to raise awareness of the various expectations of industry involvement.

Following the presentations, audience members were invited to access SLI.DO on their phones, and to participate in an interactive live poll comprising three questions.

Question 1. Where do you see the benefits in a closer cooperation with researchers?	17 🏜
Performance	
	<b>5</b> 9%
Safety	
18%	
Savings	
0%	
Other	
24%	
Question 2. How can we implement a closer cooperation between industry and research?	15 🚠
Publicly/Institutions-funded projects	
27%	
Public/Private Partnerships	
	60%
Skill building	
<i>0</i> %	
Other	
13%	



Question 3. Are you confident in that Industry / Research cooperation 14 🚔 will shortly emerge?



Economic	Economic development in the Arctic has been largely driven by its petroleum, mineral and biomarine resources as well as its opening of shipping routes. Quality data coverage is much needed by business and research communities to better forecast environment dynamics, in turn improving the sustainability and safety of operations.
Social	When we have big data, we also have big data quality issues. Data sharing is currently moving away from serving a single purpose to serving multiple purposes, which has prompted a need for standardization – common terminology, common quality criteria, and common specifics for collection and management.
Environmental	The Arctic is one of the fastest changing regions on Earth, with rapid declines in ice extent resulting in rising global temperatures as well as increases in vessel traffic from a range of domains, including shipping and tourism. There remains, however, an inadequacy of data on climate patterns and sea ice interaction.
What does it mean for the World Ocean Council?	The WOC is a partner within the H2020 EU-PolarNet ARICE program working to identify key industry stakeholders with operations in the Arctic Ocean, i.e. those who are able to deploy instrumentation or collect environmental data in the region, and implement an Industry Liaison Panel (ILP).



# 2.4 Special Speech by Peter Thomson, Special Envoy for the Ocean, United Nations

Lunch 12:30-12:45 Garden Room A-B

#### Get the Balance Right Between Production and Protection

"Today the ocean is telling us that mankind has pushed the planetary boundaries too far, and that we are heading down an unsustainable path if we continue on our current practices.

The good news is that we do have a plan to save the ocean. That plan that we – all 193 Member States of the United Nations – have devised after many years of tough negotiations agreed on two essential agendas to help species continue life on this planet. They are the Paris Climate Agreement, and the 2030 Sustainable Development Agenda and SDG 14 on the oceans. As U.N. Special Envoy for the Ocean, my present task is to keep the momentum going through 2020, when the first developed target of SDG 14 matures. It's a sprint really, not a marathon, to make this happen as quickly as possible. The scenario is still looking grim, but we *can* turn the corner if we faithfully implement these two agendas that we've developed. And don't be disappointed by certain people getting off the bus. Governments come and governments go. The vast bulk of humanity is following the Paris Agreement and the Sustainable Development Goals. So that's our plan.

Current trends show that we are not heading towards the  $1.5^{\circ}$ C target that we've been fighting for the past decade. We had got the Paris Agreement to affirm the 2°C goal; yet we are currently well on course to 3°C and beyond. So when we get to COP 24 in Poland in a couple of weeks' time, the message is going to be very strong. We will need to toughen our ambitions to get the ocean written into national priorities as much as possible. We're discovering that blue carbon – mangroves, sea grass and so on – offers far more carbon sequestration than land-based sources. A lot remains to be done on climate change, but we are currently not ambitious enough.

That said, everywhere I go I'm seeing this big wave of ocean action. Governments, corporations, communities. People are gripped with the realization that they need to start doing something. That's another thing I feel very optimistic about to tell my grandchildren as I go from country to country – to say that yes, the ocean is now part of everybody's agenda.

So as we head towards 2020, I'd like to give a few shout-outs. In a week's time, we are going to be at the Sustainable Blue Economy Conference in Nairobi. It's the single most important ocean conference that's happened in the African continent. Over 8,000 people from 155 countries have already registered. It has a fantastic program that the Kenyans, in partnership with the Canadians, Japanese and a few others, have put together. So I look forward to seeing some of you there. The conference will be a game changer in terms of getting that balance right between sustainability and giving back to the ocean. That's what SDG 14 is all about – 'Conserve and sustainably use the resources of the ocean'. Get that balance right between use and conservation.

There's another great movement headed by a panel that Norway's Prime Minister has got together with 12 heads of government. They are going to produce a report that will be delivered in 2020 at the U.N. Ocean Conference – on what should be done with all our sectors to get the balance right between production and protection. Obviously there are huge choices to be made, but we've got to get it right.

The shipping and shipbuilding industries are adopting strategies to meet that 50% cut in greenhouse gas emissions. Electrical vessels are commencing operation along Norwegian coasts. I see that this is spreading all around the world, and I'd love to see electrical vessels started up in Fiji. Shout out to the IMO (International Maritime Organization) for going in the right direction.



I also want to give a shout-out to the FAO, the U.N. Food and Agriculture Organization, for bringing forth the Port State Measures Agreement. If your business is in any way related to ports or fisheries, I strongly encourage you to get involved. The Port State Measures Agreement is the best weapon we have to tackle illegal fishing. We, and I mean all of us, are still receivers of stolen goods. Every year, we receive 23 billion dollars of illegally caught fish, stolen from other countries and put on our plates. It's crucial that we have small island states signing and ratifying the Port State Measures Agreement, and putting in place fisheries inspections. These are great areas for partnership. If any of you can get involved, you'll be doing the right thing as far as that 33% of overfished fish stocks in the world are concerned.

#### Business is the Engine to Make this Happen

I'm really here to listen to you than for you to listen to me, and I want to conclude by emphasizing two points. The first is that like anything in life, there are no silver bullets. Everytime you think you've got that great idea, try to do something with it. There will be a great mix of solutions to get us to that balanced relationship with the ocean. So let the thousand flowers bloom. And don't put anybody down who's trying to do the right thing. Help them along.

The other important principle is that nobody can do this alone. Business sectors can't do it on their own. Governments can't do it on their own. The scientists can't. It's everybody. We're all in this together. It's our fundament. It's what we live and exist in – the climate, the ocean. Without this safeguard, mankind and all species on this planet won't be living. It's time for the boundaries between science, business, academia, NGOs, IGOs and governments to come down. Today we really need to be stepping out of our silos and finding out what's happening in our neighboring sectors and working with them. I was in the private sector myself 20 years ago, and I'm convinced that business is the engine to make all this happen. The World Ocean Council is taking the ocean's problems to business. Please go out with your solutions to the rest of your industry networks. The Sustainable Development Goals are the masterplan for humanity survival. When I was Secretary General for the United Nations General Assembly years ago, one of my main tasks was to deliver that message – that the SDGs are our survival plan. What I found out was that many governments of small island nations like Fiji have accepted and included the SDGs in their five-year development plans. I also found out that leadership organizations and corporations are trying to understand the SDGs. This is the future of our world and your business. Industry needs to uphold the SDGs for it to be sustainable, and you're doing the right thing to be learning about them and putting them in place.

So the challenge I would put to all of you is to get more involved. It is for our grandchildren that we're doing all this, as well as the sustainability of our ocean sectors. As Nelson Mandela said, 'It always seems impossible until it is done.'

Thank you."



### 2.5 One Belt, One Road, One Ocean: International Business Collaboration to Help Ensure the Maritime Silk Road Leads to a Sustainable Destination

PLENARY SESSION 13:30-15:00 Grand Ballroom

- What are the status and plans for the Maritime Silk Road in the Asia/Pacific region, the Indian Ocean, around Europe and in the Arctic Ocean (Northern Sea Route)?
- How are sustainable development issues being identified and addressed in the Maritime Silk Road projects?
- How can the international ocean business community best collaborate with Maritime Silk Road developments in support of sustainable development?

#### **Chair/Moderator**

• Tina Liu, China Liaison Officer, World Ocean Council

#### Speakers/Panel

- Astrid Skala-Kuhmann, Special Advisor G20, Belt and Road Initiative, Deutsche Gesellschaft für Internationale Zusammenarbelt (GIZ)
- Yiwei Wang, Professor, School of International Studies; Director, Institute of International Affairs; Director, Center for EU Studies, Renmin University of China
- Liisa Kauppila, Centre for East Asian Studies, University of Turku
- Greg Fisk, Business Development Director, BMT
- Cho Hor Wong, Director, Five Oceans Maritime

#### Discussions

**Tina Liu**, China Liaison Officer of World Ocean Council, opened the session by iterating the need for the 21<sup>st</sup> Century Maritime Silk Road (MSR) to incorporate existing global sustainability principles and frameworks, and to work with private sector actors to advance sustainable development opportunities during the current early phases of the initiative.

Astrid Skala-Kuhmann, Special Advisor G20, Belt and Road Initiative, Deutsche Gesellschaft für Internationale Zusammenarbelt (GIZ), traced the MSR back to its inception in 2013, when plans were made to link up China's coasts and Europe via the South China Sea and the Indian Ocean, and from China's coasts through the South China Sea to the South Pacific. The aim to promote infrastructure development, institutional linkage and people connectivity for ocean industries draws linkage to the SDGs and Agenda 2030, the foundations for which were subsequently laid down in the BRI Concept 2015. In June 2017, a "Vision for Maritime Cooperation" was issued by the NDRC, State Oceanic Administration, which emphasized the significance of joint marine ecological conservation efforts and ensuring that ocean health contributes to improving human wellbeing for present and future generations. Emphasis was also laid on the protection of regional marine environments, and cooperation in addressing marine pollution, marine litter and ocean acidification, as exampled by the China-ASEAN Environment Cooperation Strategy and Action Plan. The reality is that these visions have yet to gain much traction. With the MSR being a tool for developing the Blue Economy and innovative maritime technology, efforts to date have focused on port infrastructure development and the acquisition of container management companies. As the implementation phase only began in 2015, Astrid opined that it may be too early to judge whether the MSR will become a true enabler for the SDGs. Rather, efforts at this point in time should focus on getting MSR planners and implementers to become more engaged in existing global governance of the oceans, in order for opportunities in sustainable business operations to materialize in the future.



