The Shenzhen Global Marine Economy Forum 2022

"Leadership for the Sustainable Expansion of the Marine Economy"

Hosted by:

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Executive Summary

Introduction: Some Key Outcomes

The Shenzhen Global Marine Economy Forum 2022 brought together more than 60 speakers – business leaders from Chinese and foreign companies, government officials, public personalities, top academics and thought leaders – to discuss the sustainable expansion of the global marine economy.

The two-day annual event, held this year in a hybrid format with on-site and online participants, produced intensive exchanges of insight and expertise sharing that will contribute to shape a wide range of action points and strategies and to launch new initiatives.

One focus of the forum was on the booming ocean economy of its host city: Shenzhen. Experts noted that Shenzhen has all the assets to become a global hub for the marine economy but that some challenges remain before it takes its place next to major marine cities such as Singapore, Tokyo and San Francisco.

Some of the points that must happen to make Shenzhen a global marine city include:

- Financial mechanisms and arbitration for marine issues
- Develop academic institutions
- Expand the potential of the Greater Bay Area
- Develop and consolidate resources, including talent
- Establish a financial center
- Improve research and development capabilities

Three major, intertwined, concepts emerged forcefully from the sessions, providing guidance for what needs to be done in the future:

- **It is now a priority to develop and expand Global Ocean Governance:** Globally accepted laws and mechanisms are crucially needed to manage the exploration of resources, the sustainable development and protection of biodiversity – especially in the areas beyond national jurisdiction which represent 80% of the oceans' surface. This priority is of greatest urgency for example regarding the issue of overfishing or plastic pollution. Without a more efficient global ocean governance it will be impossible to deal successfully with the climate change challenge. And the depletion and deterioration of

oceans' resources will dangerously accelerate at a moment when – more than ever before – mankind needs to use these resources in a sustainable way. As a major marine economy player China needs to take a more active role in the governance architecture and could play a leading role in launching some initiatives to strengthen and expand global ocean governance with increased participation in conferences and events throughout the world, which contribute to shaping the thinking and the agenda on issues of ocean governance.

- **Decarbonization and sustainability:** This was a thread line across all the conversations over the two days Forum, and is clearly an urgent need across the entire ocean economy, especially with respect to the shipping sector. The technologies to move towards a carbon neutral shipping industry exist. The challenge is now to create incentives for shipowners and shipping companies to use the most efficient of these technologies – which are not the cheapest – to reach carbon neutrality by 2050. With respect to sustainability, it is worth noting that the 14th Five Year Plan has introduced, for the first time, the notion of sustainability regarding the marine economy. The sustainability imperative is becoming even more pressing for marine economy corporations as China has introduced its first ESG standards and environmental factors are becoming as important as corporate governance ones.

- **Technology:** The forum was fortunate to hear from entrepreneurs who are leveraging disruptive technologies to promote sustainable economic activities across the whole range of marine economy sectors. The technologies for harvesting the resources of the oceans in a sustainable, environment-.friendly way, also exist and continue to be developed at a faster speed than many people realize – and many examples of that figure in the following pages reflecting the Forum's discussions. The challenge resides in the will to bear the cost for that and in the ability for steady, efficient, execution. A positive development highlighted by some speakers was the fact that new financial mechanisms now exist that will allow to mobilize the necessary resources to create sustainable aquaculture and fisheries and expand carbon capture potentialities such as algae-based carbon sequestration.

Another important takeaway from this year's forum was the crucial importance of improving the relationship between people and the ocean. Discussions at the Forum highlighted how much a healthy ocean system depends on creating a global ocean culture, creating an ocean literacy – the crucial linkage between a healthy marine ecosystem and a prosperous world economy.

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01. Increasing the Role of China's Marine Economy

China's marine economy has been skyrocketing in recent years, reaching 9 trillion yuan (USD $1.4 trillion) in 2021 – a figure that is expected to more than double by 2030. Yet this substantial growth in ocean revenue is still only 8 to 9% of China's GDP, a share expected to increase to 15% or more by 2030.

However, this relatively small percentage of China's GDP does not accurately reflect the crucial role that marine industries – including shipping, fishing, offshore energy, coastal tourism, and biotech – play in the overall economy.

The session speakers outlined the factors that will drive China's marine economy in the coming years, how to mobilize the necessary financial support, and how to ensure that the policies needed to boost marine development do not harm the ocean environment.

Pan Xinchun, secretary-general of the China Oceanic Development Foundation, confirmed that China is firmly committed to becoming a "powerful ocean nation" and this goal has been declared in official policies released at the past three sessions of the National Congress of the Communist Party of China.

SPEAKERS

Pan Xinchun, Secretary-General of China Oceanic Development Foundation, People's Republic of China
Lin Jian, Internationally Renowned Marine Geophysicist, Member of Academia Europaea, Chair Professor of Southern University of Science and Technology, People's Republic of China
Denis Depoux, Global Managing Director, Roland Berger (Headquarter: Germany), People's Republic of China
Chen Weijie, Expert of Consulting Center of China National Offshore Oil Corporation, Honorary President of Shenzhen Offshore Oil Service Enterprise Association, People's Republic of China
Ted Janulis, Founder and Principal, Investable Oceans, United States of America

MODERATOR

Wu Chen, Chief Editor of The Economist Global Business Review, People's Republic of China

"China has achieved tangible results in becoming a maritime power and we have advanced steadily in terms of comprehensive growth," Pan said. "After more than 10 years, we have built up 12 major marine industries, developed three major marine economic hubs in the north, east and south, and we have laid a good foundation for our deep-sea mining industry."

He added that China has developed several world-class port groups, describing the Guangzhou and Shenzhen, Shanghai, Ningbo-Zhoushan, and the Beijing-Tianjin-Hebei port groups as all “world-class.”

“In terms of strong marine industries, China has many *FIRSTs* in the world: The container traffic of Shanghai Port has ranked first in the world for 12 consecutive years, and the cargo ‘throughput’ of Ningbo Zhoushan Port has ranked first in the world for 13 consecutive years,” he said.

“The world is facing global warming, sea level rise is accelerating, non-renewable resources are decreasing, the ecological environment is deteriorating, and the pressure of global population growth is increasing.”

— Professor Pan Xinchun, China Oceanic Development Foundation

Pan added that China has become the world's largest producer of offshore engineering equipment, accounting for half of the world total. China’s offshore wind power has reached a grid-connected capacity of 16.9 million kilowatts, ranking first in the world, and China’s marine farming was also number one in the world.

There was also a stern warning for the future:

“The world is facing global warming, sea level rise is accelerating, non-renewable resources are decreasing, the ecological environment is deteriorating, and the pressure of global population growth is increasing,” Professor Pan said. “If we continue to use the previous ways of production and life, the Earth will not be able to carry it, and sustainable development will not be realized. Therefore, we must develop in a green, low-carbon, intelligent, and safe way.”

Lin Jian, a marine geophysicist and chair professor of Southern University of Science and Technology, spoke of the need for international cooperation on ocean resources, as well as the need for globally accepted laws and regulations. In terms of China’s rise as a marine economic power, he pointed to regional competitors.

“Singapore is one of the most important countries competing with us,” Lin said. “Its maritime affairs are particularly strong, but if we add Hong Kong and Shenzhen together, we can compete with Singapore. Shenzhen is determined. Shenzhen is a place to create miracles, and we will definitely enter the top 10 in the world before 2035.”

Lin pointed out that shipping accounts for 60% of Shenzhen’s marine GDP, but added that the transition to green shipping was a major challenge. By 2028, he said, roughly 80% of Shenzhen’s shipping fleet will be unusable under global environmental challenges.

Denis Depoux, the global managing director of Roland Berger, an international management consultancy headquartered in Germany, pointed out that industrial modernization, regional integration and decarbonization were the new engines of China's marine economy.

“If we look at the shipping industry as a whole, if shipping were ranked as country it would be sixth-largest in the world in terms of co2 emissions — and 45% of the global shipping fleet is built in China so decarbonizing port ships and shipping is a critical objective for the sustainability of the current supply chain,” he said.

“We must further intensify the exploration and development of oil and gas resources and, in the past few years, most of the increase in my country's oil and gas production has come from the ocean. The increase in offshore oil accounts for nearly 80% of the increase in crude oil in China.”

— Chen Weijie, Shenzhen Offshore Oil Service Enterprise Association

Depoux added that China’s trade with ASEAN countries is now at the same level or even higher than the equivalent U.S. trade with the European Union. He said this is driving Chinese companies and Asian manufacturing companies to search for competitive advantage across the region.

“When we look at the growth rate of Chinese investments across Asia and the dominance of manufacturing, people might see decoupling, but this is also driven by market fundamentals, supply side competitiveness, and fluid logistics,” he said.

“One final aspect of this transformation, also very relevant to the role of China and global supply chain, is China's commitment to peak and neutralize its co2 emissions. It's highly critical on the supply side because the U.S., Europe and other countries will tax incoming goods that would be high in carbon content and that would not have been paid otherwise.”

Depoux said China's rising per capita GDP and the surge in exports in the last few years had helped achieve two goals: financing and the modernization of the production system. In 2021, he said, manufacturing represented one-third of China's fixed assets investment, while advanced manufacturing had been growing by more than 20%.

“So China's production system is not only about capacity, and availability, it's also about automation, robotization, digitization and ultimately more flexibility to cope with quick demand variations,” Depoux said, “and a very relevant aspect of this major transformation is the regionalization of trade.”

Chen Weijie, an expert for the Consulting Center of China National Offshore Oil Corporation, and honorary president of the Shenzhen Offshore Oil Service Enterprise Association, discussed

the important role that the offshore oil and gas industry should play in the future of China's marine industry from the perspective of exploration and development.

“Energy security and food security are the top priorities for China's social stability, long-term national peace and stability, and sustainable development,” Chen said.

“Thanks to the favorable agricultural policies and scientific and technological progress, we have guaranteed the country's food security to a great extent. Compared with food security, our country's energy security is not so optimistic.”

