Sustainable Shipping: Enable Solutions for a Greener Future

This white paper analyzes the impact of the global transportation (especially in the shipping and logistics) industry on environment, how the concept of sustainability emerged in the shipping industry and in what ways we can take necessary actions.

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Table of Content

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Executive Summary

The need to address the climate crisis is already well established. In addition to the countless studies to support the argument, the more recent 2021 IPCC Report from the UN emphasizes on the critical need for immediate and drastic climate action. It highlights the indisputable link between climate change and human activity. Social costs are the unintended adverse effects of business activities (externalities) on people and places. The burden of social costs is always on the rise due to the over-exploitation of environmental resources. According to numerous environmental protection agencies, the industrial and commercial energy usages such as electricity, transportation, various industrial processes, manufacturing, burning fossil fuels, use of gasoline, etc. have increased the emission of Green House Gases (GHGs), with spillover effects on others in the form of noise, air, and water pollution.

The shipping industry is a rapidly growing source of greenhouse gas emissions from the transportation sector. It is a more prominent source of air pollution, causing different adverse effects linked to human health and the environment. It also contributes to climate change through emissions of Black Carbon, Carbon dioxide (CO2), Nitrogen oxides (NOx), Sulphur oxides (SOx) and particulate matter (PM), tiny black particles produced by marine fuel combustion. The shipping industry uses highly polluting bunker fuels like Heavy Fuel Oil (HFO) for economic reasons, which poses a real danger. One of the most-discussed topics in the shipping industry today is sustainability. The IMO (International Maritime Organization) has proposed several ambitious targets for shipping countries, starting with the sulfur cap by 2020, the target for 40% improvement in ship efficiency by 2030, and the target for 50% reduction in total annual GHG emissions by 2050. Zero-net carbon emission from shipping within this timeframe is one of the proposed levels of ambition in the context of the International Maritime Organization's "Initial GHG (Green House Gas) Strategy."

According to the Organization for Economic Co-operation and Development (OECD), complete decarbonization of the sector would be possible by 2035 if we can effectively combine Technological measures, Operational Measures, and Renewable Energy. However, considering the trend of emissions we have seen in the past and the progress of mitigating actions, one may wonder whether the objective of OECD to achieve complete decarbonization by 2035 is realistic. Sustainable development has become a recognized goal for human society since the environmental conditions are continuously deteriorating in many parts of the world.

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The role of digitization in environmental sustainability

Digitalization has given access to an integrated network of unexploited data that can potentially benefit society and the environment. The development of intelligent systems connected to the internet of things can generate unique opportunities to address challenges associated with climate change strategically. Technological solutions have begun to play a critical role in building sustainable solutions. One of the first steps towards achieving this decarbonization goal would be to effectively measure, understand and monitor the emission data, so the industry players can then take practical actions towards neutralizing these emissions.

Sustainability solutions: Making waves in the shipping industry

The sustainability cloud-based solutions enable shipping companies to produce meaningful insights with the right amount of data. For instance, it helps the companies measure the emission level of each vessel considering its present fuel efficiency, what's the emission w.r.t the cooling/heating consumption, etc., which effectively helps you plan solutions on how to neutralize such effects.

This white paper

- Highlights the current trends in the shipping industry concerning global emissions.
- Analyzes the impact of global transportation (with specific attention to Shipping Logistics) industry on the environment
- Explores how the concept of sustainability emerged in the shipping industry and in what way shipping giants can take the necessary actions
- Enable organizations to effectively monitor their carbon footprint

Where the shipping industry is today?

As per the Organization for Economic Co-operation and Development (OECD), around 90% of the volume of international trade of goods is carried by sea and is processed through the different ports worldwide. Let us understand where the shipping industry stands today w.r.t. the environmental values.

1.1 Trends in global emissions

The global emission of Greenhouse gases (GHGs) is growing exponentially. The profit maximization goals of the organizations with less emphasis on the environment in the past has done substantial damage, with the carbon dioxide emissions gone over six times over the last five decades.