Yiwei Wang, Professor of School of International Studies, Director of Institute of International Affairs and Director of Center for EU Studies at Renmin University of China, remarked that civilization in China has long been characterized by its longevity, and that in the same sense sustainability also lies at the heart of Chinese civilization. The aim of the 21<sup>st</sup> Maritime Silk Road is to be recognized as a pathway of "green development, robustness, intelligence and peace". In 2014 Premier Le Keqiang's speech on the "Development of a Peaceful, Collaborative and Harmonized Ocean" laid emphasis on China's remodeled "Ocean Vision" - the recognition of the "21<sup>st</sup> Century" by seeking a way to avoid the traditional risks of globalization, and developing a remodeled maritime civilization that puts sustainability and societal harmony to heart. The project emphasizes how port restructuring and the increase of shipping lines and capacity can be achieved in the new age, and at the same time embraces current ocean orders and establishes the harmonization of Human and the Ocean. There are three strands to this: 1) New needs - the transformation and advancement of ports and canals, the establishment of "information ports", and the linkage of land and sea to counteract the bottleneck effects of globalization; 2) New realms - the Arctic, finance and tourism services, such as RMB offshore centers, maritime banks - from trade to finance; 3) New thoughts - collaborative discussions and development of marine resources, the sustenance of maritime security, and the innovation of maritime regulations. It is only by establishing accepting and sustainable ocean civilizations can we then realize the U.N. 2030 Sustainable Development Goals.

Liisa Kauppila, Centre for East Asian Studies, University of Turku, provided insight into China's visions for a Polar Silk Road, which would link China and Europe through the Northern Sea Route (NSR) in the Arctic Ocean. In 2017, China and Russia signed a "Joint Declaration on Further Strengthening Comprehensive, Strategic and Cooperative Partnership", which recognized the development of an Ice Silk Road along the NSR as a key area of cooperation. Subsequently in January 2018, China's first-ever white paper on Arctic policy sought to justify the country's Arctic ambitions through the challenges and opportunities presented by rapid climate change as an extension of the MSR. Liisa noted four social processes currently advancing the Polar Silk Road. 1) Physical presence – while China has yet to acquire any ports in the Arctic, there is substantial interest in the northern hubs of Iceland and Norway. At the Asian end of the NSR, some areas have already been rented to Chinese control; likewise CNPC and the Silk Road Fund respectively own 20% and 9.9% of the Yamal LNG Project in northwestern Siberia, facilitated by ongoing domestic production of icebreakers. 2) Maritime preparedness – through overseas training of Chinese crew (e.g. ice simulators in Finland and Russia) and test sailings along the NSR, China has been obtaining data for scientific and commercial purposes and learning the technology to operate safely and sustainably in the harsh environments of the Arctic. 3) Regulatory framework - while China currently participates in the Arctic Council in the capacity of an observer, it has been gaining foothold through the Arctic Economic Council, the negotiations of the Arctic Investment Protocol at the World Economic Forum, and trilateral dialogues with Japan and South Korea pledging to enhance cooperation in Arctic research and sustainability. 4) Enabling a smooth flow of traffic for which a trust creation process is ongoing between the Chinese government and Arctic countries. In concluding, Liisa called on the business community to ponder what they can do to advance sustainable practices and mitigate the risks of collaboration between China and small Arctic economies. Despite the fears surrounding China's intentions and capabilities, inclusion of the country in all dialogue concerning the sustainability of Arctic maritime activities is indispensable.

**Greg Fisk,** Business Development Director of BMT, provided perspectives from the engineering sector – how the influx of MSR funding is impacting the industry as well as marine environment protection. One of the biggest challenge, he noted, is advance planning for new and existing ports. When funding is offered (e.g. by China, the World Bank or other entities), it falls on governments, port authorities and terminal operators to conduct timely and holistic assessments of cargo mix and cruise potential, proximity to existing shipping channels, demands for business case, and siting and options. Other risks include route selection – where potential user conflicts are and how to maximize benefits – and local impacts and EIAs – dredge spoil management, biodiversity, coastal processes, water quality, sediment quality and landside infrastructure. On the other hand, MSR development is foreseen to provide opportunities in improving knowledge from impact



statements and addressing key transboundary environment issues in collaboration: embedding best practice and minimum standards, ballast water and marine pest incursion, oil spill/grounding response, climate and extreme weather resilience infrastructure, sustainability and efficiency, reducing impacts to migratory species, anchorage, and shore facilities (bunkering, wastewater, power, local provisioning). While the risks are almost certain to materialize, Greg is less convinced of the realization of opportunities unless underpinned by practical governance at multilateral and regional levels. For the MSR to become a gatekeeping investment for generations to come, it is crucial that current bars on best practices are raised via inclusion of sustainability principles.

**Cho Hor Wong,** Director of Five Oceans Maritime, reflected on various issues put forward by previous presenters, and dissected his take on the framing question of the session: "International Business Collaboration to Help Ensure the Maritime Silk Road Leads to a Sustainable Destination". Concerning "International Business Collaboration", Cho Hor noted that with trade being the essence of the BRI, all opportunities arising from this relationship – states and multinational firms alike – should be covered, regardless of differences in customs, cultures and languages. In fact, it is this cultural pot which will be vital to reaching innovative and collaborative solutions via dialogue within the BRI. Concerning the "MSR", Cho Hor traced history back to the Trojan War, opining that the prosperities of seaborne trade actually stem not from China but from Western civilization. Concerning "Sustainable Destination", he remarked that while this covers development of all forms of renewable energy, including wind and solar, there is currently no clear answer as to by whom, and to where, sustainability is headed in the MSR. He voiced his hopes to see existing sustainability principles being identified and addressed in forthcoming MSR projects, and for solutions to become clearer as time progresses.

Economic	MSR development must focus on three key strands in order to realize its economic potential: 1) New needs – e.g. the transformation of ports and canals and establishment of "information ports"; 2) New realms – the Arctic, finance and tourism services, such as RMB offshore centers, maritime banks – from trade to finance; 3) New thoughts – collaborative discussions and development of marine resources, the sustenance of maritime security, and the innovation of maritime regulations.
Social	The MSR places significance on the contribution of ocean health to improving human wellbeing for present and future generations. China's remodeled "Ocean Vision" recognizes the "21 <sup>st</sup> Century" by seeking a way to avoid the traditional risks of globalization, and developing a new maritime civilization that puts sustainability and societal harmony to heart.
Environmental	The aim to promote infrastructure development, institutional linkage and people connectivity for ocean industries draws linkage to the SDGs and Agenda 2030. However, it may still be too early to judge whether the MSR will become a true enabler for the SDGs. Rather, efforts at this point in time should focus on getting MSR planners and implementers to become more engaged in existing global governance of the oceans, in order for opportunities in sustainable business operations to materialize in the future.
What does it mean for the World Ocean Council?	The WOC provides a structure for multi-stakeholder collaboration through its networks, the Sustainable Ocean Summit and other projects and platforms, and assists businesses in becoming more invested in innovation and foresight in the BRI and MSR.



# 2.6 Ocean Business Action on Climate Change: Implementing Port Adaptation and Exploring Ocean Negative Emission Technologies

PARALLEL SESSION 15:30-17:00 Grand Ballroom

- How can the ocean business community best collaborate with other key stakeholders, e.g. multilateral/bilateral development assistance, national governments, to ensure that ports and essential coastal infrastructure are being adapted to achieve resiliency during extreme events, especially in small islands and developing countries, particularly in the Asia-Pacific region?
- What are the finance and investment options for resilient port and coastal infrastructure, including for green infrastructure?
- What is the potential for ocean-based negative emission technologies (NETs), what science is available, what are the risks and benefits, and what is needed to advance careful, science-based consideration of Ocean NETs as a potentially viable, important means to address increasing atmospheric CO2?

#### **Chair/Moderator**

• Cary Anne Cadman, Environment Sector Coordinator, World Bank

#### **Speakers/Panel**

- Chris Allen, Senior Consultant, Advance Planning Group, Jacobs
  - Port Resiliency to Sea Level Rise and Extreme Events: Private Sector Collaboration to Advance Adaptation for Small Islands and Developing Countries
- Carlo Patteri, Director of Sales, Water and Environment, DHI
  - Climate Adaptation Decision Support Systems (CADSS) Related to Port Resilience and Climate Adaptation
- Xinying Tok, Senior Manager, Asia Research and Engagement
  - Climate Costs for Asia Pacific Ports
- John Ridley, Managing Director, Ocean Nourishment
  - Ocean NETs: Responsible Negative Emissions Technologies (NETs) for CO2 Sequestration at Sea
- Pål Bakken, Founder and CEO, Casulo
  - Seaweed CO2 Sequestration and Restoring the Forgotten Forests in our Ocean

#### Discussions

**Cary Anne Cadman,** Environment Sector Coordinator of the World Bank, opened the session by posing to the audience two questions: how ocean industries are being impacted by climate change, and how they can play a role in tackling the issue. Emphasis was laid on the need for port adaptation and resilience, the risks and benefits of ocean-based NETs, and finance and investment options available to support green infrastructure, especially for Small Island Developing States (SIDS).