According to Chen, China's dependence on foreign oil has exceeded 50% since 2009. “If a country's dependence on foreign oil exceeds the warning line of 50%, it will seriously threaten the country's energy security,” he said. “The dependence on foreign oil exceeds 70%. Solving the energy security problem facing our country is not just a “wolf coming” problem, but a real urgent matter that is right in front of us.”

Chen’s answer for the problem was direct: “We must further intensify the exploration and development of oil and gas resources and, in the past few years, most of the increase in my country's oil and gas production has come from the ocean. The increase in offshore oil accounts for nearly 80% of the increase in crude oil in China.”

Chen added that across the world, marine oil and gas activities have moved from shallow water areas to deep water and ultra-deep-water areas. “In the South China Sea, where oil and gas resources are the most abundant, most of these resources are still hidden in deep water areas,” he said, noting that “the degree of oil and gas exploration in China’s deep-water areas is still very limited, but with the advances in science and technology and equipment capabilities, China’s exploration and development activities now have great prospects.”

Ted Janulis, the founder and principal of Investable Oceans, a blue economy investment platform based in New York, discussed the different kinds of investments being made into the development of marine economy activities and protection of the oceans.

Referring to a recent research report on Goal 14 of the U.N. Sustainable Development Goals, on “Conserve and Sustainably Use Oceans, Seas and Marine Resources,” he pointed out that the financing needed to accomplish that goal was about USD $175 billion per year through 2030, of which only $25 billion was in place.

So Janulis is looking at how capital goes into the oceans, breaking it down into three buckets: “On one extreme, you have investments that don't require financial return. That could be philanthropy, governments, or grants. These investors expect good stewardship and results, but don't expect a monetary return. On the other extreme is market-based investing, in which an investor going into an ocean investment would expect a comparable return to an investment in some other kind of private equity or bond or stock.”

For Janulis “there is a huge space in the middle which blends together market-based investments and those various forms of grants and contributions. That's why it's called blended

capital, and a lot of the big issues of the ocean live in that middle space, and they need the cooperation of those different kinds of capital."

02. Developing Shenzhen as Global Marine Economy Hub

Shenzhen, a flagship megacity of the Greater Bay Area, is slated to become a major national and global hub for marine economy activities, highlighting and symbolizing China's objective to join the top league of ocean nations over the next decade or so.

SPEAKERS

Li Quanhai, Chairman of World Sailing
James Chang, PwC China Regional Economic Clusters & South Markets Managing Partner
An Xin, Vice President of Shenzhen Court of International Arbitration
Zhang Chunyu, Researcher of the Chinese Academy of Social Sciences, member of the Expert Advisory Committee of Shenzhen City Master Plan (2016-2035)
Zhou Pengyuan, Partner, Kearney Greater China
Paul Holthus, Founding President & Chief Executive Officer, World Ocean Council

MODERATOR

Qiu Bohua, Chairman and General Manager of Zhendui Industrial Intelligent Technology Co., Ltd.

Shenzhen has the potential assets and attributes of a world-class global marine hub: its geographical location, long coastline, strong technology innovation capabilities, academic resources, and its close integration in the global economy.

Even so, there was a consensus among the speakers of the session that Shenzhen would need to actively leverage all these assets and more if it wants to reach its goal of becoming a global maritime city by 2035.

To achieve that goal the city must accelerate the development of native marine industries, embrace a surge in emerging green technologies, and build a world-class metropolis that entices the world's leading companies and talent to come.

Shenzhen has been dubbed China's Silicon Valley. The city's entrepreneurial, innovative, and competitive-based culture has attracted numerous manufacturing and software companies. Shenzhen's nominal GDP has surpassed that of Guangzhou and Hong Kong, now ranking it among the top 10 largest city economies in the world.

It is the eighth-most competitive financial center in the world, ranks eighth as host of Fortune Global 500 companies, fifth-highest number of billionaires, second-largest number of skyscrapers, and the 28th-largest scientific research output of any city in the world. Notable

educational institutions include Shenzhen University, Southern University of Science and Technology, and Shenzhen Technology University.

The goal is to capitalize on these advantages over the next decade, and further unlock the potential of the city's ocean economy, developing areas such as deep seabed resources, offshore renewable energy and ocean-based biotechnology, as well as continuing to improve its aquaculture and sustainable fishing industries.

"It's not only the very important shipping and ports and related components, but more broadly, the ocean economy should be considered to include offshore energy, both the non-renewable and renewable energy, seafood, fisheries, and aquaculture and seafood processing."

— Paul Holthus, World Ocean Council

"It's important to consider the overall scope of the ocean economy," noted Paul Holthus, founding president and CEO of the World Ocean Council. "It's not only the very important shipping and ports and related components, but more broadly, the ocean economy should be considered to include offshore energy, both the non-renewable and renewable energy, seafood, fisheries, and aquaculture and seafood processing."

"There's also tourism and recreation, such as sailing, and many other forms of marine recreation. There's coastal development, construction, infrastructure, dredging, submarine cables, the mining industry and many more — all of these sectors make up the overall ocean economy, or blue economy."

James Chang, a specialist and partner with PricewaterhouseCoopers in Shenzhen, has studied leading port cities of the world, including Singapore, Hong Kong, Rotterdam, and New York. For him, the city will need to move fast and act smart to hit its 2035 target.

"Shenzhen is still not part of the top dozens of marine cities in the world," he said. "Although we already rank fourth in the container industry, we still have several disadvantages in other aspects."

The most immediate challenge is upscaling the city's infrastructure. The number of trucks and shipping containers passing through Shenzhen already stretches the city's capacity. Guangdong Province has also recorded a significant decline in offshore marine-fishery resources in recent years, as well as general environmental and ecological degradation.

For James Chang, other challenges include retooling Shenzhen's tech sector — which has yet to fully get on board with the blue economy — and addressing a notable lack of industry

support services. “There is still a clear gap between Shenzhen and world-class marine cities in the areas of maritime technology, maritime finance, and legal services,” Chang said.

“Additionally, Shenzhen hasn't incubated marine brands that project global influence, and it lacks prestigious marine organizations and research institutes. Organizations and institutions in Shenzhen have a very low exposure rate in the rankings in the international marine field.”

“[Shenzhen] needs to project its aviation trade competitiveness in these advantageous areas and increase market share. It also needs to develop professional fields, such as maritime consulting.”

— Zhou Pengyuan, Kearney Greater China

In a bid to boost confidence in the sector, the Chinese government last year established the Maritime Logistics Arbitration Center (MLAC) under the Shenzhen Court of International Arbitration (SCIA). The MLAC employs more than 1,500 arbitrators from over 100 countries.

“Maritime arbitration is actually hard currency for dispute resolution in the international shipping industry,” said An Xin, vice president of SCIA. “Awards made by arbitration can be enforced in 170 member states in accordance with the United Nations Convention on the Recognition and Enforcement of Arbitral Awards.”

The MLAC this year launched a maritime law course in conjunction with the University of the Chinese Academy of Social Sciences. The aim is to grow a robust maritime legal community, and position the court and council as Asia’s de facto arbitrators for maritime litigation — and shift the industry’s legal foundations away from its traditional center.

“The London Maritime Arbitration Center accounts for more than half of global maritime arbitration,” An said. “However, for companies in the Asia-Pacific region, it does not only increase business costs if we travel across the sea to resolve disputes, but also increase the risk of losing the lawsuit due to unfamiliarity with the rules and systems.”

Kearney, the global management consulting firm, has undertaken a number of comparative studies of inland and coastal cities. Urban centers near the ocean tend to score far better, typically by offering improved access to trade, and all the benefits that derive from robust commercial activity. Yet many other factors are required to ensure success, and even more to claim a coveted title of global leader. They include a city’s livability, its ability to attract talent, a transparent and efficient business environment, and opportunities for entrepreneurship and business innovation.

Shenzhen fares well in many aspects, said Zhou Pengyuan, a partner at Kearney Greater China. “The city stands among global leaders in areas like aviation and trade, and it has built the world’s fourth-largest port in terms of throughput, but to attain the status of global leader, it must focus on several key areas such as building regional import and export trade portals,

especially in Maritime Silk Road and RCEP [Regional Comprehensive Economic Partnership] agreement areas," he recommended. "[Shenzhen] needs to project its aviation trade competitiveness in these advantageous areas and increase market share. It also needs to develop professional fields, such as maritime consulting."

Zhou noted that Shenzhen should do much more to foster innovation and entrepreneurship, emphasizing the development of maritime technology and marine technology innovation, including the application of technologies such as 5G, big data, and the Internet-of-Things in shipping.

"Shenzhen's development goal must be to become a regional marine financial center. It needs to be guided by policy-based finance and based on market-oriented operations. It must have large-scale financial institutions."

— **Zhang Chunyu**, Chinese Academy of Social Sciences

Lin Jian, a marine geophysicist and chair professor of Southern University of Science and Technology, had noted in a previous session that "If Shenzhen wants to become a global ocean center city, it must use its own innovative power, and it must have original scientific ideas and theories," Technology must become a strategic driver for Shenzhen to have a greater role as a global marine city."

Lin expressed his enthusiasm for the recent approval of Shenzhen Ocean University, which will be operated by the Southern University of Science and Technology. The 65-hectare university has already received funding and investment reaching 4.8 billion yuan (USD $748 million).

This ocean university is connected with the deep-sea scientific research center, so Shenzhen is doing a great thing. We must catch up in these areas," he said. "This Ocean University is a strategic priority and aims to be among the top three in the world. It will focus on marine engineering technology. In the future, 60% of Ocean University will be engineering technology."

Another way to build Shenzhen's reputation as a global marine powerhouse is to bring world-class sailing to the city, said Li Quanhai, Chairman of World Sailing. Over the past 20 years, the sport has evolved into becoming an object of civic pride, and the China Cup attracts teams from five continents. "If Shenzhen wants to position itself as a global ocean city, I think sailing must have a platform and a space," Li said. In the medium and long-term, Shenzhen plans to add more than 7,000 berths for leisure boats. Construction, ownership, employment, and service of these boats are a big boon to the economy."

