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# Maritime challenges:
## decarbonization and geopolitical tensions

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# **Maritime challenges:** decarbonization and geopolitical tensions


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Content:

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Consulado Geral da Noruega
*Rio de Janeiro*

# ENERGY PROGRAM

This Program encourages the discussion on questions related to the Energy and Oil & Gas (O&G) sectors and their global trends.

Its focus has been to investigate topics with the potential to enhance the insertion of the Brazilian industry into global chains and influence the formulation of public policies that create a competitive and attractive investment environment, such as technological innovations and their impacts on the sector's competitiveness; the geopolitical impacts of the increasing relevance of renewable sources in the global energy mix; the identification of anchor sectors for fossil fuel demand in the long term; changes in the sector's regulations, etc.

## TRUSTEE

**Jorge Camargo**

Former president of the Brazilian Petroleum, Gas and Biofuels Institute (IBP) and senior advisor at McKinsey & Company. Previously, he worked for Equinor, as senior vice-president in Norway and later as president of Equinor in Brazil. He is also a member of the Board of Directors at Ultrapar Group and at Prumo Logística.

## SENIOR FELLOW

**Clarissa Lins**

Clarissa is the founding partner of Catavento, a consultancy on strategy and sustainability. Since November 2019, she is the President of the Brazilian Petroleum Institute (IBP). Clarissa is also a member of Suzano's Sustainability Committee and the Global Future Council on the Future of Energy at the World Economic Forum. She has served on Petrobras' Board of Directors, the Sustainability Committee of Vale's Board of Directors, and Shell's External Review Committee. Clarissa has a bachelor's and a master's degree in economics from PUC-Rio.

## CEBRI CEO

**Julia Dias Leite**

Julia Dias Leite is CEBRI CEO. She has been working in the field of International Relations for twenty years. She held management positions in the sector's main independent institutions in Brazil and developed a relationship with representatives of the private sector, governments and official bodies in Brazil and abroad, especially in South America, the United States and Asia. She was also Executive Secretary of the Brazil China Business Council (CEBC). She holds a law degree from Cândido Mendes University and an MBA in Business Management from FGV. She collaborated in the research area with the Council of the Americas, in New York. She is a Fellow of the Inter-American Dialogue and, in 2017, she was the Brazilian representative in the US State Department's International Visitor Leadership Program. She is the Chairperson of the Board of Directors of Piemonte Holding.

The Brazilian Center for International Relations (CEBRI), with the support of the Norwegian Consulate General in Rio de Janeiro, organized the event “Maritime challenges: decarbonization and geopolitical tensions” - held on November 17th, 2020. The event discussed current geopolitical risks and the path to decarbonization as critical challenges for the maritime sector.

The opening remarks were delivered by Marianne Fosland, Norwegian General Consul in Rio de Janeiro, followed by Jorge Camargo, Vice-Chairman of the Board of Trustees at CEBRI and Coordinator of the Energy Program. The event was moderated by Clarissa Lins, founding partner at Catavento and Senior Fellow at CEBRI, and benefitted from insights presented by Admiral Eduardo Bacellar Leal Ferreira, Chairman of the Board of Directors of Petrobras, and Lars Andreas Lunde, Deputy Minister of Trade and Industry of Norway.

This paper consolidates the content presented by each participant, the discussion that followed, and additional insights provided by Catavento.

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# Event Participants

## Opening remarks

### Jorge Camargo

Jorge Carmargo is Vice-Chairman of the Board of Trustees at CEBRI and Coordinator of the Energy Program. Senior energy expert, Camargo spent his career in the O&G industry. He currently serves on the Board of Directors of Ultrapar Group and Prumo Logística. Camargo was the President of the oil and gas industry association - Brazilian Petroleum and Gas Institute (IBP) from 2016 to 2018.

He made a successful career of almost 30 years at Petrobras, serving at its Executive Board as International Director (2000-2003). He also worked for Equinor as Senior vice-president in Norway and later as the first CEO of Equinor in Brazil. Camargo is a geologist by training holding a degree from the University of Brasilia (UnB) and a Masters in Geophysics from the University of Texas at Austin.

### Marianne Fosland

Marianne Fosland is Consul General of Norway in Rio de Janeiro since 2019. She is a Social Anthropologist, with a degree from the University of Oslo. Before coming to Brazil, Marianne served in several positions inside the Ministry of Foreign Affairs and has been stationed as Minister Counsellor in the Norwegian Embassy in Helsinki, as well as First Secretary in the Embassy in Washington DC. Marianne has also worked in the Norwegian Agency for Development Cooperation and in the Parliament of Norway.