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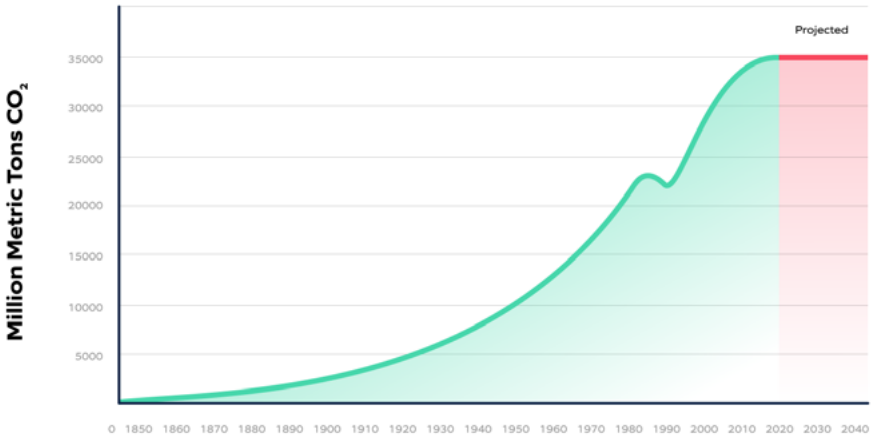

Figure 1: Global Carbon Dioxide Emissions 1850-2040

1.2 Global GHG Emission from different Economic sectors

Different industries affect the environment on a different scale. As you can see here, the Transportation sector impacts around 14% of total global GHG emissions. And even though it is not the most prominent figure among the different industries, the impact of transportation on the environment is growing rapidly.