Zhang Chunyu, a researcher at the Chinese Academy of Social Sciences and a member of the Expert Advisory Committee of Shenzhen City Master Plan (2016-2035), looks to Hong Kong and

Singapore for blueprints on creating world-leading maritime hubs. For him, what Shenzhen lacks is the supporting maritime service industry, and aspects of urban vitality that attract international talent.

Like others, Zhang believes legal and financial services are absolute requirements for building Shenzhen into a global marine hub. “Shenzhen's development goal must be to become a regional marine financial center,” he said. “It needs to be guided by policy-based finance and based on market-oriented operations. It must have large-scale financial institutions. In addition, it is also necessary to explore the innovation of various small and medium-sized financial institutions.” Zhang noted that Shenzhen had recently established the Shenzhen Shipping Fund to carry out shipping leasing. but this very helpful initiative needs to be further improved.”

On top of all these factors specific to Shenzhen’s maritime industry, three unfolding world-wide macro-trends will have enormous impact on the future of global business.

The first regards supply-chain safety and the division of labor. The second is the fast-changing knowledge and digital economy, which touches every aspect of the industry, from shipping to services to tertiary aspects like recreation and leisure.

The last, and perhaps biggest factor, is innovation driven by environmental concerns, such as green energy and low-carbon production methods.

According to Zhang these three trends will generate many new demands on the service industry, especially the intellectualization and greening of the industrial chain. The ones who satisfy these demands will be the new kings of our international marine service industry.”

03. What Policies and Corporate Initiatives for a Carbon-Neutral Ocean Economy?

The globally acknowledged concept of a sustainable marine economy was introduced as national policy for the first time in China with the 14th Five-Year Plan for 2021 to 2025. The fast-expanding ocean economy means intense pressure on marine ecosystems already seriously deteriorated.

Plastic pollution and overfishing are among the many dramatic threats to the oceans that make it imperative for all stakeholders to strive for a zero-carbon footprint and adhere to responsible environmental and governance policies.

The Shenzhen Global Marine Economy Forum 2022 hosted a six-member panel of experts to discuss actions that blue-economy companies must take to transform their value chains, move towards a circular economy, and enhance their business models to help achieve long-term sustainability of the seas.

SPEAKERS

Shen Tao, Head of Global Sustainability Center Shanghai, American Bureau of Shipping
Daniel Song, Head of Expertise Center, Innovation & Technology Development, Bureau Veritas Marine & Offshore
Yu Lu, Vice President/Ecological Director, Urban Planning & Design Institute of Shenzhen
Isabella Lövin, Chair of Stockholm Environment Institute(SEI), Former Deputy Prime Minister of Sweden
An Yan, China Country Director of Marine Stewardship Council (MSC)
Martin Crawford-Brunt, Chief Executive Officer Lookout Maritime

MODERATOR

WU Chen, Chief Editor of The Economist Global Business Review

Shen Tao, the head of Global Sustainability Center Shanghai of the American Bureau of Shipping, spoke about the role of ocean-based renewable energy in the fight against global warming. “If we want to achieve net zero emissions by 2050, we must obtain a large amount of renewable energy through the ocean, meaning wind energy,” Shen said.

He observed that nine countries formed an offshore wind power alliance, considering that to achieve net-zero emissions in 2050, 2,000GW capacity needs to be deployed globally in the oceans. Today, the total capacity of marine wind turbines in the world is only 60GW, which means that in less than 30 years, the marine wind energy industry must achieve a 33-fold increase. Shen outlined the fact that “the core points to achieve net-zero emissions are sustainable energy, green energy, offshore hydrogen production based on wind power, and a green energy chain centered on hydrogen energy, including future green methanol and even green ammonia. The most important carrier here is hydrogen, and offshore wind power is the most important way to obtain hydrogen.”

In the past 10 years the cost of generating electricity from offshore wind power has been reduced by 60%, adding that as the demand for renewable energy grows, the market will definitely respond. The development of marine energy will make us turn from industrial civilization to ecological civilization.”

Daniel Song, the head of innovation and technology development at Bureau Veritas Marine & Offshore, a ship and offshore classification service, pointed out that about 11 billion tons of goods are transported by sea in the world, adding that 1 million people of different nationalities are directly employed in the shipping, global shipping contributes 3% to carbon dioxide emissions.

"Various countries, regions, and institutions are gradually implementing decarbonization strategies," Song said. "The International Maritime Organization (IMO) has begun to implement the strategy of reducing carbon intensity by 40% in 2030 and by 70% in 2050." He continued: "President Xi Jinping put forward the goal of reaching carbon peak in 2030 and carbon neutrality in 2060. In order to achieve this ambitious goal, the shipbuilding industry also has to bear certain responsibilities: The transformation and upgrading of ship energy are imminent."

"If we want to achieve net zero emissions by 2050, we must obtain a large amount of renewable energy through the ocean, meaning wind energy."

— Shen Tao, American Bureau of Shipping

Yu Lu, the vice president, and ecological director at the Urban Planning & Design Institute of Shenzhen, focused her remarks on marine ecological protection, pointing out that this involves a wide range of disciplines – not only renewable energy, and low-carbon, but also biology, hydrology and sediment dynamics.

She continued: "The protection and governance of our marine ecological environment must be integrated into our strategy to create in Shenzhen a demonstration area of global green marine civilization." Yu cited the San Francisco Bay Area and Tokyo Bay as coastal cities that use comprehensive management as a platform to achieve a balance between resource protection, development and utilization.

Shenzhen looks at these cities as models for co-governance and sharing mechanisms, according to Yu, to promote the restoration of natural areas damaged by the city's industry and construction -- as well as for opening seaside parks and restoring diverse ecosystems.

"We must coordinate and protect high-quality marine and wetland resources, such as coral reefs, mangroves, and algae," she said. "Construction, safety and protection of marine biological habitats must be coordinated and co-constructed at the level of river basins, regions and bay areas. We must create a world-class coastal vitality belt."

Isabella Lövin, the chair of Stockholm Environment Institute and a former Deputy Prime Minister of Sweden, said the post-pandemic context presents an opportunity to rethink how to best protect the global ocean environment. "We need to do things right from the beginning.

And the most important thing to do is to have sustainability at the core of everything that has been planned and not as an afterthought."

Lövin stressed that past mistakes resulted in two-thirds of the fish stock biomass being removed from the ocean by coastal exploitation and overfishing over the last 150 years, adding that "There are no real estimates yet on how much that has meant in terms of reducing the potential of the ocean as a carbon sink." So she stressed the need to put ecosystems at the heart of all policies and don't forget the importance of reinforcing resilient ecosystems, which are now very vulnerable to climate change, warming, acidification, de-oxygenation, and pollution.

"We must coordinate and protect high-quality marine and wetland resources, such as coral reefs, mangroves, and algae. Construction, safety and protection of marine biological habitats must be coordinated and co-constructed at the level of river basins, regions and bay areas. We must create a world-class coastal vitality belt."

— Yu Lu, Urban Planning & Design Institute of Shenzhen

Lövin also cited a study estimating that the carbon released from bottom trawling –from the carbon released from the sediments of the seafloor - was enormous as much as global aviation. "And, she added, if you read the study, you will find that China is actually one of the major contributors to co2 emissions through bottom trawling. So, now is a chance to change that"

An Yan, the China Country Director of the Marine Stewardship Council (MSC), mentioned that "the main vision and mission of the Marine Stewardship Council is to use the market to help promote sustainable development in the ocean. We have many sustainable principles, and some specific projects that can help us actively participate with the main players in the industry – from the fishery to the dining table."

She pointed out that over the years MSC has driven many companies to achieve sustainable development, such as Wal-Mart, McDonald's and JD.com, etc. Many companies have millions of consumers, so we can drive these companies to take the road of sustainable development, which allows us to reach more consumers, and at the same time, effectively reduce overfishing."

An pointed out that 19% of the global fish catch comes from companies approved by the MSC, with 628 fisheries participating in their sustainable fishery project. In the future, the MSC will promote sustainable practices in 62 countries, which could potentially affect about USD $12.2 billion in retail sales.

“Environmental protection cannot be achieved by individuals alone,” she said. “We need to design strategies from a high-level perspective, starting from the top, and considering the impact of the environment when planning economic activities.

“The MSC will also carry out further in-depth cooperation with Shenzhen to achieve the relevant emission reduction goals in 2030 and to promote more sustainable projects.”

“Shipping is very disjointed and different stakeholders have different interests, and some of them are conflicting. So, if we can align some of these incentives, we could do what is good for business, and also what is good for sustainability. That's the key message here.”

— Martin Crawford-Brunt, Lookout Maritime

Martin Crawford-Brunt, the CEO of Lookout Maritime, a sustainability and emissions reduction organization, said the path to sustainability in ocean economies is making responsible practices more efficient and cost effective.

“Shipping is very disjointed and different stakeholders have different interests, and some of them are conflicting. So, if we can align some of these incentives, we could do what is good for business, and also what is good for sustainability. That's the key message here.”

Crawford-Brunt said a key aspect in this campaign was to understand what “good” looks like. “I think we will see some more consumer pressure, which is good on shipping and supply chains, but it's also very good to see this coming on the industrial side. Because every nation, every country, every producer is beginning to understand that reducing emissions matters to their supply chain,” he said. “If you can reduce the scope of emissions in your supply chain, you can actually improve the efficiency for the way we do things globally. And there are opportunities to do things in a better way which aren't in conflict with business interests.”

For Crawford-Brunt the ways exist to improve how we use hydrocarbons while they are phased out and while we build and scale the alternative fuels needed for shipping. We are moving towards a multi-fuel future, not only hydrogen or methanol or others, but quite a range of fields being developed. And shipping will be competing with all other industries for those green fields.