## Panelists

### Lars Andreas Lunde

Lars Andreas Lunde is Deputy Minister of Trade and Industry of Norway since October 2020. He was Deputy Director in the Norwegian Agency for Development Cooperation from 2018 to 2020, State Secretary in the Ministry for Climate and the Environment from 2013 to 2018, and a political advisor for the Conservative Party (Høyre) in the Parliament from 2001 to 2017.

Lars Andreas Lunde holds a Master in Marine Technique from the National Institute of Technology and Science and a degree in Economy.

## Admiral Eduardo Bacellar Leal Ferreira

Eduardo Leal Ferreira is currently Chairman of the Board of Directors of Petrobras. He is a Retired Admiral and was the Commander of the Brazilian Navy from February 2015 to January 2019. He graduated at the Brazilian Naval Academy in 1974 and took postgraduate courses at the Naval War Colleges of Brazil and Chile. He had four commands at sea and was Captain of Ports of Rio de Janeiro and Director of Ports and Coasts, where he had the opportunity to deepen connections with the Merchant Marine and offshore oil industry. He was also Commander of the Naval Academy, Commander-in-Chief of the Brazilian Fleet and Commander of the National War College. Abroad, he served in Chile and was an instructor at the United States Naval Academy.

# Moderator

## Clarissa Lins

Clarissa Lins is the founding partner at Catavento, since 2013, and Senior Fellow at CEBRI, where she is responsible for the Energy Program (July 2017). Clarissa is also President of the Brazilian Petroleum, Gas and Biofuels Institute – IBP (November 2019), where she was member of the Executive Committee (2016-2019). She is also a member of Suzano's Sustainability Committee (August 2019).

Clarissa was a member of the Petrobras Board of Directors (May/2018 to December/2019), an independent member of the Sustainability Committee of Vale's Board of Directors (May/2017 to 2019), and Executive Director of the Brazilian Foundation for Sustainable Development (2004-2013). She worked in the public sector for several years, at the Ministry of Economy (1993-94), at BNDES as special advisor to the CEO (1995-99), and at Petrobras as special advisor to the CEO and executive manager of Corporate Strategy (1999-2002).

Clarissa Lins is an economist with a Master's Degree in Economics from PUC-Rio, Brazil.

# Executive summary

1. **The maritime sector is key to the global panorama.** It accounts for almost ¾ of total freight transport activity related to international trade and it is the most energy efficient mode of transport. It is also an important lever to the energy sector, as it is responsible for 3% of the world's total energy demand and 2% of global energy-related emissions.

2. **Geopolitical tensions, exacerbated by the COVID-19 pandemic, and decarbonization of shipping were highlighted as the most critical issues faced by the industry** in 2019 and 2020, according to a report published by the Global Maritime Forum. This panorama indicates that the maritime sector is facing a period of unprecedent changes and challenges.

3. Increased geopolitical tensions have impacted both international trade and the global economy. Conflicts between China and the United States, as well as uncertainties surrounding Brexit influenced the trade panorama back in 2019. In 2020, the COVID-19 pandemic restricted trade and accelerated nationalist sentiments among different countries. **In the coming years, structural changes are expected in the global economy and maritime scenario, including the promotion of more resilient supply chains.**

4. **Climate change is considered another critical challenge for the maritime trade.** In the past years, due to the lack of adequate environmental policies and regulations, technological development was incipient, leading to increased $CO_2$ emissions within the sector. **However, the IMO's more ambitious climate targets established in 2018 leveraged global action from countries and private companies, pushing the shipping industry towards its decarbonization.**

5. **The maritime industry in also key for the Brazil-Norway relationship.** Norway is one of the leading countries of the maritime industry and aims to strengthen its position by promoting ambitious decarbonization targets and new technologies. On the other hand, Brazil has a yet unexplored potential in the maritime sector – as a source of energy (e.g. O&G and offshore wind), resources (e.g. Blue Amazon), and transport (e.g. cabotage and international insertion). **Therefore, there is a clear opportunity to enhance this partnership based on Norwegian technological know-how and leadership and Brazilian maritime business opportunities.**

# 1. **Maritime sector –** Critical challenges for the future of the industry

**The maritime sector is key to the international economy and trade, accounting for almost ¾ of total freight transport activity.**[1] Shipping is also the most energy-efficient way to transport cargo in terms of energy use per tonne-kilometer. Its importance can be noted when analyzing its relevance for energy demand - 3% of world's total energy demand, and global emissions - 2% of the world's energy-related emissions.

In the past years, the industry has been experiencing a period of unprecedented changes and transformations. In this sense, the Global Maritime Forum,[2] a not-for-profit organization supported by different companies and institutions such as Shell, BHP, and the World Economic Forum, has mapped top maritime global challenges in terms of impact and probability.

**Geopolitical tension was identified as a leading issue faced by the industry. The geopolitical maritime landscape is being reshaped by the erosion of institutions and international norms.** In addition, the outbreak of COVID-19 has put into question the way in which global trade and supply chains are currently structured.