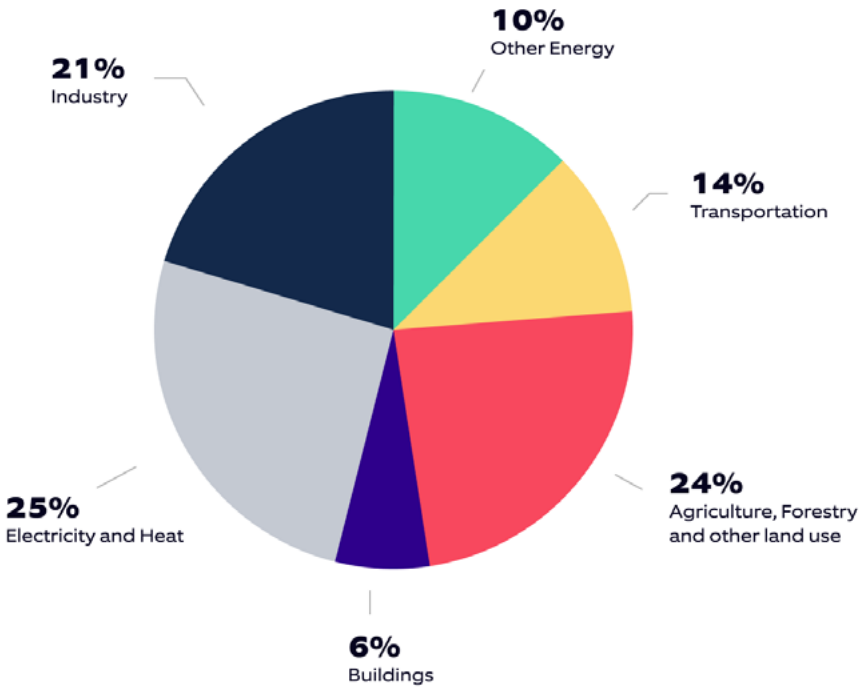

Figure 2: Global greenhouse gas emissions by economic sectors

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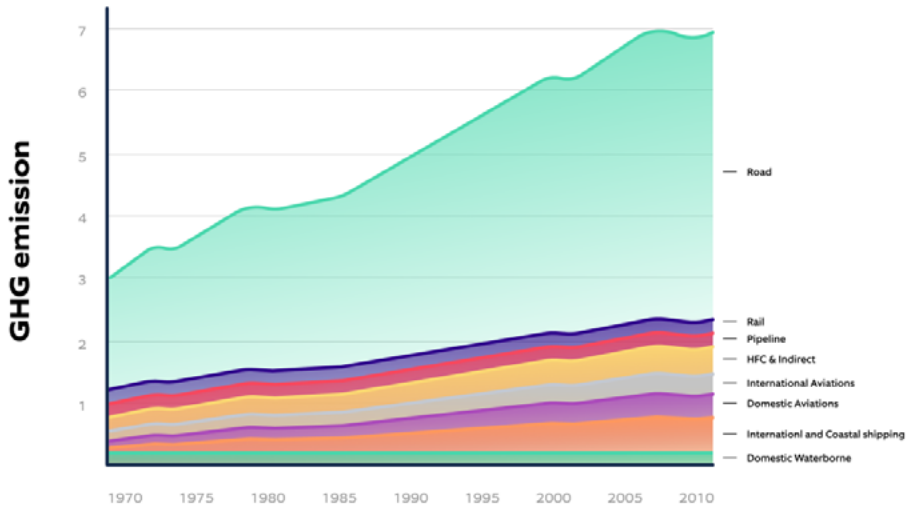

Figure 3: GHG emission from the transport industry

1.3 Emission from transportation industry

People and goods are moving faster and farther than ever before, and all these movements come at a cost. The transportation sector is one of the rapid sectors that is a primary contributing to the global environmental damages. Even though the contribution of the coastal shipping sector in the total carbon emission is not the highest, as seen in Figure 3, albeit 90% of the internationally traded goods are transported through the shipping industry, this requires exclusive attention. Hence an environmental focus on the shipping sector is of critical importance.

1.4 Emission from Shipping Sector

Under the fourth Greenhouse Gas Study of IMO, the total Greenhouse Gas (GHG) emissions from the shipping sector were 1074 million tons, which is around 2.8% of total global greenhouse gas (GHG) emissions. As per their 2020 report, the total Greenhouse Gas (GHG) from the shipping sector from 2012 to 2018 increased by 9.6%. These emissions are projected to increase significantly if mitigation measures are not put in place swiftly.

Another study of IMO estimated that, in the case of a Business-As-Usual scenario, we could see an increase between 50% and 250% in the emissions from the shipping sector by the year 2050 if proper measures are not taken. The International Maritime Organization (IMO) contributes to the global fight against climate change, supporting the United Nations' Sustainable Development Goals (SDGs).

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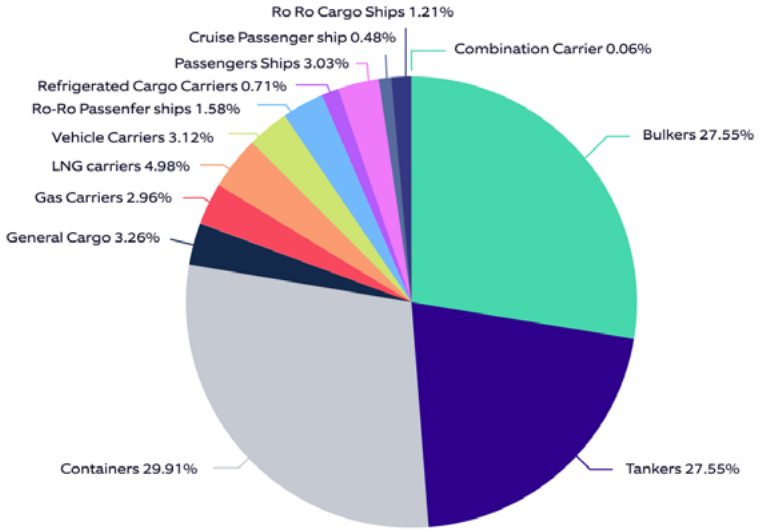
1.5 Major sources/causes for increased GHG emissions from the shipping sector

