

Forum:	The Group of Twenty (G20)
Issue:	Enhancing decarbonization efforts in the maritime industry
Student Officer:	Valia Memeniou
Position:	Deputy President

PERSONAL INTRODUCTION

Dear delegates of the G20,

My name is Valia Memeniou, I am 16 years old and a student at CGS. This year PSMUN has given me the opportunity to be a part of the conference and I have the utmost honor of serving as a Deputy President of the Group of Twenty. The G20 aims to unite world leaders around shared economic, political, and health challenges and is intended to foster global economic cooperation. One of the issues that will be discussed in this conference is the enhancement of decarbonization efforts in the maritime industry. In a world where greenhouse gas emissions are constantly rising and damaging the environment, including oceans, decarbonization in the maritime industry is of great importance.

Lastly, this study guide is for introductory purposes only, it should not be used as the only source of information and you should conduct further research. I hope it helps you understand the issue and helps you provide relevant and effective solutions. If you have any questions, feel free to contact me at this email address: valia.memeniou@soapplied.com

Kind regards,
Valia Memeniou

TOPIC INTRODUCTION

An issue of great significance, that has been affecting the planet for many years and that hasn't yet been stopped by human innovation, is climate change. This alteration of climate is occurring at such a rate that it is impossible for living things to adapt to it. This issue is mostly caused by greenhouse gas emissions, which are mainly caused by human activities. Greenhouse gases trap heat and raise global temperatures. The primary source of greenhouse gas emissions from human activity is the burning of fossil fuels for electricity, heat, and transportation.

More specifically, transportation in the maritime sector can be really polluting. Maritime transport is estimated to emit around 940 million tonnes of CO₂ per year, accounting for about 2.5 percent of global greenhouse gas emissions, with a projected increase in the coming years (estimated increase rate of 50%-250% by 2050) unless decarbonization measures are implemented.

This has a substantially negative influence on the ocean. It results in changes in water temperature, ocean acidification, and deoxygenation, as well as changes in oceanic circulation and chemistry, rising sea levels, increased storm intensity, and changes in marine animal diversity and abundance. Deterioration of marine ecosystems endangers local communities' physical, economic, and food security, as well as global corporations' access to resources. Climate change lowers the ability of the oceans and coasts to provide vital ecosystem services such as food, carbon storage, and oxygen production.

Concluding, sustainable coastal and marine ecosystem management, protection, and restoration are critical for the continuous provision of ecosystem services that humans rely on. For the ocean's health to be preserved, following a low-carbon emissions route is required, meaning that decarbonization efforts in the maritime industry need to be enhanced.

DEFINITION OF KEY TERMS

Climate change

Long-term changes in temperature and weather patterns are referred to as climate change. These variations could be due to natural causes, such as oscillations in the solar cycle. However, human activities have been the primary driver of climate change since the 1800s, due to the burning of fossil fuels.

Fossil fuels

"A fuel, such as coal, oil, or natural gas, formed in the earth from plant or animal remains"¹ is called fossil fuel.

¹ "Fossil Fuel." *The Merriam-Webster.Com Dictionary*, www.merriam-webster.com/dictionary/fossil%20fuel. Accessed 16 Dec. 2021.

Ocean acidification

Carbon dioxide dissolves in seawater when it enters the ocean. It first produces carbonic acid. The carbonic acid then disintegrates, releasing bicarbonate ions and hydrogen ions. Ocean acidification occurs as a result of increasing CO₂ absorption, which causes a rise in hydrogen ions and a decrease in carbonate ions. Carbonate ions are essential for the survival and growth of sea life.

Marine ecosystems

Marine ecosystems are aquatic environments with high dissolved salt levels. The open ocean, deep-sea oceans, and coastal marine ecosystems are among them, each with its own set of physical and biological characteristics.

Carbon pollution

Burning fossil fuels releases carbon dioxide, which is a greenhouse gas, into the atmosphere. They pollute the air, create smog and trap heat.

Decarbonization

The term 'decarbonisation' is usually used to describe the process of lowering 'carbon intensity,' or the amounts of greenhouse gas emissions produced by burning fossil fuels.