**Chris Allen,** Senior Consultant, Advance Planning Group at Jacobs, explicated the opportunities and barriers for private sector collaboration to advance port resilience against sea level rise and extreme events, particularly for SIDS. At the outset, the "Blue Economy" has become the next economic development frontier for SIDS and coastal LDCS. With maritime freight accounting for 90% of global merchandise trade by volume, ports have become the lifelines for SIDS and LDCS. In order for SIDS to integrate into global supply chains, investment and development of ports into modernized and well-maintained transport infrastructure are crucial to overcome remote geography problems and ensure export-oriented growth. The need is particularly acute when considering the magnitude of recent climate threats e.g. hurricanes that have been



increasing port and overall economic vulnerability, such as for the insurance industry. Yet another driver for investment is SDG 9, through which the U.N. has specified an urgent need to "build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation". For private sector financing to be sufficiently motivated, however, barriers of uncertain returns need to be overcome, including: macro-economic challenges, and lack of knowledge on market vulnerability and project developer capacity. In particular, a lot of work remains to be done with capacity building for port managers and planners and government agents, such as on scenario and risk modeling, project finance, adaptation rationales and strategies, and stakeholder education and coordination. Chris outlined four "Consortium + Partnership" approaches for moving forward: 1) Assemble expertise from finance, planning and engineering, science, business leadership, insurance and government; 2) Align approaches in identifying and surmounting barriers to investment in adaptation; 3) Develop interdisciplinary solutions to overcome siloed reactions; 4) Integrate local values and perspectives with global expertise and financial capacity.

Carlo Patteri, Director of Sales at DHI Water and Environment (Singapore), began by outlining market trends in the port industry – surges in global vessel sizes over the next five years, and a need for ports to expand capacity and comply with stricter environmental legislations. Environmental threats are concurrently affecting port assets and operations through sea level rises, extreme events and storm surge (leading to higher temperatures, waves and erosion), pollution and biofouling, and changes in shipping seasons. These are in addition to less direct economic impacts on access routes and terrestrial connections, supply chains, energy suppliers, and third parties such as insurers. According to modeling studies, port structure will require an extra height of 1.6-2.3m to adapt to climate change and accommodate uncertainty and extreme events, with Asia alone requiring at least US\$30.9 billion in adaptation costs. Carlo emphasized the broader need for responses to evaluate tolerance of supply chains for existing and planned infrastructure, and secure funding for improvements in the longer term if short-term upgrade costs are too prohibitive. DHI's CADSS (Climate Adaptation Decision Support System), for instance, has been introduced to provide calculations of long-term probabilistic risks, as well as catalogues and cost-benefit ratios of intervention options. Recommendations were given for moving forward: 1) Determine baseline risk and establish business case for adaptation with probabilistic risk based approach over time (80-100 years) with full financial and economic assessment of direct and indirect losses; 2) Ensure strong recovery plans are in place; 3) Consider "whole of operation" as an integral part of long-term operational resilience and competitive advantage of the port.

Xinying Tok, Senior Manager of Asia Research and Engagement, shared ARE's recent research efforts on climate costs for Asia Pacific ports commissioned by HSBC. Today, with global temperatures continuing on an upward trajectory and resulting in sea level rises, increased storm intensity and greater damage to ports, the "climate challenge" has never been more acute. With 9/10 of the world's top ports (in terms of capacity) being in APAC, however, the continued functionality and growth of Asian ports will be critical for global economic development. In this respect, what do we consider as a climate-safe port, and how much time do we have to adapt? In illustrating the costs required for port adaptation, Xinying drew on two climate scenarios, with variations in emissions, temperature rise, sea level rise, storm intensity and surge translating into total port elevation of between 1.6m and 2.3m. She also drew on a range of engineering assumptions for port aprons, container and automobile yards, warehouses and silos. Results foresaw adaptation costs for Asia's largest ports being in the range of US\$30.9-49.4 billion, with Japan topping the list due to higher material and labour costs. While in the short-term port owners and operators may be able to pass such costs to insurers, with more frequent incidents insurance companies will likely start raising premiums or denying cover to ports that have not upgraded their protections. When deciding on which scenario to plan for the long-term, Xinying noted that 100-year storm/flood events will differ for different locations, but that it will not be much more expensive to adapt for more aggressive climate scenarios. With Asia's rapid port built out, early economic planning will be necessary. Likewise, stakeholders should engage with local governments to coordinate approaches to manage the physical effects of the changing climate, evaluate safety margins for current infrastructure, and consider impacts in other sectors and for assets beyond ports.



John Ridley, Managing Director of Ocean Nourishment, began with an appeal to the delegation for interest in forming a WOC Ocean NETs platform where the private sector can make a real contribution to tackling climate change, in conjunction with relevant government agencies, NGOs, and the natural and social science sectors. In face of today's unprecedented rates of planetary change, there can be no more "business as usual". We are now heading towards a state the planet was in 3-4 million years ago (Mid-Pliocene), when CO2 levels were at 400-450 ppm, temperatures 2-3°C above pre-industrial levels, and sea levels 10-22m higher compared to now. Scientists indicate that once temperatures slip past the point of no return, the planet will reach a "stable" state of "hothouse", where most of the tropics and subtropics will be too hot for human habitation, and maximum carrying capacity will be no more than 1 billion, mostly in the polar regions. Likewise, changing temperature and rainfall patterns will make current agricultural areas unproductive, and sea level rises of 20-40m will likely drown coastal cities and agriculture infrastructure. John stressed that there is no "Plan B" – the only thing that remains to be done is to reduce emissions as rapidly as possible, and at the same time start to test and deploy NETs at scale. Examples include macro algae, artificial swelling, ocean iron fertilization, ocean nourishment (macro nutrients N and P), biomass storage, increased ocean alkalinity, sub seabed CO2 storage and coastal ecosystems. To bring these NETs from research to reality, assessment will need to consider, inter alia, social license, finance, risks, governance, ethics, security of storage, impacts on food production and natural ecosystems, and scalability.

Pål Bakken, Founder and CEO of Casulo, spoke about one of the most overlooked environmental problems contributing to climate change - the disappearance of marine vegetation. At the outset, the Blue Front Yard shared by all continents is immense, allowing vegetation (seaweed, seagrass, salt marshes, mangroves, coral reefs) to be grown in a 30m depth zone equating to 15 million km<sup>2</sup>. Of these vegetation, seaweed merits attention by reason of its constitution (60% of marine vegetation) and coverage (large forests in developed countries). It is also significant for its environmental value (biodiversity and fish biomass increase, CO2 capture and fixation, nutrient bioremediation as mitigation for hypoxia and eutrophication) and industrial value (oxygen provision for agriculture and aquaculture, seaweed harvest for feed and food, coastal protection). Notably, seaweed sequesters over 5 times more carbon/m<sup>2</sup> than rainforests - 5000 km2 of seaweed (equating to 0.03% of the Blue Front Yard) is able to produce 570,000 tons of carbon stored per year and 500,000 tons more fish. The problem is that these filters of the ocean are presently broken seaweed is disappearing worldwide due to ocean warming, heat waves, coastal development, pollution, agriculture runoffs, invasive species and overfishing, amongst others. The good news is that solutions are there, and include: direct ocean seeding, seeding on stones, artificial structures, temperature tolerance breeding, removals (e.g. sea urchins) and cultivation. These solutions, Pål noted, provide five times the ecosystem benefits of land forests. An example was given of Seaforester's testing of seeding methods and planting of four types of seaweed along the Portuguese coast. Moving forward, Pål called on ocean industries to take the lead in supporting global seaforestation, in view of their direct dependence on the ocean. Collaborative action in planting the sea will serve to provide measurable impact (fish, CO2, N) and will be the only way to ensure sustainable blue business.

Economic	The magnitude of recent climate threats has been increasing port vulnerability and impacting access routes and terrestrial connections, supply chains, energy suppliers and third parties such as insurers. With 9/10 of the world's top ports (in terms of capacity) being in APAC, the continued functionality and growth of Asian ports will be critical for global economic development.
Social	Stakeholders (including industry) and local governments need to engage in managing the impacts of changing climate and evaluate safety margins for current infrastructure. To bring mitigation research to reality, assessments of ethics, security of storage, social license and governance will be necessary.



**Environmental** In face of today's unprecedented rates of planetary change, there can be no more "business as usual". Once temperatures slip past the point of no return, the planet will reach a "stable" state of "hothouse". The only thing that remains to be done is to reduce emissions as rapidly as possible, and at the same time start to deploy mitigation measures (NETs, seaweed plantation, port resilience) at scale.

What does it mean<br/>for the WorldThe WOC is uniquely placed to offer assistance in urgently bringing together private<br/>sector interests to foster collaborative action amongst stakeholders, including the<br/>natural science and social science sectors, NGOs and relevant government agencies.<br/>Companies interested in being in a part of the WOC Ocean NETs platform are invited<br/>to contact the WOC Secretariat.

### 2.7 Aquaculture: Ensuring Sustainable Production in Crowded Seas PARALLEL SESSION 15:30-17:00 Garden Room C-D

- With Asia as by far the most important aquaculture area of the world, how has the industry evolved in the increasingly multiple-use ocean situation in Asia?
- What are the barriers to sustainable aquaculture expansion, and what is needed to help expand and accelerate sustainable aquaculture?
- How can aquaculture meet future global human protein demands sustainably in an increasingly crowded, multi-use ocean, notably in Asia?

#### **Chair/Moderator**

• Guillaume Drillet, Past President, World Aquaculture Society, Asian Pacific Chapter

#### Speakers/Panel

- Farshad Shishehchian, CEO, Blue Aqua International
  - Application of Science and Artificial Intelligence (AI) in Aquaculture
- Aurore Trottet, Senior Environmental Scientist, Water and Environment, DHI
  - Planning Aquaculture Zones in Crowded Coastal Areas: Case Study from Denmark
- Hal Stillman, Director, Technology Development and Transfer, International Copper Association (ICA)
  - Copper Alloy Mesh for Sustainable Aquaculture
- Marcelo Hidalgo, Science and Standards Coordinator, Aquaculture Stewardship Council
  - Ensuring Responsible Management of Aquaculture Operations

#### Discussions

**Guillaume Drillet,** Past President of World Aquaculture Society Asian Pacific Chapter, opened the session by emphasizing the need for innovation in overcoming barriers to sustainable aquaculture expansion, and for action not by siloed actors but by a collective of stakeholders that includes the private sector, governments, NGOs and the science community.