**The global pandemic triggered an unprecedent health and economic crisis, heavily affecting the maritime transport (Fig. 01)**. According to UNCTAD, the total volume of maritime trade should fall by approximately 4% in 2020.[3] This panorama has caused countries to rethink globalized supply chains in order to reduce exposure to international risks, which in turn may reshape commercial agreements and trigger further geopolitical tensions, with increased nationalist trends.[4]

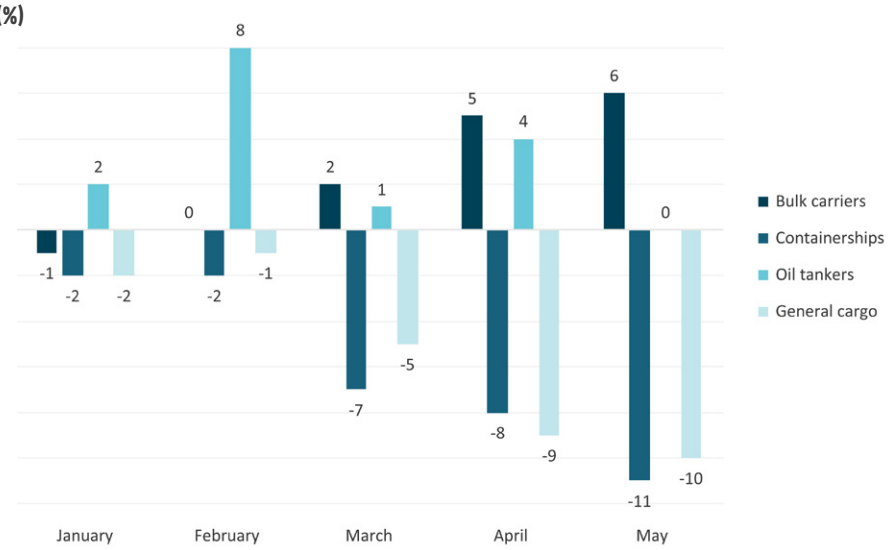
1. IEA. Tracking report – International shipping. 2020

2. Global Maritime Forum. Global Maritime Issues Monitor. 2019

3. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020

4. United Nations Conference on Trade and Development. Investment trade monitor: impact of the coronavirus outbreak on global FDI. 2020

Fig. 01: **Changes in seaborn transportation capacity (dwt-miles) - monthly basis, 2019 versus 2020 (%)**




Source: United Nations Conference on Trade and Development. Review of Maritime Transport. 2020

**In addition, decarbonization of shipping and new environmental regulations were also pointed as relevant issues faced by the industry, reflecting the growing perception of the challenges posed by climate change.** In order to meet the Paris Agreement goals, the global maritime sector needs to undergo structural changes to reduce its emissions, which currently represent 2% of the total global emissions,[5] proving to be one of the main challenges to be faced by the sector. Therefore, countries are mapping decarbonization pathways and pursuing different strategies in order to achieve global maritime climate goals.

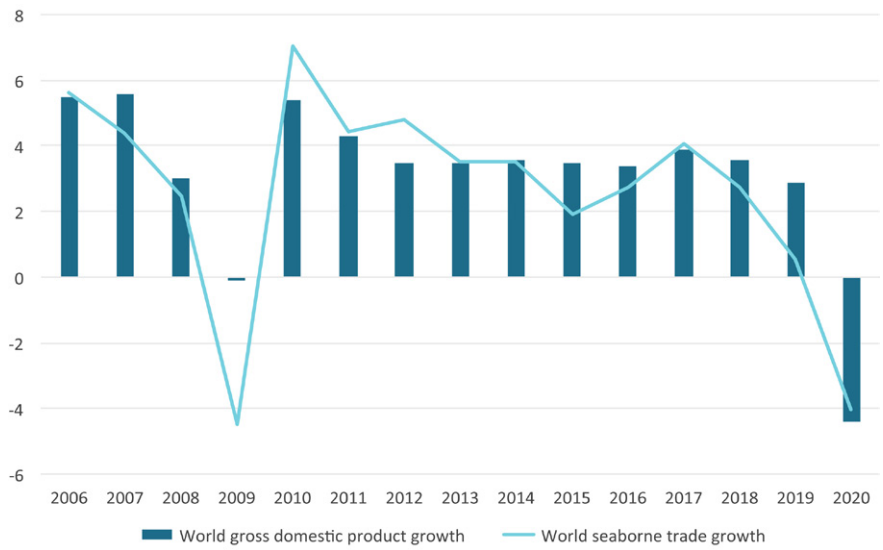
**In this sense, both geopolitics and decarbonization may have a common ground to influence the future of the maritime industry.** This paper aims to review current geopolitical risks, the path to decarbonization, and how Norway and Brazil are positioned in this context.