BACKGROUND INFORMATION

CO₂ emissions

Global climate change is mostly caused by carbon dioxide emissions. It is commonly acknowledged that, in order to avoid the worst effects of climate change, the world must reduce emissions as soon as possible. Emissions were quite low prior to the Industrial Revolution. Emissions growth was still quite moderate until the mid-twentieth century. Emissions have since risen dramatically, and we currently produce over 34 billion tons of carbon dioxide every year. The maritime sector contributes to the production of carbon and its release into the atmosphere.

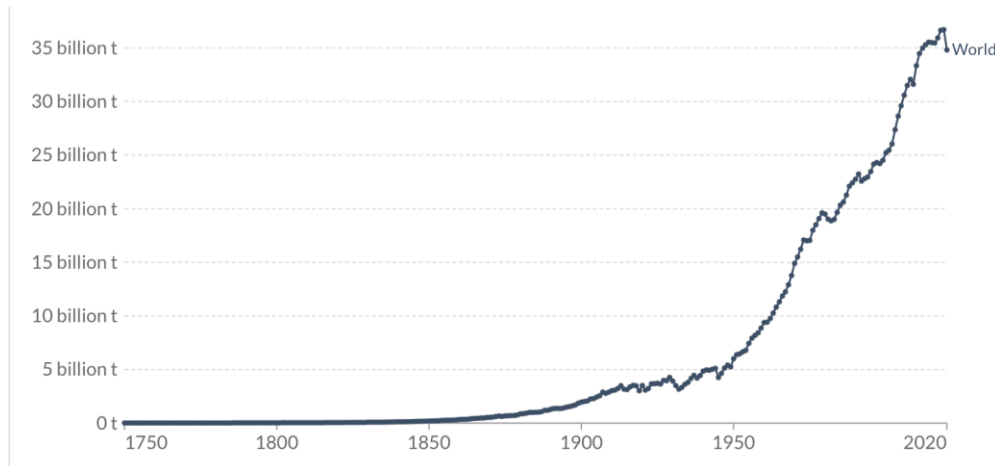


Figure 1: Annual CO2 emissions

Ritchie, Hannah. "CO2 Emissions." *Our World in Data*, 11 May 2020, <https://ourworldindata.org/co2-emissions>.

Main sources of CO2 emissions

Carbon dioxide emissions occur from both natural and human activities. Decomposition, ocean release, and respiration are all-natural sources. Human causes include cement manufacturing, deforestation, and the combustion of fossil fuels such as coal, oil, and natural gas.

Energy consumption is by far the most significant source of human-caused greenhouse gas emissions, accounting for 76% of global emissions. Transportation, electricity and heat, buildings, manufacturing and construction, fugitive emissions, and other fuel combustion are all part of the energy domain. Heat and electricity generation account for the majority of emissions in the energy sector, followed by transportation (14.2 percent of total emissions) and manufacturing and construction.

The maritime sector is a large global industry. However, like other profitable industries, it not only has to manage with a high demand for services, but it also has to deal with several environmental challenges. The amount of carbon monoxide emitted by ships is increasing at an alarming rate as climate change worsens year after year. Greenhouse gas emissions from the shipping industry are predicted to account for 10% of global emissions by 2050, according to Transport and Environment. The shipping sector also contributes to the worsening of climate change by releasing black carbon into the atmosphere as a result of the burning of maritime fuel.

Effects of CO2 emissions

Since the end of the preindustrial era, the ocean has absorbed around 29% of global CO2 emissions. We emitted around 40 gigatons of heat into the atmosphere in the last decade. Some of the issues caused by this problem are the following.

Humans have considerably increased the amount of CO2 in the atmosphere in the last 150 years by burning fossil fuels and changing land-use practices. As a result, the

ocean has absorbed nearly a third of the extra carbon. Ocean surface temperatures are rising and ocean acidification is occurring as carbon dioxide levels in the atmosphere rise. Despite the fact that warming and acidification are two separate phenomena, they cooperate to endanger marine ecosystems.