04. Towards More Effective Global Ocean Governance

China's 14th Five-Year Plan for 2021 to 2025 has put increased emphasis on expanding China's role in global ocean governance. Along with the priority to increase its share of marine activities in the overall blue economy, China is now striving to be more a proactive contributor to global ocean governance.

The Shenzhen Global Marine Economy Forum 2022 brought together a five-member panel of ocean governance experts to discuss the ways in which key stakeholders and organizations can shape the global conversation around international maritime cooperation.

There was a consensus on the need for building trust and cooperation through dialogue at international conferences. These exchanges should lay out the key issues and plan for solutions for effective ocean governance, while also looking at the blue economy as a means of global economic recovery in the post-pandemic era.

SPEAKERS

Wu Shicun, Chairman of the Council of China-Southeast Asia Research Center on the South China Sea; Chairman, Huayang Research Center for Maritime Cooperation and Ocean Governance; Founding President of National Institute for South China Sea Studies

Zhang Zhiwei, Marine Spatial Planning Consultant of the United Nations Environment Programme (UNEP), Senior Engineer of the First Institute of Oceanography, Ministry of Natural Resources

Palitha Kohona, Ambassador of Sri Lanka to China

Julia Tang, Division Director for Marine Strategy, Department of Marine Strategy, Ministry of National Resources, People's Republic of China

Zhu Zhengguang, Ocean Policy Manager for WWF China

MODERATOR

Dahai Liu, Director of Coastal Zone Center, First Institute of Oceanography, Ministry of Natural Resources

"We need to understand that for global governance, we are at the junction of so many uncertainties," said Julia Tang, of the Department of Marine Strategy at China's Ministry of National Resources. "'Black swan' incidents are happening more often, and global economic measures and global communication are needed to build trust and cooperation between people."

While the challenges are complicated there are also opportunities. Julia Tang emphasized that China was willing to work with other countries to find solutions, and that the blue

economy could drive impetus for economic post-COVID recovery. “We need to develop equal partnerships and strategies for development. With global ocean governance, different countries have different demands but we should find more common ground between countries,” Tang said.

For Wu Shicun, chairman of the China-Southeast Asia Research Center for the South China Sea, and founding president of China South China Sea Research Institute, it is essential for the global community to build a platform for international cooperation and meetings to ensure a more effective global ocean governance. “The Marine Governance Conference [MGC] started in 2020 is a platform to discuss ocean governance, marine issues, and promote international cooperation,” Wu said. “The inspiration is to create partnerships and initiatives on regional maritime cooperation and to have influential international maritime organizations and agencies try to come up with some agreements for the guidance of governance in the future.”

“We need to understand that for global governance, we are at the junction of so many uncertainties. ‘Black swan’ incidents are happening more often, and global economic measures and global communication are needed to build trust and cooperation between people.”

— Julia Tang, Ministry of National Resources

“If we work together,” said Wu Shicun, “we can maybe build a global blue economy, a blue partnership.”

Dahai Liu, the discussion moderator and director of the Coastal Zone Center at the First Institute of Oceanography at the Ministry of Natural Resources, agreed there were “a lot of inspirational ideas based on consultation, and all countries need to understand each other.”

Tang said the conferences she had attended were useful for discussing different aspects of marine governance and technological developments that were going to contribute solutions to the global problems. For her, the key areas on global ocean governance are: research about international treaties, rules and regulations on the distribution of marine resources; ecological and biodiversity protection, the impact of climate change and new technologies to deal with pollution; and economic recovery and sustainable development.

As many countries are developing different rules and regulations for ocean governance, Big Data and new technology could help to harmonize these rules and China has also an important role to play here. Tang pointed out that “China has done deep research on ocean governance, blue partnerships and the blue economy, and we need to articulate the concepts and to

continue the engagement between China and the international community. China is also providing solutions and new ideas for ocean governance."

Ambassador Palitha Kohona, the envoy of the Democratic Socialist Republic of Sri Lanka to the People's Republic of China, issued the same stark warning about sustainability. "The world is nervously staring into the face of a major economic crisis," he said. "The economy's growth has slowed, unemployment is rising, supply chains have been disrupted, and the dreaded specter of inflation is looming. This crisis is threatening all of us."

Kohona admitted that the conservation and sustainable development of marine biodiversity were difficult and challenging because more than 3 billion people depend on the ocean. "There is more biological diversity in a bucket of sea water than in hectares and hectares of dry land," he said, adding that "the ocean continues to support life, providing protein for more than 50% of the world's population."

"There is more biological diversity in a bucket of sea water than in hectares and hectares of dry land. The ocean continues to support life, providing protein for more than 50% of the world's population."

— Ambassador Palitha Kohona, Sri Lanka

Kohona added, "We not only need to ensure that the ocean governance is adhered to, but we need to assign more areas to be protected in the ocean because the protected areas also constitute the spawning grounds for an endless variety of ocean species. These are the areas that rejuvenate the ocean and its biodiversity, which also provides raw materials."

He confirmed that negotiations were progressing on an agreement on biological diversity protection beyond national jurisdictions. Hopefully, he said, the discussions would result in establishing marine protected areas and rules for the regulation of the exploitation of marine resources and equitable sharing of benefits.

Kohana observed that "as the global economic crisis intensifies, many actual mechanisms are being explored to assist the poorer countries. I would like to suggest that some of these financial mechanisms and resources be allocated for ocean-related activities of developing countries, especially the fund established to compensate for the loss and damage under the UN Framework Convention on Climate Change. This will improve sustainable fisheries thus contributing to better climate generation, better education and training, and a culture of sustainability."

For Zhu Zhengguang, Ocean Policy Manager for WWF China, "China needs to contribute wisdom. On the South China Sea, we have conducted research and studied the impact of climate change. We should look not only at regional developments but pay attention to the whole world. The UN has many global projects and we should build and cooperate with

different countries," Zhu said. For instance, a foundation could be established in Shenzhen to focus on the issues related to fishery issues which would attract UN and other international organizations to learn from them and integrate their ideas.

Zhang Zhiwei, a marine spatial planning consultant for the United Nations Environment Programme and Senior Engineer at the First Institute of Oceanography at China's Ministry of Natural Resources, addressed international cooperation in the field of spatial planning, which he said represents the synergy between commercial interests and academia on ocean governance. He stressed the need for a better understanding of global governance.

"There have been events on blue partnerships this year which provided results and promoted the sustainable development goals for 2030. We are in the deep water of international ocean governance."

— Zhang Zhiwei, First Institute of Oceanography

"In recent years, China has moved forward step by step. At the recent CCP conference we saw new developments on the China Global Financial Aid Foundation, which works with 10 countries and organizations on international ocean governance, "he said. "There have been events on blue partnerships this year which provided results and promoted the sustainable development goals for 2030. We are in the deep water of international ocean governance."

On spatial planning, he pointed out that China has been studying this space since the 1980s for the protection of the environment and to utilize the resources of the ocean, adding that international conferences and cooperation were important for the sharing of ideas.

The Regional Comprehensive Economic Partnership (RCEP) could be a source of initiatives to strengthen ocean governance and be a driver for the sustainable development of the blue economy in the whole region, said Wu, adding that there were many opportunities to be seized within the RCEP framework on global and regional ocean governance as well as the blue economy, for instance with respect to enhanced information-sharing.

He suggested that the marine region including the South China Sea could be the third main global cruise ship destination, after the Mediterranean and the Caribbean. One cruise could visit many coastal hubs, including Manila, Kuala Lumpur, Hong Kong and Singapore.

05. Unleashing the Full Business Opportunities of the Greater Bay Area

The Greater Bay Area, comprising nine cities in the Pearl River Delta plus Hong Kong and Macau, is arguably the factory of the world with its massive manufacturing base. These days, however, the GBA is evolving into a global center for technological innovation, financial services, trade transport and logistics.

Among many improvements, the area has benefitted from major infrastructure projects that have cut travel times between urban areas. The GBA also offers high-technology capabilities, academic and scientific resources and benefits from the attractiveness of global tourism and leisure centers.

What is the future for the GBA, and what can businesses and local governments do to develop the region as a major center for tech and innovation ? What additional actions are needed to address the existing challenges and fully unleash the economic potential of the GBA.

“There's a shortage of talent in South China,” said Klaus Zenkel, the chairman of the South China Chapter of the European Union Chamber of Commerce. “So some of our members are collaborating with universities and colleges to get fresh graduates into the company and give them the training to develop the correct skills.”

SPEAKERS

Klaus Zenkel, Vice President, European Union Chamber of Commerce & Chairman of the South China Chapter

Martin Mueller, Chairman at Swiss Chinese Chamber of Commerce (China) and Director at SKC Group

YU Ya, Senior Advisor of Global Ocean Capital Promotion Council of Shenzhen

Victor Cadena, Executive Vice President of the Mexican Chamber of Commerce in China (MEXCHAM) and CEO of Dadao Capital Ltd

LI Lianjun, Senior Partner and Head of Shipping and Litigation Practice, Reed Smith Richards Butler LLP, Hong Kong SAR；Invited mediator of the Cross-border Commercial Mediation Center of Guangdong Higher People's Court

Teck Kin SUAN, Executive Director in Global Economics and Markets Research, United Overseas Bank, Singapore

MODERATOR

Guo Jian, Country Manager, Norwegian Energy Partners China

Zenkel pointed out that, according to the Department of Commerce in Guangdong province, some 700,000 students graduate from local universities each year, and not all of them are able to find a job, or at least not the one they want. Companies and the government need to work together to find solutions, and more ways for useful skills to be developed.

“With the growing market demand and the fast growth of China's manufacturing industry, companies will face even more challenges. Sophisticated manufacturing technologies and products will impose higher requirements on workers skills, causing a surge in demand for highly skilled employees, and this will intensify existing talent shortages.”