According to **Farshad Shishehchian**, CEO of Blue Aqua International, with increasing world populations and rising seafood consumption, intensification is the only way forward for the global aquaculture industry. With a presence in 13 countries, Blue Aqua has been working on several fronts to develop and promote intensification technology for the implementation of sustainable production: R&D MOUs, industry magazines, regional professional networks, breeding centers, farms and training schools. Of note is Blue



Aqua's Smart Farm currently under development – a fully-integrated, cost-productive culture model designed to effectively manage a high-density farm using Artificial Intelligence and automation technology. Recognizing the traditional challenges of the industry (such as limited land and water resources, climate change and environmental degradation due to biotic depletion and eutrophication), Blue Aqua's Smart Farm aims to provide sustainable intensification to, inter alia, improve production and resource use efficiency, strengthen economic viability and farmers' resilience to climate events, reduce labor costs and disease, and improve accounting and understanding of processes. The Smart Farm will be a land-based, closed recirculating system, allowing for remote, real-time management of water quality (temperature, pH, salinity, biological filtration, oxygen supply, denitrification etc.), feed systems, internal transport and size grading via automated sensors. Blue Aqua's patented mixotrophic technology is also used in three phases – phytoplankton phase, phytoplankton-probiotic phase and probiotic phase – to ensure beneficial bacteria application for bioremediation, pathogen control and immunostimulation, as well as microalgae bloom and stabilization for better water quality and as natural food promoter.

Aurore Trottet, Senior Environmental Scientist at DHI Water and Environment, provided perspective on the challenges the aquaculture industry is facing. The FAO estimates that feeding a world population of 9.1 billion people in 2050 would require raising overall food production by 70% between 2005-2050 – requiring a 107% growth in agriculture production between 2010-2030 in Southeast Asia alone. The need for sustainable operations is clear. For this, the FAO encourages an Ecosystem Approach to Aquaculture development (EAA), which takes into account production, society, and ecological impacts. A case study from Denmark was brought up to illustrate the application of EAA in site selection and impact assessments. To ensure that a recent expansion of offshore farms was compatible with the Water Framework Directive on Marine Strategy & Habitat, and that there were no conflicts with other marine activities, a two-step assessment was initiated by DHI. The first was site selection. This required GIS-based screening of spatial constraints (shipping routes, underwater cables, dumping sites, military areas, offshore wind farms, protected areas), production constraints (water depth, waves, osmotic stress, distance to harbor, risk of disease etc.) and environmental constraints (seabed stability, sediment dynamics). Once potential sites were identified, the second step was to conduct EIAs (hydrodynamic and ecological modeling) on the carrying capacity of sites, to determine impacts relating to nutrients, eutrophication, sediment quality and antifouling. While the model tool has proven to be very efficient in supporting sustainable aquaculture planning in crowded coastal areas, quality of data will be vital to its efficacy.

Hal Stillman, Director of Technology Development and Transfer at International Copper Association (ICA), spoke about copper alloy mesh (CAM) as a key enabling technology for offshore aquaculture systems. Copper-zinc alloy (brass) has long been recognized for its excellent corrosion resistance, strength and wear resistance, 100% recyclability and smooth surface which inhibits adhesion of biofouling organisms. When applied to CAM in aquaculture, proven benefits are many - reduced environmental impacts (no plastics), reduced maintenance, higher profit for farmers, containment to adapt to climate change and oceanic storms and currents, reduced drag (meaning higher stability), reduced fish loss to predators, fish health (due to higher water exchange and the inability of parasites to grip CAM) as well as opportunities for investors. Aquaculture sites that have already started adopting CAM technology include China, Panama, Hawaii, Japan and Chile. Notably, with existing near-shore CAM cages in China demonstrating positive outcomes, the Chinese government has included in its 13<sup>th</sup> five-year plan the installation of 10,000 offshore CAM systems with submersible designs, and has promised to provide 50% of the costs (with the remaining 50% representing an opportunity for investors). Likewise, the U.N. SDGs have been a vital part of CAM development - SDG 2 (faster growth and allowing industrial scale production), SDG 8 (investment and financing), SDG 9 (innovative applications of CAM technology extend fish farming into new areas), SDG 13 (undamaged by severe storms for increased food security) and SDG 14 (healthier fish, no chemical release, improved sustainability and improved economics for fish farmers).



Marcelo Hidalgo, Science and Standards Coordinator at Aquaculture Stewardship Council (ASC), explicated the need for aquaculture certification - with the rapid rise in demand and production of farmed fish (especially in Asia), responsible management will be crucial to minimize negative impacts on the environment and local communities. As an independent, not-for-profit certification and labelling program, the ASC strives to enhance consumer trust in farmed seafood by setting measurable performance indicators that reflect best management practices, and ensuring conformance by farms via third party certification. The current nine ASC standards cover 15 species (abalone, bivalve, freshwater trout, salmon, seabass, tilapia, shrimp etc.) - the ASC Salmon Standard, for instance, requires "legal compliance", "preservation of the natural environment and biodiversity", "good animal health and husbandry", "smolt production", "being a good employer", "preservation of water resources and quality", amongst others. Additional environmental metrics that the ASC considers include the origin of marine ingredients, waste plastic and management, the health and welfare of cultured fish, and effluents nitrogen and phosphorus. In general, the ASC farm certification process requires four months to complete, beginning with the farmer signing a contract with an ASC qualified independent certifier, the audit being announced on ASC's website allowing for stakeholder input, and ending with the issuance of ASC certification if compliance is confirmed. There are currently 721 certified farms covering 1,550,615 tons of certified seafood, with an additional 335 farms undergoing assessment. Moving forward, work priorities for the industry are many – in conjunction with the ASC and other stakeholders, industry players must work to support sustainable aquaculture development through developing research capacity and transferring best practices through dialogue and partnerships.

Economic	With increasing world populations and rising seafood consumption, intensification is the only way forward for the global aquaculture industry. The private sector and science community have been working on several fronts to develop the technology required for implementation of sustainable production.
Social	With the rapid rise in demand and production of farmed fish (especially in Asia), responsible management will be crucial to minimize negative impacts on local communities. Social metrics considered by the ASC include being a good employer and legal compliance, amongst others.
Environmental	The FAO encourages an Ecosystem Approach to Aquaculture development (EAA), which takes into account production, society, and ecological impacts. Environmental metrics considered by the ASC include the origin of marine ingredients, preservation of the natural environment and biodiversity, preservation of water resources and quality, waste plastic and management, and the health and welfare of cultured fish, amongst others.
What does it mean for the World Ocean Council?	The WOC is uniquely placed to foster collaboration between leadership companies and relevant stakeholders on sustainable aquaculture development. In particular, the WOC Ocean Investment Platform will serve to facilitate dialogue with potential investors.



## 2.8 The Role of the Ocean/Maritime Legal Community in Understanding and Addressing Risk and Opportunity in the Blue Economy and Ocean Sustainable Development

PARALLEL SESSION 17:30-19:00 Grand Ballroom

- What is the role of the ocean/maritime legal community in addressing the risks, opportunities and challenges of the growing and increasingly diverse ocean economy?
- What experience, lessons learned and ongoing efforts can the ocean/maritime legal community bring to help advance ocean sustainable development, and is there a need for greater collaboration amongst the ocean/maritime legal community on sustainable development?
- What are the priority ocean development and sustainability issues for engaging the ocean/maritime legal community from the perspective of: a) the legal community, b) the overall ocean business community and c) other ocean stakeholders (e.g. government, NGOs)?

#### **Chair/Moderator**

• Jonathan Webb, Partner, Holman Fenwick Willan

#### **Speakers/Panel**

- Catherine Smith, Senior Associate, Holman Fenwick Willan
- Liv Monica Stubholt, Partner, Selmer
- Bryan Druzin, Associate Professor of Law, Director of LLM Programmes, Faculty of Law, Chinese University of Hong Kong
- Philipp Hermes, Attorney-at-law, BHM Penlaw

#### Discussions

**Jonathan Webb**, Partner at Holman Fenwick Willan, explicated the need for the legal community to engage in ocean sustainability issues, in view of recent environmental compliance measures (such as on sulfur emissions, ballast water management, vessel speeds) that are exerting increasing regulatory pressures on maritime industries. As these pressures come down the line towards legal practitioners, how engaged should they be? Jonathan put forward two approaches: 1) Being reactive and restricting themselves to advising clients as regulations come in, or 2) Being proactive and engaged in setting the agenda, with the latter being potentially problematic as clients may not want to see their lawyers as agitators. Moving forward, a delicate balance must be tread – the question is how to get there.