Many marine species are threatened by ocean acidification, which is compounded by other climatic consequences such as warmer waters, deoxygenation, melting ice, and coastal erosion. Ocean acidification is particularly harmful to organisms that rely on calcium carbonate for their skeletons and shells, and which are at the bottom of the food chain. Acidification limits the availability of carbonate ions in ocean water, which provide the building blocks these animals need to create their shells and skeletons, lowering their offspring's chances of survival.

In addition, toxic algal blooms have expanded in response to rising water temperatures. Toxic algae create domoic acid, a neurotoxin that accumulates in the bodies of shellfish and poses a health concern to humans.

Ocean acidification has a negative influence on vital economic sectors such as fisheries and tourism, as well as the food supply. It also magnifies global warming by impairing the oceans' ability to absorb CO₂. Communities that rely on coastal resources risk losing their way of life and cultural identity.

Maritime Industry and carbon emissions

International shipping is critical for trade activities, and demand for shipping is expected to rise dramatically. Today's international shipping is still heavily reliant on fossil fuels, which create greenhouse gases.

Maritime transportation is said to release roughly 940 million tons of CO₂ per year, accounting for around 2.5 percent of global greenhouse gas emissions, and is expected to rise dramatically in the coming years.

Decarbonization of the maritime industry

Shipping confronts a unique combination of climate mitigation issues, and present policies are unlikely to cut emissions to the levels required to meet the Paris Climate Agreement's goals. The Energy Efficiency Design Index (EEDI), the Ship Energy Efficiency Management Plan (SEEMP), the Energy Efficiency Existing Ship Index (EEXI), and the Carbon Intensity Indicator (CII) have all been used internationally.

Challenges of decarbonization in the maritime industry

Due to the transnational and global nature of shipping, a lack of commercial availability of alternative fuels, the difficulty of electrification, the need for new common infrastructure, the lack of clarity of potential regulation and guidelines, and potential economic impacts from trade patterns and market conditions, decarbonisation of shipping faces a unique set of challenges. For the above reasons, alternative fuels and market-based methods would require a more multilateral effort.

MAJOR COUNTRIES AND ORGANIZATIONS INVOLVED

The United Kingdom

The United Kingdom supports projects that promote industrial decarbonization. The United Kingdom's ambition is to be a global leader in the technologies needed to decarbonize industry and economies so that they can transition to net zero carbon emissions through the use of innovative technologies and carbon reduction programs.

The UK government is expected by the Climate Change Act 2008 to achieve net-zero greenhouse gas emissions by 2050. A set of five-year carbon budgets will be used to track progress toward this goal. Figure 2 depicts the United Kingdom's emissions milestones (5-year carbon budgets) along its route to net zero emissions by 2050. The United Kingdom has met the first of its three carbon budgets (2010, 2015, 2020). The decline in CO₂ emissions was caused by a more environmentally friendly electricity mix based on gas and renewables rather than coal, as well as lower energy consumption in homes, businesses, and industry.