— Martin Mueller, Swiss Chinese Chamber of Commerce

A significant trend, noted Zenkel, has been an increasing shift for companies in the GBA to focus more on research and development. “We know that South China, and especially the GBA, are striving to reach the next level in high-tech manufacturing, innovation output and R&D. Many companies have had their teams here to do R&D but many of them just continued with the existing products and further developed them. Now, companies are developing new products from scratch here in the GBA for the Chinese market, and also for the global market.”

Zenkel had one note of caution, stressing the need for all the data, technology and intellectual property rights to be protected.”

Martin Mueller, chairman of the Swiss Chinese Chamber of Commerce in China, agreed that access to skilled employees was a “bottleneck” for countries operating in the GBA. “With the growing market demand and the fast growth of China's manufacturing industry, companies will face even more challenges. Sophisticated manufacturing technologies and products will impose higher requirements on workers skills, causing a surge in demand for highly skilled employees, and this will intensify existing talent shortages.”

Mueller mentioned the need for a high-quality vocational education system, citing the Swiss model in which nearly two-thirds of young people enter after their compulsory education to start their professional careers. China's vocational education is still in an early stage,” he said. “Cooperation between China and Switzerland on this issue will fill the gap of high level vocational education in China and take it to the next level.”

Mueller also mentioned the need for more innovation through international cooperation. In a measure initiated by President Xi Jinping, Switzerland and China have established an innovative strategic partnership in 2016, the first of its kind between China and a foreign country. “A systematic upgrading of all these sectors will definitely increase the attractiveness

of the GBA as a place where top talents want to live and work so that technology and innovation will flourish as a result," Mueller said.

Yu Ya, a senior advisor for the Global Ocean Capital Promotion Council of Shenzhen, discussed the "breakthroughs" driving the innovation chain of the marine industry in the Greater Bay Area, focusing on deep sea industries and the offshore oil and gas market.

"In the face of the new fast-growing market, how to take advantage of this new demand? From large-scale growth to high-quality, from catching-up technology to becoming a technology leader, this is what we want. How to make good use of new demand opportunities?"

— Yu Ya, Global Ocean Capital Promotion Council of Shenzhen

"This breakthrough is reflected in two sectors: one is that the deep-sea development and operation capabilities have been significantly improved, and the second is that the design and assembly capabilities of deep-water equipment have been leapfrogging, including breakthroughs in some core technologies, and the establishment of a relatively complete industrial chain for deep-sea oil and gas equipment."

Yu pointed out that in 2021, China ranked first in the world in terms of offshore wind power installed capacity, which had increased by more than 300% compared with the previous year.

"The growth was explosive but now we see a problem," she said. "In the face of the new fast-growing market, how to take advantage of this new demand? From large-scale growth to high-quality, from catching-up technology to becoming a technology leader, this is what we want. How to make good use of new demand opportunities?"

Victor Cadena, the executive vice president of the Mexican Chamber of Commerce in China, said trade with Guangdong province, not considering Hong Kong, Macau and the other parts of the Green Bay Area, was equal to around 40% of all the bilateral trade between Mexico and China – roughly half a billion dollars.

Cadena echoed other panelists in lamenting the lack of travel options in China brought on by the global pandemic. From the perspective of the Chamber of Commerce one of the main restrictions we have are the travel restrictions. We had three direct flights between our two countries that indeed were not used only for Mexico, but were used for all Latin America," he said. "So this has had a direct impact not just in the tourism industry. We understand this is a health situation and is for the good of everyone, but we all hope that the travel restrictions can be lifted not just domestically, but also internationally."

Even so, Cardena was bullish about the potential for the GBA. "All the infrastructure is there, the human resources are there, and our bilateral trade with the Greater Bay Area is very, very large – much larger than with all the other provinces and regions," he said. "So, I still

believe that the best years are still yet to come and the best opportunities haven't been grasped yet. We look forward to the following years to continue our presence here. We have a long-term commitment with China and we look forward to further business opportunities and cooperation."

"The development of the Guangdong-Hong Kong-Macao Greater Bay Area is inseparable from the integration of the laws of the three places."

— **Li Lianjun**, Reed Smith Richards Butler

Li Lianjun, a senior partner and head of Shipping and Litigation Practice for the law firm of Reed Smith Richards Butler in Hong Kong, discussed the advantages of having several legal systems at work in the GBA. "Under the policy of one country, two systems, the Guangdong-Hong Kong-Macao Greater Bay Area spans three different legal systems, which will help the high-quality development of the marine industry," Li said. "There is Hong Kong's common law system and then there's the Portuguese legal system, which can help people in Portuguese-speaking countries. Then, of course, we have the Chinese legal system.

He observed that "in September 2021, the overall plan for the Guangdong-Hong Kong-Macau Cooperation Zone proposed to strengthen and deepen reforms, strengthen the protection of the rule of law, gradually build a system for the convergence of civil and commercial rules with Macao and international standards, and explore the convergence of different legal systems and cross-border legal rules. This shows that the development of the Guangdong-Hong Kong-Macao Greater Bay Area is inseparable from the integration of the laws of the three places."

For Teck Kin Suan, the executive director of Global Economics and Markets Research for the United Overseas Bank of Singapore, "In terms of the value, just cargo transported, the GBA has strong advantages and must make full use of its ports and infrastructure, but it must also develop all its ocean resources," Suan said, as "the marine economy is more than cargo shipping. For example, developing cruise lines. This year, Singapore received around 1 million passengers from 13 cruise line operators who are using our ports. Tourism is important for Singapore and there are natural advantages for cooperating with the GBA."

Teck Kin Suan emphasized that, from a Singapore perspective, both Singapore and the GBA can work on developing connectivity, especially data connectivity between the Singaporean and the GBA ports. Both parties can push further their digitization process and improve the connection among the ports which would be conducive for the global shipping sector and enhance their efficiency in energy and fuel.

06. The Technology Innovations That Will Drive the Development of the Marine Economy

Disruptive technologies are transforming the marine economy – from advanced materials and biotech, to underwater robotics, autonomous ports and data analytics. Scientists, entrepreneurs, companies and even national governments are seeking innovative approaches to optimize the development of every sector of the ocean economy.

This involves among other things a more integrated approach to understanding the oceans; the search for technology synergies, the need for academia and business to promote a new culture of education and skills.

"One of the most important factors in this discussion is the coordinated development of science and technology," noted Chen Dake, an oceanographer and director of the State Key Laboratory of Satellite Ocean Environment Dynamics.

"Now we talk about science and technology together all the time. In fact, science is science, technology is technology, and the coordinated development of the two is very important. If you look at the development history of marine science, all major scientific breakthroughs are brought about by technology. I think we should pay special attention to this point."

SPEAKERS

CHEN Dake, Physical Oceanographer, Academician of the Chinese Academy of Sciences, Director of Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai)
WU Haifeng, Vice President of Kongsberg Digital, General Manager of Kongsberg Digital China
CUI Junhong, National Distinguished Expert, Professor of the Institute for Advanced Study of University of Electronic Science and Technology of China (Shenzhen), Chairman/Founder of Shenzhen Smart Ocean Technology Co., Ltd.
MA Yanfeng, Senior Vice President of HMN Technologies Co., Ltd.
QIU Haihong, CEO of Geneinno Technology
Ido Sella, Co-Founder & CEO, ECOncrete Tech LTD, Israel

MODERATOR

LU Gang, Founder and CEO, TechNode; Co-Founder, BEYOND Expo

Chen pointed out that the current understanding of the deep sea is due to the emergence of deep submersibles and deep-sea equipment, adding that "we now know less than 1% of the

world's precise topography of the seabed, which is an astonishing number." He continued: "The most important thing is to cultivate interdisciplinary talents. Oceans need talents who understand both science and technology. The theme of our meeting is to understand the industry, and the cultivation of compound talents is very important." However, Chen pointed out that while talent formation is crucial, designing the right policies for technology development is no less important.

"The most important thing is to cultivate interdisciplinary talents. Oceans need talents who understand both science and technology. The theme of our meeting is to understand the industry, and the cultivation of compound talents is very important."

— Chen Dake, Satellite Ocean Environment Dynamics

Wu Haifeng, the General Manager of Kongsberg Digital China, mentioned that his company was the largest state-owned high-tech enterprise in Norway, mainly engaged in marine engineering, energy and new energy. "[Kongsberg] manages projects that are very suitable for the entire marine economy, such as unmanned ship technology and remote control centers for offshore oil and gas, for marine farming, and marine wind power, which is very hot right now. We also have deep-sea submersibles, underwater robots and other technologies, which we have promoted globally, including now in China."

Kongsberg has the world's first truly unmanned ship, electrically driven and completely zero-emission. Wu also mentioned unmanned platforms for offshore oil production, as well as shore-based drones, built by Kongsberg, adding that "through an intelligent production management system on the shore, we can manage some very dangerous scenarios on the oceans. During the epidemic, this technology was a great help to sustain the production of industries, such as aquaculture and offshore wind power."

Cui Junhong, a distinguished expert and professor of the Institute for Advanced Study of the University of Electronic Science and Technology of China (Shenzhen), explained her personal journey to the top ranks of marine science and tech: "I originally came from a background in computer communications. I was a professor in the United States. Why did I want to go to the ocean? Because the ocean is really the cradle of life, and it is also a treasure house of resources. Ocean resources are inexhaustible. Our understanding and utilization of them is far from complete, mainly because of technical inadequacy."

Cui went on to mention "cloud-ocean computing," a new system taking into account the fact that underwater acoustics is particularly weak, so she used various methods to change the direction of technology. "Underwater acoustic communication technology and smart ocean communication will come first. We can do it on land, but many things can be moved to the

ocean," she said, adding that "marine electronic information can empower various traditional industries and emerging industries because the underwater information system is connected. Smart unmanned equipment can be used."

"The ocean is really the cradle of life, and it is also a treasure house of resources. Ocean resources are inexhaustible. Our understanding and utilization of them is far from complete, mainly because of technical inadequacy."