Some of the significant sources of GHG emission from Shipping Companies are specified below.

a. Increasing Fuel Consumption because of an increase in overall demand is one of the major causes. The total demand and supply of transport have risen more than ever. Increasing emissions are driven by increasing demand and supply for shipping and fossil fuel consumption. The increased shipping activity brings more emissions.



b. The top three classes of ships that cause the most CO2 emission are Container Ships, Bulk Carriers, and Oil Tankers.

c. After CO2, Black Carbon (BC) contributes the most to the climate impact of shipping. BC contributes 21% of CO2-equivalent emissions on the last 20-years of time scale.

d. In the shipping industry, it is a known fact that increased speeds cause more emissions. The largest ships, such as oil tankers, increased their cruising Speed Over Ground (SOG) by nearly 4%, and the largest container ships increased their cruising SOG by more than 11%.

e. Therefore, the concept of slow steaming comes into the picture. As per the empirical studies, reducing the vessel's speed by 10% will reduce the emission by around 27%.

f. CO2 is not the only climate pollutant ships emit. The so-called “non-CO2 climate pollutants” like BC, CH4, and N2O also contribute to climate change. Approximately 40% of the EU.

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g. Population lives within 50 kilometers of the sea, so air emissions from ships are a particular concern for coastal communities. Ships emit substances including Sulphur oxides (SOX), Nitrogen oxides (NOX), and Particulate Matter (PM), which can affect human health.

h. Vessels with inefficient fuel systems cause severe environmental emissions, which adds up to the total CO2 emissions.

i. The ship designs also play a part in fuel efficiency. The new ships are designed with better efficiency in mind, and hence renewing the fleet becomes a critical aspect.

j. As the demand and supply for transportation are constantly rising, the shipping companies are increasing the size of the ships to accommodate more containers, passengers, equipment, etc. The ships' size increases demand more fuel consumption, leading to more emissions.

k. The main engine power for many ship classes has increased over the years, which adds up to the GHG emission. At the same time, extended operating hours of ships is another reason

02 The value and scope of sustainability in shipping

When we think about the value and scope of sustainability, one must not only think about the current perspective but also factor in the costs and benefits of sustainability for the future. Though the sustainability objectives differ from organization to organization, some of the common areas of development and focus are given below.

Maritime environmental regulatory compliance

Creating a sustainable work environment

Increasing vessel efficiency

Use of sustainable alternative fuel

2.1 Salesforce Net Zero Cloud

Corporates, institutions & governmental agencies have recognized climate change as the greatest threat humanity is facing today, it requires us to act now. However, to take the necessary measures, we need the right data. Unfortunately, the majority struggles to understand their carbon

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footprint today. To get the right and the required data for the business entities and the individuals, it is tedious for them to individually calculate how they impact the environment as part of their business operations. Organizations need information that gives them insights into how their production and consumption behaviors impact the planet. Moreover, the information should enable them to undertake the necessary measures to future-proof their business to track emissions, set targets, and meet government legislation.

The simple answer to the above questions eventually comes down to the required 'data.' However, powerful tools are needed to obtain meaningful data and drive critical insights from the data. One such tool available in the market is the Salesforce Net Zero Cloud, which helps measure, analyze, and report greenhouse gas emissions and create a sustainable long-term value proposition.