**Catherine Smith,** Senior Associate at Holman Fenwick Willan, presented a classic example of bottom-up emissions compliance in Hong Kong. Despite its size, the city is a massive port, with some of the largest container vessels passing through its waters. Until recently, there were no local shipping emissions regulations. What happened was the Fair Winds Charter, the first voluntary scheme initiated by 17 companies – 14 shipping lines, two cruise lines and one autoliner – to reduce ship emissions by requiring ocean-going vessels to switch to a low-sulphur fuel (0.5 percent sulphur content or lower) while at berth. The enactment of regulations followed in 2015, after initial difficulties due to differences in regulations and incentives between Hong Kong and its neighboring ports in Shenzhen and Guangzhou. The first prosecution by the Environmental Protection Department under these regulations involved a shipowner who was unable to switch on time due to technical complications, and who subsequently made efforts to cooperate with the authorities by appearing before the Magistrates, attending meetings and providing documentation to help mitigate emissions due to the breach. Subsequently to the case, the regulations were amended to require a switch to low-sulphur fuels not only at berth, but when ships enter Hong Kong waters. Notably, from 1



January 2019 onwards – a year ahead of the IMO 2020 SulphurCap – vessels trading within the Pearl River Delta Domestic ECAs are required to run on low-sulphur fuel with sulphur content not exceeding 0.5 percent. To an extent, the genesis of these regulations stemmed from industry action. In this, the role of lawyers is multifold: in addition to offering advice that considers better practices, they are able to provide well-drafted contract terms that comply with necessary regulations. In-house counsels have a further opportunity to form policy based on best practice. Likewise, membership at organizations such as the WOC and WISTA will provide lobbying power for influencing wider policy direction.

Liv Monica Stubholt, Partner at Selmer, put forward a crucial question: "What's the point of lawyers in ocean sustainable development?" She began by highlighting the need for Selmer to be concerned with any matters impacting maritime industries - in Norway, about 85% of GDP is related to the ocean, and 70% of exports are ocean-related. As legal advisors they have a mandate to point out legal, governance, compliance and strategic issues that are coming up clients' way - including on SDG 14 commitments. Significantly, this requires legal practitioners to move away from being "reactors" and to becoming partners in business development strategy and risk management. The problem, however, is that lawyers are often called in too late to be helpful in offering the legal dimension to business development. Liv Monica reflected on the prevalence of legal perspectives in discussions conducted at the SOS thus far, which she plans to bring back and communicate to her clients, in order for them to be able to re-identify their place in the value chain well ahead of the market. This includes, amongst others, the increasingly efficient development of policy initiatives into legally enforceable instruments, such as IMO's Polar Code and FAO's PSMA on IUU fishing. From her experience, most clients are receptive and engaged because they understand from past experience the potential risks of trends breaking up business models (e.g. geopolitics and cybersecurity). Their lawyers' instructions on sustainability commitments as least come with a survival plan. Likewise, the sustainable development agenda has become of importance in investment considerations. The Norwegian Pension Fund Global provides an example, which states that companies may be excluded from the fund's investment portfolio if there is unacceptable risk that it contributes to severe environmental damage. Other investor initiatives that have been developed and relevant to SDG 14 include the Declaration of the Sustainable Blue Economy Finance Principles, as well as the AIP Guidelines for Responsible Investment in the Arctic.

Bryan Druzin, Associate Professor of Law and Director of LLM Programmes at the Faculty of Law, Chinese University of Hong Kong, opined if we cannot coordinate with each other on a transnational level, no action (no matter how well-intentioned) can be sustainable. To this, he presented a proposal to prevent the "Tragedy of the Commons" (TOC) in International Environmental Law. The TOC is defined as a group of actors behaving according to rational self-interest by depleting a common-pool resource, in turn undermining the entire group's long-term interests. While the dilemma is easily solved on sub-state levels through top-down regulation, it is not viable on the supra-national level because the international system is anarchic - there is no authority higher than that of States. For this reason solutions must come bottom-up with the only recourse being that of international agreement through treaty. The problem, however, is that the same structural dynamic has been shown to undermine agreements in many instances. To this, Bryan presented a proposal comprising a mechanism for strong ex ante signaling, which would require that States contribute to a Commons Management Fund (CMF), an upfront "deposit" in an international regulatory body to be forfeited if States fail to honor their treaty commitment. The goal is to provide a sufficient burst of initial confidence in the parties' level of commitment, resolving their fears of free riding, and in turn preventing a TOC from emerging. In a TOC dynamic, ex ante costly signaling is superior to ex post punitive mechanisms because it shows a willingness to "put money where the mouth is" by producing a separating equilibrium. Likewise, MEAs turn on collective expectations, allowing perception to become reality - if actors believe others will comply, they are more likely to comply.



According to Philipp Hermes, Attorney-at-law at BHM Penlaw, the legal community serving the maritime private sector are niche experts. There is much they can do to educate and guide public stakeholders in shipping and other maritime domains, who often demonstrate a lack of understanding of the operational parameters of industry. Philipp gave an example of the practice of Flag of Convenience (FOC), whereby shipowners register and opt for a flag in a ship registry of a country other than that of the shipowners' to avoid financial charges or restrictive regulations in the owners' country. When it comes to enforcement actions, the consent of the Flag State is necessitated. Public agencies often attempt to reach ship registries in different countries by online searches, without sufficient knowledge on the organization and structure of these registries. This is where the expertise of private industry maritime lawyers comes in, who have both the contacts and know-how to reach registries from across the world. Yet another arena where the expertise of private industry lawyers can be utilized is that of policy-making, as drafters often display a lack of consideration for the full picture in their wording of policies. Speaking further on cyber-security and its legal implications for the maritime sector, Philipp opined that this is an area where lawyers can learn from industry players. There needs to be better understanding on the cyber-connectivity of vessels out at sea, such as how easy it is to hack a ship. Likewise, if industry wishes to develop smart shipping, how does data protection come into play? Who owns the data in a container, and how to deliver data between locations without violating any lines? These are just a few of many issues about which private legal practitioners are constantly deliberating and developing a more comprehensive understanding.

Economic	Legal advisors have a mandate to point out legal, governance, compliance and strategic issues that are coming up clients' way – including on SDG 14 commitments. In general, clients are receptive and engaged because they understand from past experience the potential risks of trends breaking up business models (e.g. geopolitics and cybersecurity). Their lawyers' instructions on sustainability commitments as least come with a survival plan.
Social	The legal community serving the maritime private sector are niche experts. There is much they can do to educate and guide public stakeholders in shipping and other maritime domains, who often demonstrate a lack of understanding of the operational parameters of industry.
Environmental	There is a real need for the legal community to engage in ocean sustainability issues, in view of recent environmental compliance measures (such as on sulfur emissions, ballast water management, vessel speeds) that are exerting increasing regulatory pressures on maritime industries. Notably, this requires legal practitioners to move away from being "reactors" and to becoming partners in business development strategy and risk management.
What does it mean for the World Ocean Council?	The WOC provides a structure for multi-stakeholder collaboration through its networks, the Sustainable Ocean Summit and other projects and platforms, and assist the legal community in better understanding and engaging in regulatory developments relevant to the Blue Economy.



### 2.9 LNG as a Marine Fuel: Changing the CO2 Footprint of Shipping and Other Ocean Industries

PARALLEL SESSION 17:30-19:00 Garden Room C-D

- What are the benefits, trends and forecasts for LNG as a major marine fuel, and what are the barriers to advancing the development and delivery of LNG as a marine fuel in the next two decades?
- What is the potential for developing LNG as a marine fuel not only for shipping, but also for other maritime sectors, e.g. fishing, ferries, offshore service/supply vessels?
- In its transition to cleaner fuels what does the industry plan on doing with open loop and closed loop scrubber sulphur discharge?

#### **Chair/Moderator**

• Walter Purio, CEO, LNG Marine Fuel Institute

#### **Speakers/Panel**

- Walter Purio, CEO, LNG Marine Fuel Institute
  - Leading the Way: Western Australia in the Key to Driving LNG as a Marine Fuel
- James Forsdyke, Area Manager, Hong Kong and Taiwan, Lloyd's Register Asia
   Cleaner Cruising: How LNG Fuel is Making Waves
- Rowan Fenn, CEO, Rise-X
  - The Great Industrial Decentralization: The Environmental Imperative Driving Industrial Supply Chain Transformation
- René Sejer Laursen, Promotion Manager, MAN Diesel & Turbo
   The Dual-Fuel ME-GI Engine, A Clean Emission Option Available for Merchant Ships
- Michihiko Nakano, General Manager, Bunker Business Office, Mitsui O.S.K. Lines (MOL)
  - Mitsui O.S.K. Line and LNG as a Marine Fuel At a Glance
- Sarah Braude, Senior Sustainability Officer, RightShip
  - LNGs Role in Shipping Efficiency

#### Discussions

Walter Purio, CEO of LNG Marine Fuel Institute, requested delegates to keep in mind the "purpose" of the session as it progressed. Essentially why are we developing LNG as a marine fuel? Following a video that provided perspective on the environmental and societal problems caused by heavy fuels in shipping, Walter iterated the noble cause of LNG through the example of "The Blue Zone" in Western Australia: improve regional energy security and public health, and create a regional LNG marine fuel industry. Compared to its more polluting counterparts, LNG allows for up to 20% less CO2 (greenhouse gas), 99% reduction in Sox (respiratory/health), 80% reduction in NOx (ozone depletion) and 100% reduction in particulates (carcinogen). No doubt LNG development will play a significant role in IMO's goal to reduce maritime emissions at least 50% by 2050 from 2008 levels, and reduce CO2 emissions relative to each ton of cargo shipped by at least 40% by 2030. Collaboration and trust, especially amongst competitors, will be crucial if we want to achieve these targets with the next generation of ships. Recent years have seen the sprouting of promising initiatives, such as Lloyd's Joint Development Project (with Hyundai Heavy Industry, Woodside, Marin Gas) and DNV GL's Joint Industry Project (with Woodside, Mitsui OSK Lines, U-Ming, China Merchant, SDARI, Rio, FMG, Shell, BHP). Walter concluded with a quote from the film Kung Fu Panda - "We are stronger together than we are alone", emphasizing that it is only when stakeholders put their heads together can LNG development be made a reality and taken to the next level for global impact.