### 1.1. Geopolitical tensions – nationalism, COVID-19, and supply chain disruptions

**The negative economic panorama, exacerbated by geopolitical tensions, has deeply impacted the international maritime trade.** In 2019, commercial tensions and policy uncertainties undermined growth in global economic output and merchandise trade (Fig. 02) – global GDP growth was approximately 2.5%, 0.6 percentage point below 2018 (3.1%) and 1.1 percentage point below the historical average between 2001-2008 (3.6%).

5. IEA. Tracking report – International shipping. 2020

Fig. 02: **Development of international maritime trade and global output (2006-2020) (%, annual)**




Source: United Nations Conference on Trade and Development. Review of Maritime Transport. 2020

**The 2019 economic outlook was affected by increasing tensions between the two largest global economies, China and the United States.** Rising nationalistic sentiments and protectionism measures from the United States added uncertainty to international maritime trade, caused business confidence to deteriorate, and affected global foreign investments. New tariffs are estimated to have cut maritime trade by 0.5% in 2019. These tariffs have changed commercial agreements and redirected flows away from China towards other markets, specially to South-East Asia. The Chinese share in the United States' imports from Asia dropped to 64% in 2019, compared with 69% in 2018.[6]

**At the same time, increasing concerns in Europe and the uncertainty surrounding a no-deal Brexit had a negative impact on the economy.** The European Union experienced a GDP growth of 1.5% in 2019, the lowest level since 2013.[7] Also, there were escalating tensions between the European Union and the United States, mainly centered on subsidies to Airbus and Boeing. In 2019, the WTO authorized the American country to apply new tariffs of 25% on US$ 7.5 billion worth of imports from the European Union. The Europeans have since threatened to also apply tariffs, and the WTO is still expected to decide on the matter.

In the beginning of 2020, some critical issues were resolved, and the overall panorama was expected to improve. The Brexit agreement was delayed, including negotiations

6. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020
7. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020

on how trade relations between the European Union and the United Kingdom would evolve. At the same time, China and the US signed a trade agreement to de-escalate the geopolitical tensions between the two economies.[8] The agreement established that China would increase its merchandise imports from the US by US$ 200 billion, while the United States would cut by 50% its tariffs on US$ 120 billion of imports from the Asian country.[9]

**However, an unprecedented pandemic undermined the growth prospects for global trade and maritime transport**.[10] The worldwide spread of the disease will have long-lasting consequences for societies and economies, including supply-chain disruptions and reconfigurations. The COVID-19 pandemic has imposed global lockdowns, restrictions on mobility, travel, and economic activities. According to the United Nations, almost 90% of the world economy had been affected by some level of lockdown by the end of April (2020), including 4.2 billion people or 54% of the world's population.

**Initially, the pandemic gradually moved from one region to another.** Depending on where the pandemic was more severe, the trade of goods across boarders was to a certain extent restricted. This has influenced the pace at which global and regional trade were affected.[11] In this context, the maritime sector was severely hit, since approximately 80% of the world's merchandise trade by volume is carried by sea.

The crisis put the role of China on maritime trade and international supply chains on the spotlight. China was responsible for over 20% of the world's seaborne imports in 2019, up from less than 10% in 2003. COVID-19 has also shown that many countries depend on Chinese medical items and other products, being exposed during the pandemic and revealing potential vulnerabilities in future health crises.

**In this context, an already present nationalist sentiment among different countries was exacerbated**.[12] Some experts are predicting a challenging landscape for the future of globalization. In the past years, the world has seen an enormous increase in the flow of people and goods. These flows were slowed down or reversed during the pandemic. At the same time, this scenario led to calls for supply chains to be renationalized or regionalized.

On the other side, however, some positive trends are also accelerating. For example, digital technologies are being developed and becoming mainstream, enhancing

8. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020
9. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020
10. World Economic Forum. Challenges and opportunities post COVID-19. 2020
11. United Nations Conference on Trade and Development. Review of Maritime Transport. 2020
12. World Economic Forum. Geopolitics: resilient and sustainable globalization. 2020

global supply chains efficiency and promoting global services outreach.[13] At the same time, global cooperation is being reinforced as scientists from different nationalities are working simultaneously to develop vaccines.

**Given this panorama, structural changes are expected on the global economy, which will also impact international trade and the maritime industry.** According to WEF (2020),[14] countries will recalibrate the balance between full self-sufficiency and deep supply chain interdependence. The pandemic also represents an opportunity to promote a more resilient global supply chain, leveraged on digitalization and enhanced collaboration.