Salesforce Net Zero Cloud is a carbon accounting product for businesses to drive climate action to accelerate the world's efforts towards carbon neutrality. With Salesforce Net Zero Cloud, companies can now have a 360-degree view of their environmental impact and provide data-driven insights to make necessary changes that the planet will notice. The key offerings include:

Calculate emissions from operations automatically	**Manage emissions factors, offsets, and assets**	**Take actions on emissions with data-driven Insights**
Net Zero Cloud can be integrated into an organisation's IT infra to automatically calculate direct and indirect emissions relating to various operations, supply chains & distribution, product development & manufacturing, building usage, travel and more.	Complex emission calculations can be made, it manages emission factors across regions, manages emissions by organisational asset such as buildings, data centre, vehicles, or employees, and is powerful tool for companies wishing to set targets and manage clean energy offsets.	Once the relevant data is collected and the specific targets are available in the system, the Net Zero Cloud provides insightful reports and data-driven dashboards. We can also make use of Einstein AI analytics services of Salesforce.

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Net Zero Cloud performs many calculations behind the scenes to help the organizations summarize their carbon footprint. An organization's carbon footprint is a roll-up or a summarization of multiple energy use records applicable to the organization itself. The system consists of numerous complex algorithms to calculate the organizations' Carbon footprints from the current Greenhouse gas protocol guidelines.

Net Zero Cloud associates the Carbon footprint with the energy use records through Carbon Footprint Report Items (CFRI) objects. It triggers a recalculation whenever a specific change occurs in the energy use records. Assets that belong to different general emission scopes (such as Scope 1, Scope 2, and Scope 3) can be configured. Then the system applies its underlying logic to calculate emission levels that fall under each of these scopes.

Carbon footprint under scope 1 includes all the emissions from all the assets owned by the organization (such as Ships, warehouses, data centers, etc.). Scope 2 consists of indirect emissions from the generation of purchased/rented services such as purchased electricity consumption, steam, heat, cooling, etc. For instance, a third-party vendor generating and providing the energy will come in scope. Scope 3 emissions include all other indirect emissions in a company’s value chain, such as business travel, waste disposal, employee commute, hotel stays, etc. The system can apply its algorithm to all these entities in different emission scopes and compute the total Carbon footprint of the organization. The system also provides different configurable dashboards and reports that provide the shipping organization's with relevant insights, acting as the first step to take any necessary actions for footprint reduction.

Nagarro has helped multiple customers to adopt the Net Zero Cloud and reduce their carbon footprint. With our work, we have developed a deep understanding of the Net Zero Cloud and have proven experience in configuring, implementing and integrating the system for shipping logistics companies. The core offerings of the solution and our deep expertise make for a complete package to build critical insights on sustainability for the shipping industry.

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Conclusion

There is clearly an increasing and recurring realization that sustainability matters globally and personally. Hence, every member of the maritime ecosystem is ready to take the first steps towards sustainability. The emergence of various environmental agencies in many parts of the world, such as the United States Environmental Protection Agency (USEPA), European Environmental Agency (EEA), European Maritime Safety Agency (EMSA), along with global organizations like the International Maritime Organization (IMO), and many other State Environmental protection agencies across different countries are expected to bring down the emission levels in the years to come. Various targets are in front of all the enterprises, and to achieve those targets from a sustainability point of view, technological progress and innovations are a must.

The solutions based on the Net Zero Cloud are certainly a step towards that goal of effectively monitoring the emissions and taking necessary actions based on its insights. The importance of sustainability solutions comes into the picture in taking actions required to proactively contribute to ocean governance and the healthy use of maritime resources. It also helps the shipping companies to act as trusted and responsible partners in the communities where they work and operate. The Net Zero Cloud drives performance improvements and enables better sustainable decision-making through transparency and accountability.

Nagarro's integrated service offering connected with the Salesforce Net Zero Cloud can play a critical role. Our Net Zero Cloud expertise and implementation experience can transform the shipping logistics industry into a greener and sustainable sector.

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Shiju A L is an Associate Principal Consultant with 12.5 years of IT experience in various domains such as Logistics, Operations Management and ERP. He is part of the Logistics practice at Nagarro and focuses on thought leadership activities as well as supports digital customers in most aspects of logistics including business need identification, elicitation, solutioning to business problems, documentation, implementation and delivery.

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