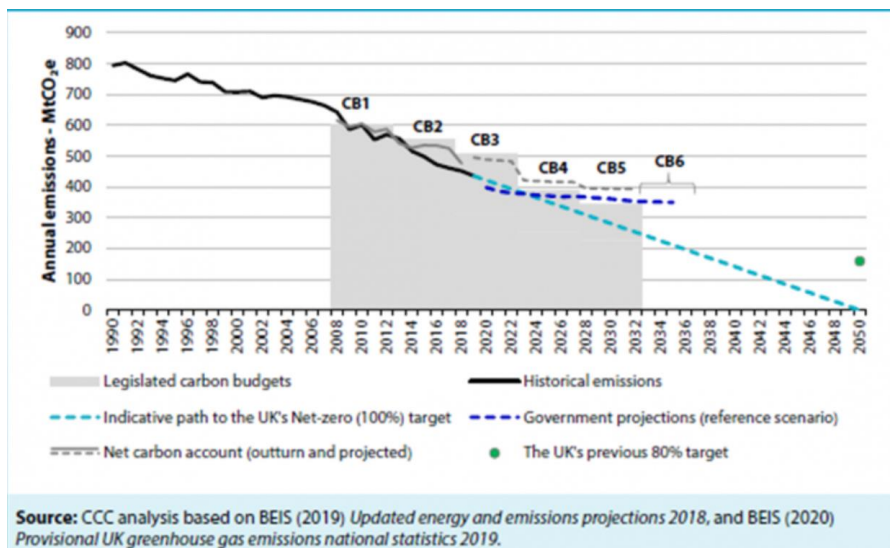


Figure 2: UK target setting and emissions milestones

Ucl. "UK Decarbonisation Pathways." The Bartlett, 29 June 2021, www.ucl.ac.uk/bartlett/news/2021/apr/uk-decarbonisation-pathways.

China

China produces more greenhouse gases than the rest of the industrialized world put together. In 2019, China emitted over 27% of global greenhouse gas emissions. China has pledged to achieve net-zero emissions by 2060, with a peak by 2030. To that end, the country will promote large-scale carbon capture projects and monitor methane emissions from coal, oil, and gas extraction.

European Union (EU)

Shipping emissions account for around a quarter of all EU transportation-related greenhouse gas emissions (2015). The contribution of the shipping sector to emission

reductions consistent with the Paris Agreement's temperature goals is still a highly regarded issue in the EU.

The European Commission released a series of legislative recommendations on July 14, 2021, outlining how it plans to achieve climate neutrality in the EU by 2050, including an intermediate goal of a net reduction of at least 55 percent in greenhouse gas emissions by 2030. The package seeks to update a number of pieces of EU climate law, including the EU ETS, the Effort Sharing Regulation, and transportation and land use legislation, laying out in concrete words how the Commission plans to meet EU climate targets under the European Green Deal.

Singapore

Singapore has announced its enhanced National Determined Contribution and Long-Term Low-Emissions Development Strategy to the United Nations Framework Convention on Climate Change in 2020, as part of its pledge under the Paris Agreement to reduce national domestic emissions. The strategy aims to peak domestic emissions at 65MtCO₂e around 2030, with a goal of achieving net zero emissions as soon as possible in the second half of the century.

Singapore recently unveiled the Singapore Green Plan 2030, a national initiative to urge bold and collaborative action to combat climate change and decarbonization.

As a result, the Maritime and Port Authority of Singapore (MPA) is preparing the Maritime Singapore Decarbonisation Blueprint 2050, which will outline decarbonisation plans to cut GHG emissions from international shipping and mitigate Singapore's maritime transport emissions.

International Maritime Organization

The International Maritime Organization (IMO) is a United Nations specialized organization in charge of maritime safety and security, as well as the prevention of ship-related marine and atmospheric pollution.

The International Maritime Organization (IMO) continues to contribute to the global fight against climate change, in support of UN Sustainable Development Goal 13, which calls for immediate action to prevent climate change and its consequences.

Under the IMO's pollution prevention treaty (MARPOL), mandatory measures to minimize greenhouse gas emissions from international shipping have been adopted: the Energy Efficiency Design Index (EEDI), which is mandatory for new ships, and the Ship Energy Efficiency Management Plan (SEEMP).

In 2018, the International Maritime Organization (IMO) announced an initial strategy for lowering GHG emissions from ships, outlining a vision that reaffirms the organization's commitment to decreasing GHG emissions from international shipping and phasing them out as soon as practicable.

IMO is also working on global technical cooperation programs to help countries, particularly poor countries, improve their capacity to implement and support energy efficiency in the shipping sector.

International Chamber of Shipping

The ICS was founded in 1921 and is responsible for all elements of maritime affairs, including maritime safety, environmental protection, maritime law, labour issues, and trade. The ICS recognises that rapid decarbonisation of the shipping sector is vital, and supports the goals of the IMO on decarbonisation in the maritime sector.