— Professor Cui Junhong, University of Electronic Science and Technology

Ma Yanfeng, a senior vice president of HMN Technologies Co., Ltd., based in Tianjin, pointed out that more than 99% of all transoceanic communications, including voice, data, and video, are carried by the submarine optical cable communication system. "Qatar is hosting the World Cup," she said. All these videos and high-definition images are carried by submarine optical cables. Fortunately, we participated in the construction of the submarine optical cable communication system from Qatar to Asia, and also contributed to the video transmission of the World Cup."

"Before we entered this field in 2008, China was completely dominated by Western suppliers and operators. At present, we have built more than 80,000km around the world, and China's submarine optical cable system covers all continents including the first submarine optical cable from the mainland to Taiwan, which was also built 12 years ago."

Ma described the importance of submarine optical cables in staggering financial terms: "There are almost 440 submarine optical cable systems in normal operation around the world. Basically, every day on average the amount of commercial and financial transactions related to the submarine optical cable communication system is equivalent to tens of trillions of dollars." Even so, Ma pointed out that in terms of landing facilities for submarine optic cables and data centers, China is still behind Singapore: While 38 global international submarine communication optical cables connect Singapore, China – not including Hong Kong – has only eight submarine optical cables currently in operation.

Qiu Haihong, the CEO of Geneinno Technology, said her company was the first in China to commercialize consumer-grade underwater robots and drones. "In the blue economy, underwater intelligent robots will inevitably become a natural tool," she said. "We focus on the deep sea and have made breakthroughs in core key technologies in the deep sea, which will promote the development of a higher-quality marine economic cycle

"Breakthrough in key technologies, collaboration, multi-party real-time sensing fusion and timely response will help develop the interconnectivity of the entire underwater robot industry and push it in the direction of deep-water operations. This will be revolutionary."

Ido Sella, co-founder and chief executive officer of ECOncrete Tech, an environment-friendly concrete company based in Israel intervened online to mention that “about 70% of coastal infrastructure is made of concrete, and concrete is associated with bad biodiversity, poor construction, and negative environmental impact,” adding that ECOncrete is focusing on that impact and trying to create better ecological options through a different material composition than regular concrete and has added “surface complexity” that enables organisms to flourish. Areas using ECOncrete have 16 times more improved water quality and twice as much biodiversity. ECOncrete has helped develop coastal infrastructure in 40 locations, eight seas and 11 countries.

“We’re tackling coastal erosion projects, creating living breakwaters, and we can support the growth of local oyster much better than other materials,” he said. “Now we’re exploring offshore applications such as providing environmental protection for offshore wind farms.

Lu, the moderator, asked in his closing remarks for a succinct answer to the question: what does the marine economy need the most right now? The answer came from Wu of Kongsberg Digital China, in 12 words: “Energy, cost reduction, efficiency increase, fuel savings, emission reduction, and safe production."

07. Developing a Viable Ocean Renewable Energy Supply Chain

In 2020, President Xi Jinping announced that China’s economy would aim for peak carbon emissions in 2030 and carbon neutrality by 2060. His call sparked a wave of activity across China’s green energy sector, as companies scrambled to innovate solutions in low-carbon and carbon-neutral power.

Research and development in offshore energy technologies, which was already well underway, has accelerated rapidly as companies, utilities and governments prepare to meet targets for the de-carbonization of the global economy.

Offshore wind development — especially floating offshore wind — is at the forefront of offshore green energy production. The technology holds great potential and oil and gas companies are far along in investing money and manpower into the domain. China plans to build over 1,200 GW of solar and wind power by 2030, nearly two times current capacity.

In the last year, China has launched or announced several major *firsts* in offshore power generation, an indication of the speed at which the industry is moving.

SPEAKERS

Chen Daoyi, Director of the Marine Technology Center of Tsinghua University, and Vice President of the Institute of Ocean Engineering of Tsinghua Shenzhen International Graduate School

Dahai LIU, Director of Coastal Zone Center, First Institute of Oceanography, Ministry of Natural Resources

Kevin TU, Managing Director of Agora Energy Transition China, Non-resident Fellow at the Center on Global Energy Policy of Columbia University, Former China Programme Manager at International Energy Agency

Michael Lochinvar Sim Abundo, Managing Director, OceanPixel Pte Ltd, Singapore

MODERATOR

Guo Jian, Country Manager, Norwegian Energy Partners China

In November, China's government-owned utility State Power Investment Corporation launched the world's first commercial offshore floating solar panels paired with an offshore wind turbine. The two solar floaters have an installed capacity of 0.5 megawatts peak. If the pilot is successful, the plan is to build a 20MW floating wind-solar farm in 2023.

In October, China revealed plans to build a 43GW wind farm in the Taiwan Strait. Operating between 75 and 185km offshore, the 10km-long wind farm will feature thousands of powerful turbines. Work on the project will begin by 2025 and once completed will eclipse the world's current largest wind farm, the Jiuquan Wind Power base in western Gansu province, a massive site with 20GW capacity.

In May, China deployed a 13.6MW floating wind turbine as part of a project designed to advance the technology and demonstrate the capabilities of floating wind power generation. The rotor has a record-breaking diameter of 252 meters, and the turbine can generate 63.5 million kWh per year, capable of supplying 30,000 homes with power.

The giant floating platform known as Fuyao, has been designed for deep-sea and challenging conditions, including the ability to withstand a once-in-a-century typhoon.

The majority of China's potential offshore wind resources reside in waters more than 60 meters deep, which is beyond the reach of traditional, offshore wind power platforms. The solution is floating wind turbines, which utilize more flexible, cost-effective design. These turbines can vastly expand the scope and use of offshore wind power.

China, after launching its first floater in May, is gearing up to expand its floating wind power fleet almost one-hundred-fold in the next five years. “The reason lies in that the shortage of energy in our country is a very serious problem,” said Chen Daoyi, director of the Marine Technology Center of Tsinghua University. “Energy security is a top priority. We import more than 70% of our oil, and also much natural gas, every year. Nearly 60% of our power generation is still coal-based. On the one hand, we are short of energy, and on the other hand, the energy structure is imbalanced. Especially with the aim of carbon peaking and carbon neutrality, under the pressure of energy conservation and emission reduction, there are great expectations for renewable energy.”

One of the greatest near-term challenges is cost. Offshore wind energy in Guangdong has the potential to satisfy 40% of China’s energy demands, maybe more. But the price tag is hefty. The 70GW currently planned in Guangdong will likely cost more than $1.4 trillion. It’s not clear where the money will come from, Chen said, or even if the project is worth the investment.

In May, China deployed a 13.6MW floating wind turbine as part of a project designed to advance the technology and demonstrate the capabilities of floating wind power generation. The rotor has a record-breaking diameter of 252 meters, and the turbine can generate 63.5 million kWh per year, capable of supplying 30,000 homes with power.

“This matter cannot be handled by one company, or one government agency,” Chen noted, adding that Tsinghua University is designing bases for floating wind power, trying to find a lighter base, which features more typhoon-resistance and that is cheaper to produce and install.

Chen continued: “In terms of terminal construction, maintenance and operation, and wind turbine manufacturing, one possible way is that wind power will eventually reach large-scale production, which will significantly drop costs. In fact, it can be standardized to allow more small and medium-sized enterprises to come in and make standardized products and join the supply chain. So this requires every industry in all fields to cooperate.”

How long it will take for costs to drop remains uncertain. More money and resources dedicated to the job can likely speed development, but there’s no guarantee of that.

One place China may consider looking for innovation is Denmark, which raised its first commercial wind turbine in 1979. The European country is now a global leader in green and wind energy, supplying 50% of its power needs with wind and solar. It plans to be 100% renewable by the end of the decade. The country’s flagship project is the North Sea Energy

Island, located about 80 kilometers off the coast, said Peder Bo Sorensen, a special advisor to the Ministry of Foreign Affairs of Denmark.

The artificial island will serve as a hub for 200 giant offshore wind turbines. It is planned to cover at least 120,000sqm and will provide enough energy for three million homes. The energy island is the largest construction project in Danish history, with a completion date of 2033 and an estimated price tag of $34 billion.

“Climate change is very obvious. In particular, our country’s total carbon emissions have ranked first since 2005. Global temperature rise exceeds 1 degree every year, and extreme high-temperatures occur often in Antarctica and the North Pole. There is a very urgent need to achieve carbon targets.”

— Deng Changhong, CNOOC Shenzhen

In addition to wind, China is working on research and development across the energy sector. That includes improving traditional production methods like oil and gas drilling, as well as delving into leading edge technologies like hydrogen, methane and ammonia.

China National Offshore Oil Corporation (CNOOC), the state-owned oil giant, is focused on capturing and storing C02 from industrial operations, a process known as carbon capture, utilization and storage, or CCUS, also known as carbon sequestration.

“Everyone knows the overall situation,” said Deng Changhong, deputy general manager at CNOOC’s Shenzhen Branch. “Climate change is very obvious. In particular, our country’s total carbon emissions have ranked first since 2005. Global temperature rise exceeds 1 degree every year, and extreme high-temperatures occur often in Antarctica and the North Pole. There is a very urgent need to achieve carbon targets.”

Carbon sources around the Guangdong-Hong Kong-Macao Greater Bay Area are close to 400 million tons annually, bringing the demand for carbon-emission reduction into sharp focus.

The Enping 15-1, China’s first offshore oil well to use enhanced oil recovery, was inaugurated earlier this year about 200km south of Shenzhen. The high-tech platform is at the forefront of CNOOC’s sequestration efforts. EOR uses captured C02 to force oil out of the ground and up to the surface. The process, which permanently sequesters CO2 in the bedrock, can extend well life up to 25 years.

The Enping 15-1 is capable of storing more than 300,000 metric tons of CO2 annually, equivalent to planting 14 million trees or taking one million cars off the road each year. More platforms like it are planned. The Guangdong Provincial Development and Reform Commission

is working with Shell and ExxonMobil to develop improved CCUS methods based on Enping 15-1 technology.