### 1.2. Climate change – IMO targets, new technologies and global cooperation

**The shipping industry is key to the international trade and the world economy, accounting for almost 70% of global freight transport.** Due to increased globalization and economic development, $CO_2$ emissions from the industry have increased significantly over the past years.[15]

**In 2018, the International Maritime Organization (IMO), one of the industry's most relevant institutions, announced its strategy to align shipping emission reduction targets with the Paris Agreement.** The strategy aims to reduce absolute GHG emissions by at least 50% by 2050. It also proposes to reduce the carbon intensity of international shipping by at least 40% by 2030, as well as an additional effort to reduce emissions intensity by 70% by 2050 (compared with 2008 levels).

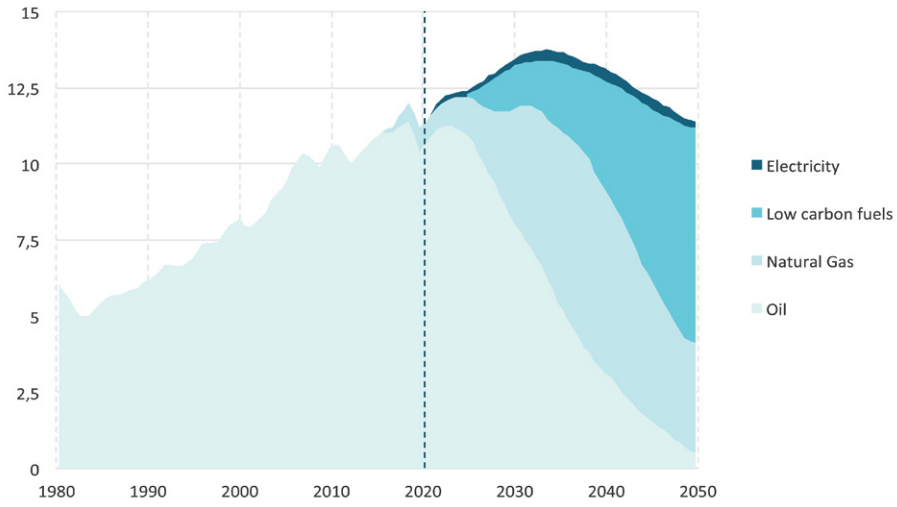
**In this challenging context, the industry must develop more energy efficient technologies, as well as switch to zero-carbon fuel vessels.** Due to operational and economic considerations, as well as the lack of environmental policies and regulations, virtually no low-carbon fuels were used in international shipping by 2019. Biofuels were the only non-fossil alternative that has been adopted, accounting for less than 0.1% of the industry's final energy demand.[16]

**According to DNV GL (2020),[17] the maritime energy mix will have to change drastically by 2050 to achieve its decarbonization goals.** Pushed by environmental policies and technological improvements, efficiency gains will be mainly associated with logistics and technological measures in hulls and engines. Unlike road transport, efficiency gains promoted by electrification will be limited to short-sea and in-port operations. It is expected that the fuel-mix in 2050 will be dominated by low and

13. World Economic Forum. Geopolitics: resilient and sustainable globalization. 2020
14. World Economic Forum. Challenges and opportunities post-COVID-19. 2020
15. International Energy Agency (IEA). International shipping. 2020
16. International Energy Agency (IEA). International shipping. 2020
17. DNV GL. Energy Transition Outlook. 2020

zero carbon fuels (60%) (e.g. ammonia, hydrogen), and natural gas (30%), mostly via LNG (Fig. 03).[18]

Fig. 03: **World maritime subsector energy demand by carrier (EJ/yr)**




Source: DNV GL. Maritime Forecast to 2050. 2020

According to DNV GL's decarbonization scenario, which is aligned with the IMO's emission targets, fossil fuels such as very low sulfur fuel oil (VLSFO), marine gas oil (MGO), and LNG will be in rapid decline by mid-century. Natural gas gains significant share in the medium term. However, as regulations are expected to tighten between 2030 and 2040, the scenarios point to the prioritization of other solutions, with reduced emission intensity.[19]

**In this sense, carbon-neutral fuels will become more relevant by the late 2030s. As highlighted before, e-ammonia, blue ammonia, and bio-methanol are expected to be the most relevant low carbon fuels in the future energy mix.** Hydrogen, as a primary energy fuel, does not gain significant relevance in DNV GL's decarbonization scenario, however, it will be critical to the production of these carbon neutral fuels.

**The IMO's emission targets will demand further collaboration between the public and the private sectors. Public policies could reinforce measures to align the shipping sector with the Paris Agreement.** The European Union, for example, requires ships that arrive at European ports to monitor and report $CO_2$ emissions, fuel consumption and energy efficiency since 2015.