James Forsdyke, Area Manager (Hong Kong and Taiwan) of Lloyd's Register Asia, began by outlining the developmental status of LNG as a marine fuel. LNG-fuelled ships currently total 0.1% of the existing fleet and 0.3% of order books, with 8 LNG bunker vessels in service and 14 in order books. The first LNG vessel that Lloyd's dealt with was Viking Grace; to date it has operated on LNG fuel for five years and completed more than 1,000 LNG bunkering operations. In face of IMO's 2020 target to reduce global fuel sulphur levels to 0.5%, LNG is proving an increasingly competitive alternative, in addition to scrubbers and other low sulphur fuel oils. Looking further at IMO's 2050 goals to reduce annual GHG emissions by at least 50% compared to 2008, James noted that because LNG is primarily methane, which is "worse than CO2 as a GHG" because it is 10x more effective in retaining heat in the atmosphere when combusted, the ultimate role that LNG can play remains uncertain. No doubt LNG represents a transitionary solution - in the long term, however, the structural problems need to be dealt with, as the current commercial framework for shipowners to contract out their vessels is not conducive to easy uptake of LNG in the global supply chain. Recent years have seen new designs for large bunker carriers gaining momentum in Asia, with three more LNG bunkering vessels entering service in 2018. In all, while ongoing LNG projects have served to prove technological viability and operational sturdiness of the concept, what remains is for the commercial logic to be realized in order for LNG to attract investment in the long term.

**Rowan Fenn**, CEO of Rise-X, introduced the company's ambition to increase the carrying capacity of the planet in face of mankind's growing demand for resources – by developing decentralized management systems for industrial ecosystems to deliver productivity gains, and by employing innovative business models that enable greater participation throughout the value chain. This "Industrial Decentralization" will be served by Rise-X's digital infrastructure – cloud-based blockchain platforms – that will allow all parties participating in a local, regional or global marketplace to operate using a common inter-company record, significantly reducing defects, disputes, over-production, waiting time, transportation and other costs associated with coordination. The company is starting this journey with LNG as a marine fuel, in view of IMO's forthcoming regulations and the potential of LNG as a cost competitive and cleaner fuel alternative. Rise-X recently announced a joint venture with maritime consulting company P & H Marine Australasia to develop a specialized industry software platform named QuayChain. Based in Singapore, the software automates the sourcing, procurement and delivery of bunkers in the marine industry via decentralized ledger technology and intelligent contracts, in turn reducing operating costs and increasing transparency, port capacity and workforce productivity. Rowan iterated that this will be the first of many steps by Rise-X to increase the planet's carrying capacity and reinvent our global green infrastructure.

René Sejer Laursen, Promotion Manager at MAN Diesel & Turbo, brought forth an engine manufacturer's perspectives. At the outset, dual fuel represents a clean emission option for merchant ships. MAN B & W has been leading the development of dual fuel engines for the past decade: 2012 with the first engine order for the world's first LNG driven ocean-going ship owned by TOTE (RH on LNG approx. 200.000), 2013 with the first methanol driven ship owned by MOL (RH on methanol approx. 38.000), 2014 with the first ethane driven ship owned by Hartmann Schifffahrt (RH on ethane approx. 20.000), 2018 with the world's first LPG driven ocean-going ship owned by Exmar which is not yet in service. Duel fuel engine orders currently total 246, with engine types and options comprising methane, methanol, ethane and LPG. In introducing the new MAN B&W ME-LGIP engine, René noted that regulation has been a driving factor. While the focus of today's regulatory change is SOX (reduction achieved with MGO, LFSO, scrubber, LNG, methanol and LPG) and NOX (reduction achieved with EGR and SCR), a growing focus is on CO2, methane slip and VOC (including requirements for 40% reduction of carbon intensity per transport work by 2030 and 70% by 2050 compared with 2008, 50% reduction of GHG emissions from ocean shipping by 2050 compared with 2008, reduction of methane slip emissions with diesel cycles, and reduction of VOC emissions with ME-LGIP). Notably, the new MAN B&W ME-LGIP engine is designed to support all of these regulatory goals – facilitated by high thermal efficiency, low unburned hydrocarbons, largest range of available fuel types, and best controlled combustion under all dynamic and ambient conditions.



Michihiko Nakano, General Manager of Bunker Business Office, Mitsui O.S.K. Lines (MOL), began by highlighting two recent achievements for LNG development. The first is MOL's signing of a deal for the construction of the first LNG-fueled tugboat in January 2018 (which will be launched in 2019). The second is Total and MOL's signing of a long-term charter contract for a pioneer LNG bunker vessel in February 2018. The vessel, of 18,600m<sup>3</sup> and to be delivered 2020, will operate in Northern Europe and will be the first ever capable of supplying large quantities of LNG in one single bunkering operation. Attention was drawn to a number of issues for clean fuel development: 1) Emissions, which require further strengthening of global emission control and further tightening of the Marine Pollution Act; 2) Conventional petroleum fuels, concerning quality deterioration and economical means for the Pollution Act; 3) Alternative fuels, with possible options being LNG, LPG, methanol, ammonia, bio fuel, hydrogen and others. Michihiko also spotlighted concurrent initiatives for LNG development by the company, including participation in industry groups such as SGMF and LMFI, an "LNG Ready" 20,000 TEU container ship delivered in 2017, an LNG fuel "ME-GI" engine demonstrational operation in 2012-13, and LNG-fueled ferry design studies since 2009. Of note was a recent joint study of the design of an LNG-powered coal carrier to earn Approval in Principle (AIP) from Lloyd's Register, the focus of which was to ensure sufficient cargo capacity without making the hull larger by installing the LNG fuel tank at the stern.

Sarah Braude, Senior Sustainability Officer at RightShip, began by introducing the company's GHG Emissions Rating system, which aims to increase transparency in the shipping industry by ranking ships according to their energy efficiency and GHG emissions, and assists the maritime industry in transitioning to a low carbon economy through informed selection of more efficient ships. The system has served to drive GHG efficiency in the global market, with 1 in 5 vessels selected for charter based on its data. On LNG-fuelled vessels, the GHG Rating "Vessel Design Index" factors in fuel type, speed, capacity and engine specification to determine CO2 emissions per ton (cargo) per nautical mile. Examples of ratings of LNG-powered vessels include the Isla Bella, rated "D" for its 18g CO2 emissions per ton (cargo) per nautical mile, the Fure Vinga (A-rated chemical tanker) and Greenland (B-rated cement carrier). In comparison, the MDO-powered Szechuen was rated "B+" for its superior design optimized for efficiency, and for producing 14.8 CO2 emissions per ton (cargo) per nautical mile. Looking more specifically at capesize fleets, a large number of which were scrapped in the last 3-5 years, notably 80% of "A" and "B" rated capes were built in 2015-17, compared to 60% of "E" and "F" rated capes built in 2010-12. In concluding, Sarah put to the audience the question of whether LNG is a "silver bullet". With consideration for infrastructure and bunkering facilities, she iterated that a low carbon future will take more than LNG fuel. It will require a holistic approach and better efficiency through ship designs, operations, carbon neutral power and technological innovations.

Economic	LNG is proving an increasingly competitive alternative fuel. Blockchain software is being brought into the industry to facilitate automation of sourcing, procurement and delivery of bunkers, in turn reducing operating costs and increasing port capacity.
Social	The creation of a LNG marine fuel industry has served to improve regional energy security and public health, as demonstrated by "The Blue Zone" in Western Australia.
Environmental	Compared to its more polluting counterparts, LNG allows for up to 20% less CO2 (greenhouse gas), 99% reduction in Sox (respiratory/health), 80% reduction in NOx (ozone depletion) and 100% reduction in particulates (carcinogen). No doubt LNG development will play a significant role in achieving IMO's goals.
What does it mean for the World Ocean Council?	It is only when stakeholders put their heads together can LNG development be made a reality and taken to the next level for global impact. WOC will continue to facilitate multi-stakeholder dialogue through its networks, the Sustainable Ocean Summit and other projects and platforms to advance development of LNG as a marine fuel.



## DAY 3

#### 16 NOVEMBER 2018

## **3.1** The Digital Ocean, Big Ocean Data and the Ocean Cloud: Data Driven Sustainable Development of the Seas

PLENARY SESSION 08:30-10:00 Grand Ballroom

- What are the status, trends and forecasts for the development of the Digital Ocean, Big Ocean Data, the Internet of Things (IoT) and the use of Cloud Computing and satellites for ocean sustainable development, especially in Asia?
- What are the benefits (economic, sustainability, operational oceanography, 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 better industry leadership and collaboration in advancing the Digital Ocean, Big Ocean Data and Cloud Computing for the Blue Economy, especially in Asia?

#### **Chair/Moderator**

• Bill Staby, CEO, Resolute Marine Energy

#### **Speakers/Panel**

- Elizabeth Tørstad, CEO, Digital Solutions, DNV GL
  - The Digital Ocean Unlocking the Value of Data and Connecting Industry
- Pierre Bahurel, CEO, Mercator Ocean International
  - Copernicus Marine Services: Digital Ocean, an Innovative EU Driver for the Global Maritime Business
- John Breslin, General Manager, SmartBay Ireland
  - SmartBay A Test Bed for Proving New Technologies and Innovations for Digital Ocean and Marine and Renewable Energy Applications to Support the Sustainable Development of Ireland's Blue Economy
- Tina Liu, Vice President, Elane
  - Data and Technology Driven Decision Making

#### Discussions

**Bill Staby,** CEO of Resolute Marine Energy, remarked that the Digital Ocean represents a huge opportunity for ocean sustainable development. While a lot of data, and applications to use these data, have been made available in recent years, the next step is for stakeholders to capitalize on this availability and drive policy and business behavior in the right direction for a sustainable future.