Newer research into leading edge green-power production has produced less clear results. Hydrogen energy is at the forefront of the research, but others such as methane, ammonia and the bleeding-edge concept known as Power-to-X are gaining momentum. Tidal and wave energy methods are only beginning to be fully understood.

“From the perspective of offshore energy development, the next one that may grow rapidly is China's offshore photovoltaics. In October, 500 kilowatts of power was successfully generated by a floating solar pilot project on the Shandong Peninsula,

— Kevin Tu, Agora Energy Transition China

In March, China announced its first long-term hydrogen plan, which laid out a phased approach to developing a domestic hydrogen industry. The technology is still at the “frontier” stages, said Kevin Tu, managing director of Agora Energy Transition China, adding that China’s goals remain modest. The country is the globe’s largest hydrogen producer, outputting about 33 million tons annually. By 2025, the country plans to produce 100,000 to 200,000 tons of renewable-based hydrogen annually and have a fleet of 50,000 hydrogen-fueled vehicles.

Tu said using low-carbon sources to produce hydrogen and using clean hydrogen in various industrial sectors would help mitigate China’s carbon emissions. For example, the government estimates that its 2025 target for renewable-based hydrogen could reduce the country’s carbon emissions by one to two million tons annually. However, China’s expertise in hydrogen technology is far behind advanced countries, and it’s not clear how fast it can catch up. “

China is similarly exploring leading-edge non-renewable products. Earlier this year, the country successfully produced natural gas hydrates in the Shenhu area of the northern South China Sea for 60 days. But hydrate mining has many environmental and technical challenges, and how much potential this technology has in the future is actually a big question.

“From the perspective of offshore energy development, the next one that may grow rapidly is China's offshore photovoltaics,” Tu said. “In October, 500 kilowatts of power was successfully generated by a floating solar pilot project on the Shandong Peninsula, and more offshore photovoltaic projects have been confirmed in places such as Jiangsu, Shandong, and Zhejiang.”

These advancements in China’s green-power production are in many cases leading the world’s efforts — if not always in technology and innovation, at least in terms of size. China, for example, accounted for 80% of all offshore wind-power installed last year, and it’s slowly and steadily closing the knowledge gap with advanced nations.

All these efforts are aimed at one critical goal, said Dahai Liu, a director at the Ministry of Natural Resources: “How to achieve sustainable development, and how to realize the relationship between human beings using the ocean and resources.”

08. Global Shipping Industry Faces the Challenges of ‘New Normal’

The global pandemic, rising protectionism, geopolitical risks, and general uncertainty about the world economy – all these factors have created a “perfect storm” of challenges for the international shipping industry.

SPEAKERS

Kane Xue Liangyu, General Manager of Market Innovation at Wartsila Group
Li Yanqing, Chair of ISO/TC8; Vice Chairman of ASEF; Secretary General, China Association of the National Shipbuilding Industry
Mikael Adler, Senior Vice President – Head of Region Asia Pacific at MAN Energy Solutions
Maria Strandesen, Head of Future Fuels, Maersk Decarbonisation, A.P. Moller – Maersk, Denmark
Alexandra Hirst, Senior Policy Analyst, British Chamber of Commerce in China

MODERATOR

Sam Li, Associate Professor, Shenzhen International Graduate School, Tsinghua University

The global shipping sector – the industry that still transports more than 80% of all global goods – is more than ever a key tool and driver of economic growth and will play a transformative role in sustainable practices in the post-Covid era, making the emergence of “green shipping” a priority for all stakeholders.

Ambassador Signe Brudeset, the envoy of the Kingdom of Norway to the People's Republic of China, acknowledged the challenges to the shipping industry, notably its negative impact on the environment: “The global shipping industry is easily affected by geopolitics, by protectionist measures and by global prices and disruptions that have demonstrated the vulnerabilities of our globalized economy and its dependence on an efficient maritime transportation system.”

The ambassador provided examples from Norway’s shipping sector and how the Norwegian government is prioritizing “green” maritime transportation.

“We will lead an ambitious policy to cut emissions from our national maritime transport system and our fisheries,” she said. “The international maritime industry is in the middle of having to rethink and restructure for the future.”

Brudeset added that the maritime transport sector was crucial to reducing global greenhouse emissions. While the pace of this transition is still undecided, the direction is clear: the world's maritime fleet will need to decarbonize to support sustainable development.

Governments, meanwhile, must remain committed to the existing global regulatory framework for shipping and the maintenance of free-trade principles. Brudeset listed a number of action points across the shipping industry:

- Norway has developed and updated a national action plan, which establishes a goal to reduce gas emissions from domestic shipping and fisheries by 50% by 2030, instead of 2050.
- Carbon pricing, support schemes and private public partnerships are being utilized to meet this goal.
- Upgraded the national ferry sector to low-emission vessels. The world's first Liquified Natural Gas (LNG) ferries started operating in Norway in 2000; the first fully electric ferry in 2015.
- In 2022, the world's first hydrogen ferry will begin operations in Norway, while the first ammonia-fuel vessel will be ready for operations in the offshore sector in 2024.

"We aim to be in the forefront of developing and deploying zero-emission solutions in shipping, and we hope that other markets can benefit from our experiences and solutions," said Brudeset.

The panelists noted that the processes introduced by the International Maritime Organization had been crucial in reducing emissions from ships. Greenhouse gas emissions from international shipping are set to be reduced by 50% by 2050, compared to 2008 levels. Even so, substantial cuts in greenhouse gas emissions from international shipping are still needed to reach the goals of the Paris Agreement, the legally binding international treaty on climate change. "We need to innovate and find new ways of expanding the marine economy and create value from the oceans sustainably," said Brudeset. "And we need more international cooperation."

Li Yanqing, secretary general of the China Association of National Shipbuilding Industry, concurred, mentioning that China had the same maritime interests as Norway. Li suggested the two nations should continue partnering on green shipbuilding efforts, adding that Beijing and Also could serve as a bridge between industry players in different countries.

Li pointed to the crucial necessity of adaptations in the shipping industry, adding that some good changes had already been made. "We used to have only 13% green ships but that number has grown and everyone is transforming to green-powered ships," he said. "LNG and methanol-powered ships are on the rise and many alternatives such as hydrogen and ammonia-powered ships have been developed." Maritime engineering is also in transformation, with new assets such as wind power potentially able to replace the capacity previously required for marine equipment.

“Uncertainty is the new normal, there is no certain market. Trade and shipping are still growing but it's fluctuating at the bottom and now that trend is rising,” he noted. “We know we need to reduce emissions and set a deadline for achieving, but we need to remain safe in using the technology to that effect. Safety is a priority in shipping.”

For Li, the coming boom cycle in shipping is not about growth alone: the industry needs to look at intelligent ship technology and an inclusive global vision. “We need to build energy infrastructure and make it the foundation for the green shipping industry” he recommended.

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— Ambassador Signe Brudeset, Kingdom of Norway

Mikael Adler, the managing director at MAN Energy Solutions Asia, offered some insights into how the decarbonization issue is being tackled in the shipping industry. He pointed out that MAN Energy Solutions is “engineering solutions for the biggest challenge we have faced yet as humankind. The solutions to decarbonize are not difficult. The most difficult part is to get all countries to get ship owners to choose cleaner solutions, and because the cleaner solution is a little bit more expensive, we need to incentivize them, too.”

Adler pointed to some of the new solutions now emerging in the shipping industry, including PEM electrolyzers, which produce hydrogen as a source of renewable electricity, carbon capture facilities, and new synthetic fuels that are carbon neutral. He also mentioned the ongoing option of retrofitting the existing fleet of ships in the sector.

“Our mission and vision is to produce engines that can burn any synthetic carbon-neutral fuel in the future,” Adler said. “But then you might ask yourself, What about the 25,000 to 30,000 ships that are already in the ocean today, with an expected lifespan of maybe 30 years? All the engines can be retrofitted. So, we took a look at the market and there's approximately 5,000 ships that are not too old or too small, or do not already have good technology set up for the future. And those 5,000 chips can be retrofitted.”

In 2024, MAN will introduce the world's first ammonia engine to the market, Adler said, adding that with ammonia “We need to make sure that having ammonia on board must be 110% foolproof before we launch it. We are ready for zero or carbon-neutral emissions. We will have a solution for every segment.”

Maria Strandesen, the Head of Future Fuels at Maersk, was also adamant on the future of a decarbonized shipping industry. “There is no doubt that in the future we will see the new normal as decarbonized shipping,” she said. “The question is, how do we do that quickly?”

Strandesen added that Maersk was making wide scale changes towards carbon neutral because “the technology is there and should be used. Earlier this year, we bumped up the goal by 10 years and are now targeting to become fully carbon neutral in 2040,” she said. “And not only on our ocean business, but the entire company. We saw that the technologies are more ready than we thought and there's no doubt that we need to hurry up. It's no longer about preventing climate change. It's about reducing the catastrophic impact of climate change.”

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— Maria Strandesen, Maersk

Strandesen said that Maersk has recognised that it played a role in creating the problem and has subsequently looked at the different fuel options, eventually selecting green methanol as their fuel of the future. “The engines are ready, the liquid is easy to handle, it's not toxic,” she said. “We have now started our journey and we have ordered 19 container vessels able to run on green methanol.”

Xue Liangyu, the general manager of Market Innovation at the Wärtsilä Group, addressed the immediate concern of fuels, noting that much of the current shipping fleets still run on fossil fuels. Xue said the Wärtsilä Group has been developing carbon-capture technology, energy conservation for all vessels, and was looking at how to continue to decarbonize the industry. “There won't be a one-size-fits-all solution but distribution systems and optimization for these ships are important and will also help reduce the operating cost,” Xue said.