18. DNV GL. Energy Transition Outlook. 2020
19. DNV GL. Maritime Forecast to 2050. 2020

At the same time, the European Commission proposed in 2019, as part of the European Green Deal, to extend the Emission Trading System to cover the maritime sector.[20] The proposal still needs to be approved and will probably be valid only after 2022. However, some Asian countries, such as Japan and South Korea, and industry associations are expressing concerns with regard to the European proposal. They argue that shipping emissions should be regulated by the International Maritime Association (IMO) and that the regional interference will hinder progress.[21]

**On the other hand, the private sector is also mobilizing towards shipping decarbonization,** as evidenced by the two initiatives known as the Poseidon Principles and the Getting to Zero Coalition.

The Poseidon Principles are a global framework for assessing and disclosing the climate alignment of financial institutions' shipping portfolios, in line with the policies and ambitions of the IMO.[22] Currently, there are 18 signatories, representing a loan portfolio of approximately US$ 150 bn – a third of the global ship finance portfolio.[23]

Additionally, the Getting to Zero Coalition is an alliance launched in 2018 and signed by more than 120 companies across the maritime industry, financial institutions, and other stakeholders. Among its members we can highlight Maersk, Shell, BHP, Cargill, and Citigroup. The Coalition is committed to getting commercially viable deep sea zero emission vessels powered by zero emission fuels into operation by 2030.[24]

Given this challenging panorama, combined action from public policies and private actions will be key. **As a global industry that integrates and connects the different regions of the world, the maritime sector will need to consider a collaborative and global approach to address climate change.**

20. SAFETY4SEA. EU Commission to propose shipping inclusion in ETS in March. 2019 – Available at: <https://safety4sea.com/eu-commission-to-propose-shipping-inclusion-in-ets-in-march/>

21. Bloomberg. Shipping Industry and Asian Nations Object to EU Pollution Plan. 2020 - Available at: <https://www.bloomberg.com/news/articles/2020-11-26/shipping-industry-and-asian-nations-object-to-eu-pollution-plan>

22. Poseidon Principles. A global framework for responsible ship finance. 2020 – Available at: <https://www.poseidonprinciples.org/about/how-did-we-get-there/>

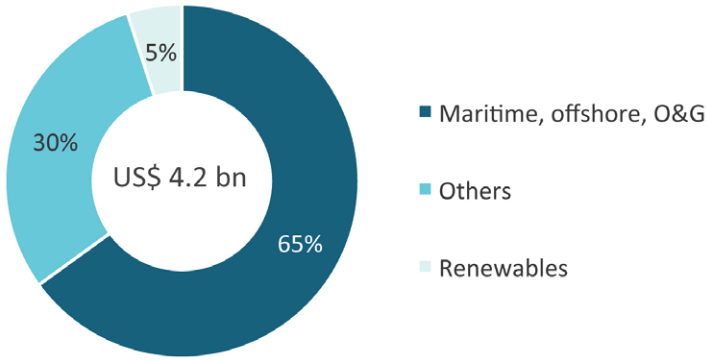
23. Poseidon Principles. A global framework for responsible ship finance. 2020 – Available at: <https://www.poseidonprinciples.org/about/how-did-we-get-there/>

24. Global Maritime Forum. Getting to Zero Coalition. 2020 – Available at: <https://www.globalmaritimeforum.org/getting-to-zero-coalition/resources>

# 2. Maritime industry – An analysis of Norway and Brazil

**Norway and Brazil are long-time partners. In the maritime sector, both countries are naturally connected by the sea, which is one of the key areas of the economic relationship.** In 2016, the Norwegian Government developed a strategy[25] to strengthen cooperation with Brazil on key areas, including the maritime and energy sectors. Norway invested over US$ 4.2 bn in Brazil in 2018, directing approximately 65% to the maritime, offshore and O&G sectors[26] (Fig. 04).

Fig. 04: **Norwegian investments in Brazil - 2018 (%)**




Source: Norwegian Consulate General – Rio de Janeiro. Norwegian Investments in Brazil. 2019

Norwegian companies are also present in all segments of the O&G value chain. Equinor, for example, is the third largest operator in Brazil, after Petrobras and Shell.[27] The company is present in the most relevant pre-salt basins and is one of the key companies capable of developing offshore wind projects in Brazil. Therefore, both countries have the opportunity to enhance this successful partnership on key maritime sectors, as well as to deal with the most relevant maritime issues.