TIMELINE OF EVENTS

Date of Event	Description of event
March 17, 1948	The International Maritime Organization was founded.
December 11, 1997	The Kyoto Protocol was signed.
January 1, 2016	The 2030 Agenda including the 17 Sustainable development goals come into force
November 4, 2016	The Paris Agreement was entered into force.
April, 2018	The IMO adopted an initial strategy on the reduction of GHG emissions from ships, called the Greenhouse Gas Strategy.
September 2019	At the Climate Action Summit, the global shipping industry launched the Getting to Zero Coalition to cut emissions by at least 50 percent by 2050 and make the transition to full decarbonization possible.
2021	The Global Carbon Project research groups study projected total global emissions this year to reach 36.4 billion tons of CO ₂ .
October 31, 2021	2021 United Nations Climate Change Conference.

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

Because international shipping is beyond the authority of individual governments, the efforts to decarbonize "International Shipping" are best characterized by the International Maritime Organization (IMO), a United Nations institution tasked with regulating it. However, history reveals that the international community took years to respond. Even so, the responses have always been peppered with different viewpoints from both inside and outside the shipping sector.

Kyoto Protocol

On December 11, 1997, the [Kyoto Protocol](#) was signed. The Kyoto Protocol now has 192 signatories. It puts the United Nations Framework Convention on Climate Change

into action by committing developed and developing countries to regulate and reduce greenhouse gas emissions in line with agreed-upon individual targets. The Convention merely requires those countries to establish mitigation plans and actions and to report on a regular basis.

Paris Agreement

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) signed the [Paris Agreement](#) on Climate Change in 2015, and it went into effect in 2016. The Paris Agreement's main goal is to enhance the global response to the threat of climate change by keeping global temperature rises well below 2 degrees Celsius over pre-industrial levels this century, and to pursue efforts to keep temperature rises even lower at 1.5 degrees Celsius. Although international shipping is not included in the Paris Agreement, the International Maritime Organization (IMO), as the industry's regulating authority, is committed to decreasing greenhouse gas emissions.

Sustainable Development Goal 13

SDG 13: “Take urgent action to combat climate change and its impacts”.

Climate change is one of the most significant issues of our time, and one that the IMO has been combating for some time. In its position as the global regulator of international shipping, the International Maritime Organization has developed a number of policies aimed at reducing emissions from the shipping industry.

The International Maritime Organization continues to contribute to the global fight against climate change, in support of UN Sustainable Development Goal 13. In 2018, the International Maritime Organization announced an initial strategy for lowering GHG emissions from ships, outlining a vision that reaffirms the organization's commitment to decreasing GHG emissions from international shipping and phasing them out as soon as possible.

Sustainable Development Goal 14

SDG 14: “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”

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

Because international shipping takes place on the world's oceans, the work of the International Maritime Organization, which is in charge of measures to improve the safety and security of international shipping and to prevent pollution from ships, is critical to most, if not all, of the SDG 14 targets. Human activities must be balanced with the seas' ability to remain healthy and diversified over time in order to be sustainable. The International Maritime Organization's duty includes ensuring that shipping continues to contribute to the global economy without disrupting the delicate balance.

The International Maritime Organization regulates all areas of international shipping, including ship design, building, equipment, staffing, operation, and disposal, in order to keep this crucial industry safe, ecologically friendly, energy efficient, and secure.

COP26

The United Nations Climate Change Conference (COP26) in Glasgow drew 120 international leaders. The COP26 provided new "building blocks" for advancing the Paris Agreement's implementation through initiatives that can move the world toward a more sustainable, low-carbon future.

The urgency of action was emphasized, and governments eventually agreed to a provision asking for the phase-out of coal power and the phase-out of "inefficient" fossil fuel subsidies.

International Maritime Organization

The IMO laid out its "initial climate strategy" in April 2018. The strategy's goals were to reduce CO₂ emissions per transport work and to reduce the total annual GHG emissions by at least 50% by 2050. In 2011, IMO adopted mandatory measures to improve the energy efficiency of international shipping representing the first-ever mandatory global energy efficiency standard for an international industry sector, the first legally binding instrument to be adopted since the Kyoto Protocol that addresses GHG emissions and the first global mandatory GHG-reduction regime for an international industry sector.