Alexandra Hirst, a senior policy analyst for the British Chamber of Commerce in China, addressed the issue of rising costs and the strain on the global supply chain since the global pandemic hit the shipping industry: “Over the past three years, we've seen unprecedented disruptions to air freight, global and local supply chains, with the entire framework on which international trade operates being threatened and tested from every angle,” she said, adding that an annual survey reported “a continuing upward trend in sea and air freight disruptions and disruptions to both global and local supply chains. According to the survey, 74% of British businesses reported that Covid-19 outbreaks were having a large impact on their business operations, with 51% citing supply chain disruptions.

In the short term, she said international cooperation and technology seemed to be the key solutions for the shipping industry, whether it's the decarbonization of the fleet, new green ships, alternative fuels, or the digitization of supply chains.

"To build the confidence to transition to a much more digitized process in supply chains and the shipping industry is going to require unified standards to provide the certainty needed for businesses," Hirst warned, adding that "where digitalization and decarbonization are concerned, the collaboration and support and incentives will need to be on a global scale."

09. Building a Global Ocean Culture

Does the global public realize how important the world's oceans are to our lives? Are people aware that oceans make up more than 70% of our planet and are crucial for fighting climate change? Do they know the marine economy is a multi-trillion dollar business sector and contributes at least 50% of the world's protein supply?

How to raise awareness about the crucial importance of the marine environment and the need to create a global "ocean culture" were the subjects of discussion for a six-member panel of experts who agreed that achieving a long-term and sustainable global ocean culture should naturally begin with many positive aspects which have been in place for centuries: water sports, beaches, travel, the arts, science, seafood, recreational opportunities and the associated ocean-based lifestyles as seen – and envied – all over the world. After all, who doesn't enjoy a trip to the ocean?

Yu Xingguang, a researcher at the Third Institute of Oceanography and the chief science communications expert of China's Ministry of Natural Resources, has studied and promoted marine culture for decades, having traveled to both the North and South Poles on missions to protect the ocean environment.

SPEAKERS

Yu Xingguang, Researcher of the Third Institute of Oceanography, Ministry of Natural Resources, Chief Science Communication Expert of the Ministry of Natural Resources

Zhang Yanxin, Professor of the Art Department of Shenzhen University, Director of the Marine Art Research Center of Shenzhen University, and President of Shenzhen Marine Art Research Association

Horace Chen, Professional Competitive Sailing Athlete, China's First World Champion of The Round The World Sailing Regatta

Sabine Roux de Bézieux, President, Fondation de la Mer, Vice-President of European and International Affairs Commission of Economic, Social and Environmental Council

Emma McKinley, Research Fellow, School of Earth and Environmental Sciences, Cardiff University, United Kingdom

Chris Gorell Barnes, Founding Partner, Ocean 14 Capital

MODERATOR

Ge Yang, Columnist, People's Republic of China

"I think there are many cities trying to build global ocean capital," Yu said. "We want to do that because it's going to promote marine ecology with the common goal that all societies benefit from the ocean economy."

For him, some of the key areas to be addressed were the protection of endangered species, strengthening the laws around marine protected areas (MPAs), the management of capacity building, and launching restoration projects for marine developments that have a lasting environmental impact.

Yu cited as an example the 350 million yuan (USD $48.7 million) that has been invested over the past decade in the renovation of Wuyuan Bay, a 1.5km stretch of coastline near Huli District in Xiamen city. The area has been redeveloped to nurture the marine environment and now underscores the concept of ocean "capital" as a means to boost tourism and commerce.

Other successful marine renewal projects include Xinglin Bay, Xiangwei Mangrove Forest Park, HaiCang Bay Park and the National Ocean Park.

Yu said the promotion of maritime culture and the enhancement of ocean awareness were essential for creating "diversified ocean-related activities and maritime environments as well as the integration of the marine economy and culture."

Zhang Yanxin, the director of the Marine Art Research Center of Shenzhen University, discussed the role of art in the Chinese efforts to embrace and understand ocean culture.

"We wanted to salvage the culture and we have done research on the history of the fine arts. We visited many museums around the world to look for drawings related to China and the maps relating to the ocean. Spain and Portugal, for example, were very helpful and we found many paintings referencing China in their vaults."

— Zhang Yanxin, Shenzhen University

"If a country has a strong ocean culture it is prosperous," Zhang said. "We wanted to salvage the culture and we have done research on the history of the fine arts. We visited many museums around the world to look for drawings related to China and the maps relating to the ocean." He and his team identified 143 museums in China that highlighted ocean culture – and many more maritime museums around the world. "We did some in-depth research and found many paintings that had Chinese characters," he said. "Spain and Portugal, for example, were very helpful and we found many paintings referencing China in their vaults."

Their research discovered several as-of-yet unknown Chinese adventurers who had traveled around the world. The researchers also found historical texts that wrote about the oceans and their astonishing influence and profound effect on people around the world.

The Chinese connection to the ocean is nothing new, but it's increasingly important, observed Horace Chen, a professional sailor and China's first world champion of the Round The World Yacht Race. Chen spoke of his wish for more people in China and globally to have greater appreciation of the oceans.

"Sailing athletes in China are latecomers, but we have been working hard and achieved a lot," he said. "For the Volvo World Cup, we needed to sail to many ports around the world and visited many coastal cities around the world. I was inspired by the other cities and the passion they have for sailing sports and how they treat it like a lifestyle. I hope we can have this in China: sailing as a cultural event is important but it is also for entertainment and leisure."

Education is an important aspect of expanding ocean culture, Chen said, and he has been helping teach the younger Chinese generation. "They need to acquire knowledge about the ocean and they need to practice and face the dangers of nature. "I hope we can see more

development for marine cities in the future. I would like to see sailing becoming part of the young people's future and I would like us to see Shenzhen as a city of sailing."

Sabine Roux de Bézieux, the president of Fondation de la Mer, said her foundation unites French-speaking stakeholders with the common goal for a "free ocean, a healthy ocean, and for harvesting the ocean sustainably." For her, partnerships and education are key to achieving this goal and her foundation works with public groups and institutions, hundreds of local NGOs, associations, and dozens of scientific organizations and universities.

"How we mobilize children's schools, how we mobilize the general public with aquariums and museums. This is vital when talking to the general public and getting them to understand that each of us has a link to the ocean, and that every other breath we take is thanks to the ocean."

— Sabine Roux de Bézieux, Fondation de la Mer

Her Fondation de la Mer focuses on five areas to promote ocean culture and sustainability. "The first one is in science. Everyone knows that the ocean is still largely unknown, especially beyond 200 meters deep and over half of our planet is covered with oceans over 200 meters deep. This is a big challenge for humanity: discovering and understanding how the ocean works, what lives under the ocean, and how these discoveries can contribute to the future of humanity."

The second focus area is the fight against plastic pollution. Roux de Bezieux said that by 2050 the "volume and mass of plastic will be probably higher than the volume and mass of life in the ocean, fish and plankton."

The third focus is protecting and resurrecting marine ecosystems. "We must be more proactive with protecting coral reefs and mangroves. Seagrass is very vital because, although they only cover a marginal proportion of the ocean, they are the host of the vast majority of marine life. This is where marine life reproduces and gets their food from, and this is why we also need to protect them," said Roux de Bezieux.

The fourth activity is education. "How we mobilize children's schools, how we mobilize the general public with aquariums and museums," she said. "This is vital when talking to the general public and getting them to understand that each of us has a link to the ocean, and that every other breath we take is thanks to the ocean."

The fifth goal is working with the corporate and finance world. "Marketization, globalization – it's all about monetization," she said. "And industries and companies around the world have a vast impact on the health of the oceans."

Emma McKinley, a research fellow at the School of Earth and Environmental Sciences at Cardiff University, started out as a marine biologist but switched her specialization when she realized the need to understand people's connection to the ocean. "My research is about the relationship between people and marine life and the ocean," McKinley said, "and how we can foster an ocean culture between different communities."

She also observed that the time is right with the UN's The Ocean Decade. "It's important to engage with different people and their connection with the rivers, the seas, the oceans and understand the differences and how we can use the insights to protect the ocean," McKinley said. "It's not just understanding the ecological aspects but the cultural aspects and how we harness that to engage with more people – to appeal to those who don't have access to the ocean or historically are not part of the discussion on the ocean."

"The ocean can recover and come back to life if it's given the chance. The most important thing is to restore the ocean and I looked at the blue economy and decided it's exciting – a 3 trillion dollar economy and it's under-invested in. There is an incredible opportunity there."

— Chris Gorell Barnes, Blue Marine Foundation

McKinley explained that ocean literacy started about 20 years ago in the U.S. to respond to a lack of marine education. Although knowledge and education are important, the emotional attachment people have to the oceans has also become a crucial factor over the past two decades. "We need systems changed and this is a real opportunity to discuss who is a coastal citizen and how to use champions and the media and organizations to drive the behavior change," she said. "What we want to challenge is who the 'we' are in that discussion about how we foster an ocean culture."

Chris Gorell Barnes, the founding partner of Ocean 14 Capital and co-founder of The Blue Marine Foundation, said he was "delighted this is a subject we are talking about in the biggest and most powerful country in the world. The planet cannot survive without a healthy marine system." Gorell Barnes highlighted three main areas: Making sure there is awareness, the right blend of government and philanthropic interest, and ensuring a sustainable blue economy.

He started The Blue Marine Foundation after filming a documentary on overfishing, creating an organization that aims to protect marine areas. "The ocean can recover and come back to life if it's given the chance," Gorell Barnes said. "The most important thing is to restore the ocean and I looked at the blue economy and decided it's exciting – a 3 trillion dollar economy and it's under-invested in. There is an incredible opportunity there."

The foundation is now the largest marine NGO in Europe, the Middle East and Africa, where it has funded marine protected areas that cover 6 million square kilometers of ocean.

“We need to make sure that more people know about the problem by using film, using communication, and social media content,” he said. “We then also need philanthropy, and we really need governments to work together because what we need to have is 30% of the entire ocean protected through MPAs. But then 70% of the rest of the ocean needs to be sustainably managed, and sustainably fished.”