25. Norwegian Ministry of Foreign Affairs. The Norwegian Government's strategy for cooperation between Brazil and Norway. 2016

26. Norwegian Consulate General – Rio de Janeiro. Norwegian Investments in Brazil. 2019

27. ANP. Painel dinâmico de produção de petróleo e gás natural. 2020

### 2.1. Norway – global leadership in the maritime sector decarbonization

**Norway is one of the leading countries of the maritime industry, which includes oil, fishing, and shipping. Norway's maritime industry comprises over 7.500 companies and accounts for approximately 10% of the country's GDP.** The shipping companies represent the largest segment of the maritime industry, operating in most of the largest shipping markets (e.g. tank, bulk, container).[28]

Norway is also the third largest shipping country for total carrying capacity and is top 10 in terms of annual value shipped by volume.[29] Some of the world's biggest ship financing banks are based in the country, as is a large share of the world's market ship insurance.[30]

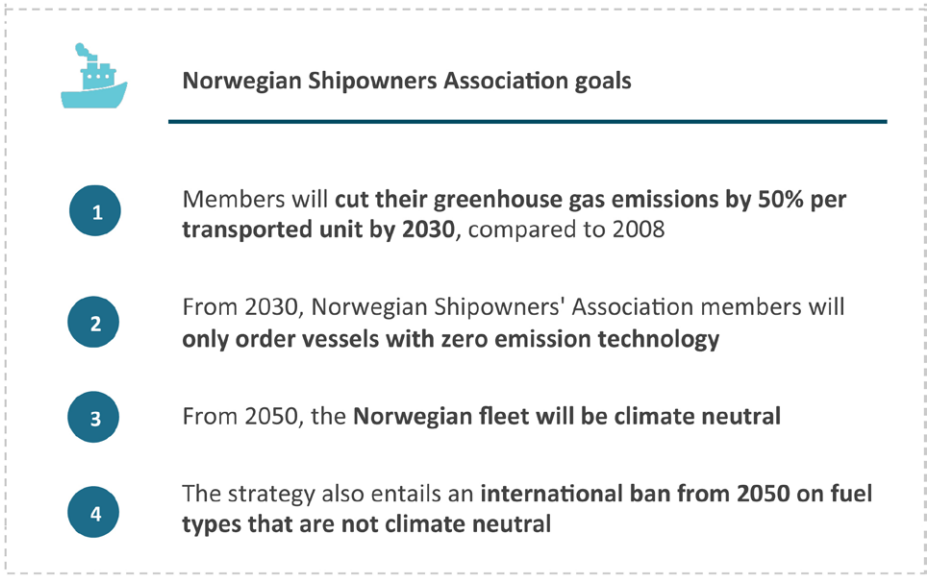
**The country aims to strengthen its position as a global leader in maritime industry decarbonization.** In 2019, the Government released an action plan for green shipping. The action plan is in line with the country's nationally determined contribution (NDC) under the Paris Agreement, which is to reduce emissions by at least 40% by 2030 compared with the 1990 level. According to the document, the Government's green shipping action plan aims to promote market change that allow zero- and low-emission solutions to become profitable.[31]

The action plan has been divided in different ship categories (e.g. cargo vessels, ferries, passenger vessels), according to emission reduction potential and policy instruments needed. As an example, for cargo vessels the Norwegian Government aims to: (i) identify possible challenges relating to funding for green fleet renewal for the short sea cargo fleet; (ii) use incentive schemes for short sea shipping as a means of reducing total emissions from freight transport; and (iii) include requirements related to zero-emission transport in public procurement processes.

**In 2020, the Norwegian Shipowners' Association, along with shipping companies, announced even bolder ambitions for the entire Norwegian fleet,**[32] as illustrated in Fig. 05 below:

28. ECODNA. Norway a Green Shipping Pioneer. 2020 – Available at:< https://ecodna.art/norway-a-green-shipping-pioneer/>
29. ECODNA. Norway a Green Shipping Pioneer. 2020 – Available at:< https://ecodna.art/norway-a-green-shipping-pioneer/>
30. ECODNA. Norway a Green Shipping Pioneer. 2020 – Available at:< https://ecodna.art/norway-a-green-shipping-pioneer/>
31. Norwegian Government. The Government's action plan for green shipping. 2018
32. Norwegian Shipowners' Association. Zero Emissions in 2050. 2020

Fig. 05: **Norwegian Shipowners' Association goals**




Source: Norwegian Shipowners' Association. Zero Emissions in 2050. 2020

The Shipowners' Association also released a roadmap to achieve their goals, establishing that the most important measures are related to energy efficiency, improvements to existing ships, fleet renewal, and the phasing in of sustainable low and zero-emissions fuels. The document also reinforces that authorities must target research and development resources for the development of zero-emission solutions, establish a maritime fund for zero-emission technologies, and develop market regulations in order to contribute to lower emission ships profitability.[33]

### 2.2. Brazil – maritime potential, source of energy, resources, and means of transport

**Brazil is a country of continental size with a coast of over seven thousand kilometers. The country's maritime sector is a relevant source of energy, resources, and means of transport.** The energy sector is already consolidated, especially the O&G sector. According to ANP (2020)[34], approximately 96% of the oil and 81% of the natural gas are produced offshore. Brazil's pre-salt discoveries are also among the most important in the world over the past decade, which comprise large reserves of high commercial value light oil and natural gas.