**Elizabeth Tørstad**, CEO of Digital Solutions, DNV GL, laid emphasis on the immense benefits of unlocking the value of ocean data, for industrial development as well as a sustainable ocean future. Digital technologies and the increasing availability of data are opening up new opportunities in ocean space – in energy, transportation, food, minerals and leisure – through reducing costs (e.g. for computing and storage) and increasing capacity and connectivity via sensors and data analytics. DNV GL is currently developing a platform by the name of Veracity, which aims to use data to transform information into insight in the industrial ocean space. The platform acts as a marketplace – data owners can store and share static and streaming data for users, such as scientists and programmers, to access, purchase and turn into value-added applications. The platform currently comprises seven ocean dataset categories: assets (ships, wind farms),



met-ocean (meteorology, oceanography), facilities (ports), maps (coastal, bathmetry), governance (ocean regulations), biodiversity (coastal and deep sea ecosystems) and human impact (ocean acidification, spills). Today, data is typically used by just one system or company, which leads to assumptions related to governance and competition, and limits the opportunity for data sharing in pursuit of dataset enrichment. Elizabeth drew on a number of platforms for illustration: AISyRisk (automated calculation of risk relating to ship traffic in Norwegian waters), Arctic Risk Map (a tool to facilitate transparent decision making in the Arctic based on data sources relating to meteorology, wildlife, oil and gas/shipping activity, search and rescue, geography), datasets to support offshore wind investment decisions, Alternative Fuels Insight Portal (using infrastructure and fuel uptake data to help the maritime industry prepare for incoming emissions regulations). Without doubt, data has become an asset in itself – the new raw material for businesses.

Pierre Bahurel, CEO of Mercator Ocean International, illustrated his organization's work with the equation: "A Digital Ocean + Service Capacity + EU Leverage = Our Value for Sustainable Ocean". Beginning with "A Digital Ocean + Service Capacity", Pierre introduced the forms of data (past, present and future blue ocean, white ocean and green ocean data) that Mercator collects and processes to generate 3D and 4D models of the global ocean. Datasets are updated every ten minutes, with 300 million gridpoints used to provide realtime forecasts. The addition of "EU Leverage" to the equation is signified by the Copernicus Marine Service, a €700 million/year European Union program which Mercator has been entrusted to implement. Copernicus' value chain is characterized by three stages: 1) Upstream (space infrastructure); 2) Midstream (data sales comprising data acquisition, processing, archiving and delivery, which Mercator implements); and 3) Downstream (value-adding services comprising adaptation and integration with data from other sources). The program is notably the largest space data provider in the world with over 12 Tbytes a day, and offers a range of free ocean data on Mercator's web portal including currents, temperature, salinity, sea surface elevation, plankon, oxygen, sea ice etc. There are currently 15,000 subscribed users and 100,000 nonsubscribed users, made up of researchers, government services, general public and businesses. The result of the equation - "Our Value for the Sustainable Ocean" - represents value for policy makers (through synthetic trends and indicators for evidence-based policies), industries such as ports, shipping, fisheries, submarine cable and renewable energy (operational and timely data for decision-making) and society. Ultimately the aim is to harness data not only for blue growth but also for ocean health.

John Breslin, General Manager of SmartBay Ireland, offered a different perspective by introducing Ireland's test facilities for new technologies being developed for the Digital Ocean and renewable energy applications. In essence, SmartBay Ireland provides a testbed for generating data to support the development, validation (performance, survivability, reliability, operability) and brokering of innovative products and services for the maritime sector. Ireland presents an ideal location for test sites by reason of its geography (climate and ocean currents), as illustrated by the locale of the Galway Bay Marine and Renewable Energy Test Site. Instrumentation used to collect data are various, and include cable installation vessels, hydrophones, fluorometers, fish tracking receivers, acoustic Doppler current profilers and others. Some lessons learnt from past testing (which have involved 12 maritime industries thus far) include the need for a multidiscipline team and community consent, as well as public funding for early stage demonstration projects. Concerning WOC's SMART Ocean – SMART Industries Program, John believed that a number of technology enablers will be of relevance, including the MariaBox (an autonomous marine pollution-monitoring device suitable for free floating devices, buoys, platforms and ships) and WAVY drifters (situ ocean observation at water surfaces). It is crucial that industry's capacities and potential are engaged in improving ocean, weather and climate knowledge in support of sustainable development and disaster reduction.

**Tina Liu,** Vice President of Elane, drew on her experience in shipping supply chain finances to derive the three data wants of her clients: cargo flow, information flow and cash flow. One source of data that holds potential to meet these requirements and be commercialized is AIS data, for which "near totality" has been made possible by IMO requirements. In addition to catering to shippers who require vessel positioning data to understand the industry and their competition, Elane has been providing cargo tracking data to traders



and hedge funds, who require transparency on the seaborne movement of specific commodities in order to be able to position themselves in stock markets, recognize trends and amplify right investments. This has been achievable because these commodities require specialized berths and vessels to be transported, including iron ore, crude oil, LNG and LPG. Macro applications (trends) aside, AIS data has also been able to provide micro applications such as traffic control and risk management at ports, as well as post-collision review for insurance companies. In terms of the wider industry's use of shipping data, Tina noted that costs have been considerably reduced and made affordable. Owing to the fact that currently 40% of AIS data is corrupted and not readily usable, efforts have thus far been focused on handling and cleaning up data. Once "data handling" has been completed, "data interpretation" will be necessitated, hopefully contributing to further transparency of the industry. Tina remarked that in recent years, economies of scale have led to individual shippers building larger vessels, resulting in the current over-supply of container ships. It is only when industry players take other factors into consideration (such as at cross-sectoral conferences) can they move into economies of scope; the availability of data will serve to facilitate this process and the eventual movement into economies of distribution. Tina concluded by proposing the possibility that the world has limitless resources. When resources are limitless, people would not have to fight over resources as they are doing right now. And data is one of the few areas that we can experiment with this.

Economic	Data has become an asset in itself – the new raw material for businesses, providing macro as well as micro applications to facilitate transparency and investments. The increasing availability of data is opening up new opportunities in ocean space through reducing costs and increasing capacity and connectivity. Data is one of the few areas that we can experiment with the notion of limitless resources.
Social	The development of new technologies for the Digital Ocean has at times necessitated a need for community consent. That said, data applications by ocean industries hold much promise for raising awareness of conservancy and engaging the younger generation.
Environmental	While a lot of marine environment data, and applications to use these data, have been made available, the next step is for stakeholders to capitalize on this availability and drive policy and business decisions in the right direction for a sustainable future.
What does it mean for the World Ocean Council?	WOC has been working to engage industry leadership in its SMART Ocean – SMART Industries program, with the aim to establish a systematic and integrated collection and reporting of standardized ocean and atmospheric data for input to operational and scientific programs in support of sustainable development.



### 3.2 Ocean Investment Platform: Financing and Innovation for Ocean Sustainable Development

PLENARY SESSION 10:30-12:30 Grand Ballroom

#### Part 1: Innovation and Ocean Sustainable Development

- How have the dynamics of innovation evolved, how does this relate to the urgent, complex, global challenges of ocean sustainable development, and are there lessons from other realms, e.g. CleanTech?
- What is the role of the innovation "ecosystem", i.e. accelerators, challenge competitions, incubators, venture capital, etc., and how can the collective role of these actors be optimized to address ocean challenges?
- How have corporate leaders in other sectors responded as a benchmark for maritime/marine, with consideration of corporate venture capital and the entrance of impact investors (e.g. family offices, foundations)?

#### **Speaker**

• Mark Huang, Co-Founder, SeaAhead

#### Part 2: Financing Ocean Sustainable Development

- How can investors better collaborate with companies from the ocean business community to identify sustainable development investment opportunities and priorities, with a focus on the maritime/shipping sector?
- What is needed to improve and increase the pipeline of viable ocean sustainable development investment opportunities, especially in Asia?
- What can be done to achieve synergies and scale up investment in ocean sustainable development, and how can investors lead the way, especially in Asia, and in relation to the maritime/shipping sector?

#### Moderator

• Jacques Demers, Chairman and Managing Partner, AGAWA Partners

#### **Speakers/Panel**

- Benjamin Wong, Head, Transport and Industrial Sectors, Invest Hong Kong
- Sabita Prakash, Managing Director and Chair of Investment Committee, ADM Capital
- Ben Ridley, Director; Deputy Global Head Sustainable Affairs, Credit Suisse AG HK
- Nicolas Parrot, Managing Director, Head Transportation Sector, Investment Banking Asia Pacific, BNP Paribas Singapore

Part 3: The Intersection of Ocean Business, Investors and Innovation: The Way Forward to Sustainable Development

- How can the ocean business community best engage with the innovation "ecosystem" to develop, deliver and implement solutions in support of "Corporate Ocean Responsibility"?
- How can business, investors and innovators best navigate the intersection of early stage bluetech venture investing and ocean sustainability?
- What keeps ocean business leaders up at night, and how can innovation and investment solve these challenges?