IMO's energy-efficiency measures implemented through global partnership projects includes:

The Global Maritime Energy Efficiency Partnerships (GloMEEP) project, which encourages the adoption and implementation of energy-efficiency measures for shipping, hence lowering shipping's greenhouse gas emissions. GloMEEP was launched in 2015 in collaboration with the UN Development Programme and the Global Environment Facility.

The Global Industry Alliance (GIA) to Support Low Carbon Shipping was launched in 2017 under the auspices of the GloMEEP project and is tasked with discovering and developing solutions to assist in the adoption of energy-efficient technologies and operational measures in the maritime sector.

The Global Maritime Technology Cooperation Centres Network (GMN) project, funded by the European Union, has established a network of five Maritime Technology Cooperation Centres (MTCCs) in Africa, Asia, the Caribbean, Latin America and the Pacific. Since 2018, the MTCCs have been focusing their efforts on helping countries develop national maritime energy-efficiency policies and measures, promote the uptake of low-carbon technologies and operations in maritime transport, and establish voluntary pilot data collection and reporting systems through collaboration and outreach activities at the regional level.

The GreenVoyage2050 project, a collaboration between IMO and the Government of Norway is a project that was launched in 2019, and will initiate and promote global efforts to demonstrate and test technical solutions for reducing GHG emissions, as well as enhancing knowledge and information sharing to support the IMO GHG reduction strategy.

The importance of addressing barriers to decarbonization will grow as shipping emissions continue to rise. There are many barriers to international shipping decarbonization, ranging from institutional, financial, and technical aspects. Some of them are the following:

1. Lack of alternative fuel/renewable energy that has commercial viability for international shipping
2. The urgency of addressing carbon dioxide and other GHG emissions does not appeal to all governments/political leaders.
3. Most shipping companies alike remain reluctant in doing anything that would raise the cost of transporting goods.

POSSIBLE SOLUTIONS

With increasing pressure from governments, regulatory organizations, and customers, the shipping sector is undergoing a "green revolution," rethinking how it might transport millions of tons of cargo across oceans without contributing to global emissions. And, like with many other climate change remedies, the answers lie in a combination of new measures ranging from highly technical to incredibly simple.

The shipping industry may lower its carbon impact in the following ways:

Switch to Cleaner Sources of Fuel

The most obvious way to reduce shipping emissions in the short-term, is to use fuels that produce fewer greenhouse gasses and pollutants. Such fuels can be biofuels, which can significantly reduce the CO₂ emissions by shipping industry vessels without expensive modifications to existing engines and biomass-derived fuels are also proving to be a promising option.

Transition to Green Hydrogen

Green hydrogen has the potential to make shipping completely emission-free. Green hydrogen, on the other hand, takes up 2-4 times the physical area of bunker fuel, limiting the amount of cargo that ships may carry. Switching to hydrogen also necessitates replacing old engines with electric motors and hydrogen fuel cells, which, while technically feasible, necessitates a large financial commitment. Despite the challenges, it appears that green hydrogen will play a significant part in lowering CO₂ emissions in the shipping industry, if not become the dominant fuel source.

Reduce travel speeds

This strategy entails shutting down engines to save fuel while also lowering shipping CO2 emissions. Slow steaming was first utilized by commercial shipping companies in 2007, when the global financial crisis caused an oversupply and interrupted international trade. Many countries, including crucial EU members, are now seeking to make slow steaming a key component of carbon-reduction plans.

Government initiatives

Governments should undertake the funding of the research and development of alternative fuels that will be commercially viable and the technology to match. The capital demand requires that the government should take the lead in this adventure. More specifically, one of their main priorities should be lowering CO2 emissions, by eliminating CO2 emitting technologies and energy sources and replacing them with low-carbon and zero-carbon alternatives, as well as reducing energy use. In addition, governments should implement new laws and regulations, producing a cohesive and sufficient set of incentives to drive emissions in line with their carbon budget targets.

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