33. Norwegian Shipowners' Association. Zero Emissions in 2050. 2020

34. ANP. Painel dinâmico de produção de petróleo e gás natural. 2020

**At the same time, considering the global energy transition, Brazil is also well positioned to capture the opportunities associated with wind offshore generation.** Currently, the country has over 6 offshore wind farm projects, which are expected to be fully operational in the coming years. According to EPE (2020)[35], all coastal regions of the country have areas with high potential, however, the best locations are in the Northeast region. Estimates point to a potential capacity around 700 GW in Brazilian offshore sites – up to 50 meters deep (almost 3.5 times the current Brazilian installed capacity)[36].

The Brazilian ocean is also a source of food and other natural resources. Currently, Brazil is the second largest fisheries and aquaculture producer in the Latin American and Caribbean region, with around 40% of the country's production coming from the ocean. It is estimated that about 3.5 million people are directly involved in fisheries and aquaculture in the country. The country is also the largest trader of fish in the Latin American region, having imported over US$ 1.4 bn and exported US$ 250 mn in 2017[37].

**The vast potential of the Brazilian maritime region is still unknown and yet to be fully explored. The Blue Amazon, for example, is an offshore area of approximately 4.4 million square km on the country's coast, rich in maritime biodiversity and energy resources.** It holds this name due to the similar extension to the Amazon forest – nearly half the size of the national territory. This area is a Brazilian economic zone that was recently expanded by the UN. Although its economic potential has not yet been fully mapped by Brazilian authorities, experts indicate that the region is home to different types of economic use, including fishing, mining, oil and gas, and biodiversity conservation of marine species[38].

**In addition to its energy and resources potential, the maritime sector also represents a relevant means of transport.** The vast majority of Brazil's foreign trade moves by sea, as approximately 90% of imports and exports use sea transportation, including those originating in or destined to neighboring countries[39]. Therefore, the maritime transport is critical to promoting the country's international competitiveness and insertion in global supply chains.

**There are also opportunities to enhance maritime means of transport within the country.** Different products can be shipped by cabotage or short sea between Brazilian regions, contributing to a more sustainable transportation matrix, reducing

35. EPE. Brazilian Offshore Wind Roadmap. 2020

36. EPE. Plano Decenal de Expansão de Energia 2029.2019

37. Food and Agriculture Organization of the United Nations. Fishery and Aquaculture Country Profiles – Brazil. 2019

38. Ortiz, F. The Blue Amazon, Brazil's New Natural Resources Frontier. 2020

39. Ortiz, F. The Blue Amazon, Brazil's New Natural Resources Frontier. 2020

logistics costs, and promoting competition between modals[40]. Since 2019, the federal government is discussing the BR do Mar program, which aims to stimulate cabotage as a logistic alternative, reducing the country's infrastructure deficit, pointed out as a barrier to investments and business development[41]. Currently, cabotage in Brazil is governed by the Law No. 9,432/97, which restricts the operation of foreign vessels and companies in navigating domestic routes (cabotage, inland navigation, and port and maritime support)[42].

**Therefore, Brazil has the opportunity to consolidate and expand its maritime vocation.** Currently, its potential is unknown and not fully comprehended by authorities and companies. Scientific research and public policies are still lagging and should be reinforced to change the current panorama.

40. Botter, R.C.; Moura, D. The Potential for the Growth of Maritime Transport in Brazil: Focus on Cabotage/Short Sea Shipping. 2020

41. While we are writing this paper, the BR do Mar Bill of Law has been approved by the Lower House and it is to be submitted to the Brazilian Senate shortly

42. Legal Intelligence Center. BR do Mar Program promises to boost cabotage in Brazil. 2020

# 3.

# Final remarks

**The maritime industry faces a moment of unprecedent challenges.** In the short term, geopolitical tensions exacerbated by the COVID-19 pandemic may impose structural changes on value chains and on the current level of interdependency among countries. In the medium to long term, climate change will demand environmental policies and innovative technological developments towards shipping decarbonization. **Both challenges also represent an opportunity to reshape the maritime industry, strengthening its resilience and sustainability.**

**As per Norway and Brazil, the partnership between the two countries in the maritime sector should be reinforced in order to deal with the recent challenges faced by the industry – geopolitical tensions and climate change.** The Norwegian leadership in the maritime industry, including its decarbonization expertise and know-how, can fulfill Brazil's needs to expand and consolidate its maritime potential. At the same time, different sectors of the Brazilian maritime industry (e.g. energy, resources, and transport) may represent attractive business opportunities to Norwegian companies, leveraging on already strong ties and consolidating their long-term partnership.

**Both countries benefit from an extraordinary sea exposure, which should revert in wealth generation and opportunities to be captured.**

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