#### **Moderator**

• Mark Huang, Co-Founder, SeaAhead



#### Discussions

Mark Huang, Co-Founder of SeaAhead, explicated the urgent need for blue economy innovation: the combination of rapid growth in the ocean economy, global populations and standards of living is putting tremendous pressure on the world's oceans, necessitating a need and opportunity for scalable new technologies and ventures to improve ocean sustainability. Recent years have seen a rise in innovation districts in the U.S., with concentrated economic clusters, migrations into the urban core, increasing speed of technology change, competitors appearing in unexpected places, flatter innovation (less controlled top down), and increasing consumer demand for sustainable products and services. Traditional sectors such as food and utilities have responded by outsourcing innovation strategies through venture capital (internal and external), incubators and accelerators. To date, environmentally focused innovations have focused on "green" – land transportation, renewable energy, recycling, power, fresh water. Blue Tech, on the other hand, is emerging as a new framework for addressing environmental issues, and takes an ocean-centered focus that moves towards land, focusing on shipping and ports, offshore wind, fisheries, aquaculture, coastal resilience, wastewater etc. Recognizing the potential, SeaAhead has been working to support growth companies with technical solutions (hardware, software, systems approach) to ocean sustainability. Examples include cross-over technology applications e.g. blockchain for cargo management, AI predictive maintenance and drones for the offshore sector (AR/VR), marine pharmaceuticals, robotics for port security and wastewater, sensors for the defense sector, anti-fouling coatings and more. Boston, in particular, is emerging as a global hub for BlueTech innovation, with seed-stage hands-on venture strategy and advisory for equity, network connections, and media and programming expertise. The potential of ocean-centric innovation space to improve environmental outcomes is enormous, and will be achievable through collaboration with corporates, foundations, impact and sovereign funds.

According to Jacques Demers, Chairman and Managing Partner of AGAWA Partners, the act of investment requires information and research to be accompanied by a human element – trust and confidence in people, and the quality and accuracy of sayings. In its mission to originate sustainable investment opportunities, AGAWA will be launching a private finance program in 2019 to support agri-food and ocean investments, including technology and infrastructure development.

Benjamin Wong, Head of Transport and Industrial Sectors at Invest Hong Kong, provided perspective on the city's significance as an international maritime hub – in 2017 Hong Kong ranked 6th amongst the world's container ports in terms of throughput. Increased emissions from high shipping traffic have contributed to increased local awareness of a need for green initiatives to maintain the city's competitiveness. Such initiatives do not only apply to the shipping/ports sector, and in terms of the range of green and blue initiatives that Hong Kong wants to foster, its role as a testing ground for renminbi (RMB) trade has become especially important. Cognizant of its small geographical and population size, Hong Kong has been improving its service offerings by being part of China's upstart Bay Area with Shenzhen and Guangzhou (also amongst the world's ten busiest ports, and comprising China's top tech expertise). This is where Hong Kong differs from other maritime centers – the provision of a strong and big RMB pool. The government has plans to introduce a three-year pilot scheme for green bonds issuance in order to encourage investors to finance their green projects through the city's capital markets, with a borrowing ceiling of HK\$100 billion and other requirements to ensure the comprehensiveness and efficacy of service offerings. These range from clean energy sources e.g. low-sulphur fuel and LNG, to the technologies of treating by-products. As a government department, Invest Hong Kong aims to facilitate foreign investments in the city, supported by upcoming initiatives regarding talent admissions and tax deductions as well as infrastructural support and connections.

**Sabita Prakash,** Managing Director and Chair of Investment Committee at ADM Capital, emphasized the importance of taking the ESG parameters a step further by measuring "additionality" in terms of the SDGs when investing in sustainability projects. The Tropical Landscape Finance Facility in Indonesia was cited as an example. With an aim to provide long-term debt finance to companies that stimulate green growth, the TLFF



essentially consists of a lending facility co-managed with ADM Capital Foundation, with BNP Paribas as structuring adviser and arranger, as well as a grant fund managed by UNEP and ICRAF to provide technical assistance, pipeline development and evaluation support. Lessons from this program for blue finance are many, and include the need for participants with different skillsets to come together to manage complex, long-term and large-scale syndicated lending, as well as good interaction between public, private and the philanthropic sectors across geographies and ecosystems. To enable the long-term risks and returns of such projects, a range of developmental finance entities at every level (philanthropic agencies, insurance companies, guarantee facilities etc.) and simpler financial structures for various involvement (e.g. as cooperatives) are crucial. Innovation is likewise needed for the different roles that governments can play, such as securing long-term loan agreements and office subsidies, as exampled by the TLFF. Ultimately, private sector financing requires from complex green/blue projects an element of pipeline replicability and scalability – to the extent that they serve not just one but multiple returns in terms of sustainable outcomes.

**Ben Ridley**, Director and Deputy Global Head of Sustainable Affairs at Credit Suisse AG HK, remarked that the association between banking and innovation has not always been interpreted in a positive sense. As a result of past financial crises, banks have been working to reduce risks, thereby impacting investments in innovation. At Credit Suisse, the Sustainability Affairs team is responsible for strategic and project-specific assessment of environmental and social matters in the marketplace and internal supply chain, as well as developing innovations and managing relationships with key stakeholders groups such as private equities, wealth managers and NGOs. Regarding blue economy innovation, the challenge concerns "where to start". Touchpoints between the banking sector and ocean industries are various. In shipping, emissions, ballast water management and plastics have emerged as potential areas for innovation, although there are risk implications for banks. And while ship finance has continued "business as usual", banks are beginning to recognize issues and are interested in facilitating solutions. Environmental impact has become a risk in financiers' lens of "risk and return". While the interest from the banking sector is existent, particularly in a facilitator role, innovation investment will require further capacity building, endorsement and transparency of corporate green bonds and other structural components in order to move forward.

Nicolas Parrot, Managing Director and Head of Transportation Sector, Investment Banking Asia Pacific, BNP Paribas Singapore, noted that banks are not as well equipped to assess technological and environmental risks as opposed to market risks, resulting in investment decisions being based on client trust as well as their own evaluations. In this regard, BNP Paribas has been trying to "do less of the bad stuff and more of the good stuff" by ceasing to finance environmentally unsustainable industries, such as shale and oil sands, especially when alternatives are available. Today, investors of green bonds demand both project scalability and funding quality, and require proceeds to deliver clear positive impacts for the environment. Ship finance, which comprises a considerable proportion of the green bond market, is a particular case due to forthcoming emissions requirements. While a lot of shipping companies are ill-equipped to issue bonds due to their small size and lack of reporting structure for bond issuance purposes, banks are open to financing provided that shippers meet their (relatively low) limits on technology and demonstrate sustainability of their operations. In addition to green bonds and green loans, BNP Paribas is currently working to introduce "Positive Incentive Loans", which will require that the bank agrees with clients on KPIs it cares about, in particular their ESG policies, and requests that clients make progress on these KPIs, the success of which will result in rebates on their margins. The rationality is that if these companies care about their impact on the environment, they're more likely to repay their loans. As one of the world's largest banks, Nicolas is of the belief that BNP Paribas' innovations in green finance will put pressure on their peers to do more of the same. He foresees that the policy responsibilities that banks are currently tasked with (e.g. monitoring and reporting on tax evasion, money laundering, terrorism) could in the future be extended to the environment footprint of businesses. This is an area where banks will clearly have leverage and can play a role in.



Economic	The potential of ocean-centric innovation space to improve environmental outcomes is enormous, and will be achievable through collaboration with corporates, banks, foundations, impact and sovereign funds. Ultimately, private sector financing requires from complex blue projects an element of pipeline replicability and scalability – to the extent that they serve not just one but multiple returns in terms of sustainability.
Social	Rapid growth in global populations and standards of living is putting tremendous pressure on the world's oceans, necessitating a need and opportunity for scalable new technologies and ventures to improve ocean sustainability.
Environmental	Environmental impact has become a risk in financiers' lens of "risk and return". It is important that investors take the ESG parameters a step further by measuring "additionality" in terms of the SDGs when investing in sustainability projects.
What does it mean for the World Ocean Council?	The WOC "Ocean Investment Platform" under development will provide a global structure and process to bring together the investment community and ocean industries providing technological solutions for ocean sustainable development challenges.



#### THE CHALLENGE

The ocean is an inter-connected global ecosystem supporting a wide range of uses. Maintaining a healthy ocean requires responsible stewardship by all users.

Concerns about the impacts of economic activity on ocean health from a growing range and level of commercial uses are on the rise. These concerns may limit industry access to marine areas and resources. Ocean users are increasingly being held accountable by governments and NGOs for the state of the ocean. Continued ocean access and use will increasingly require the social licence to operate – above and beyond simple regulatory compliance – and participation in the Sustainable Development Goals.

The best efforts by a single company or an entire sector will not be enough to address the cumulative impacts on the inter-connected marine ecosystem from growing use across the sectors. Companies dependent on the ocean can achieve business value from working with others to address shared challenges regarding sustainable development, science and stewardship.

#### WOC – OCEAN BUSINESS ALLIANCE FOR SUSTAINABILITY

## The World Ocean Council is the international, cross-sectoral industry leadership alliance on "Corporate Ocean Responsibility".

The WOC brings together leadership companies from the diverse Ocean Business Community to achieve the business benefits of cross-sectoral leadership and collaboration on sustainability.

The WOC develops global "platforms" to address cross-cutting ocean business and sustainability challenges, e.g. ocean policy and governance, marine planning, marine debris, marine sound, marine mammal impacts, water pollution, data collection by industry vessels and platforms, sea level rise and extreme event impacts, priority regions (e.g. Arctic, Indian Ocean), and investment for ocean sustainable development.

#### THE INVITATION TO RESPONSIBLE OCEAN COMPANIES

## Responsible ocean companies are invited to join the growing number of organizations distinguishing themselves as leaders in "Corporate Ocean Responsibility" through the WOC.

In addition to the 75+ WOC Members from the diverse Ocean Business Community, the WOC Network includes 35,000+ ocean industry stakeholders around the world. The WOC is recognized or accredited by numerous U.N. agencies and other international organizations as *the* credible, global leadership body on ocean business and sustainability.

The WOC Sustainable Ocean Summit (SOS) – 2010 Belfast; 2013 Washington DC; 2015 Singapore; 2016 Rotterdam; 2017 Halifax; 2018 Hong Kong; 2019 Paris – is acknowledged as *the* international business conference on ocean sustainable development, science and stewardship.





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