VesselBot
Enabling Sustainable Supply Chains

Decoding Maritime Emissions: Assessing GHG Hotspots, Trade Lanes, and Industry Shifts for Q1, 2025

Report

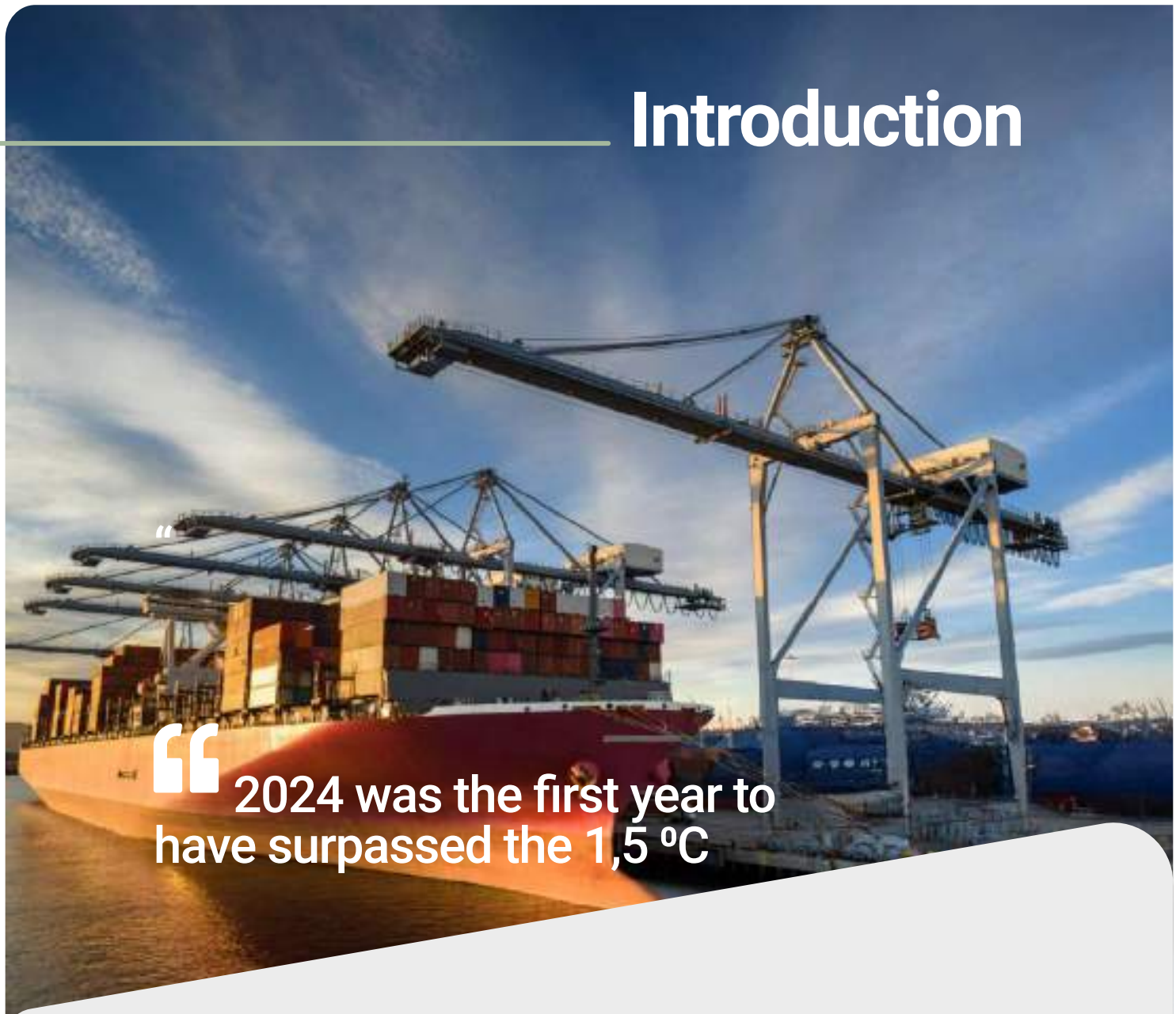
Contents

Abstract

Much like Newton's first law, the maritime shipping industry changes depending on external forces. 2025 is expected to be the year of many changes with geopolitical, environmental, economic, and technological tensions and constraints directly influencing GHG emissions. Longer routes, diversions, tariffs, congestion, and the ongoing use of fossil fuels will add further pressure on decarbonization initiatives.

In this report VesselBot analyses global container maritime GHG emissions, and presents statistics, trends, and intelligence. Results further delve into trade lane patterns, ocean transportation emission hotspots and forecast future changes arising from escalating events. The use of alternative fuels, engine retrofitting, are also investigated, highlighting the need for a faster shift from coal and oil.

Introduction



> "2024 was the first year to have surpassed the 1,5 ºC

The year 2024 was the warmest year in global temperature records going back to 1850. According to ERA5[1], the global average temperature of 15,1°C was 0,72°C above the 1991-2020 average, and 0,12°C above 2023, the previous warmest year on record. This makes 2024 the first year to have reached, and surpassed the 1,5°C above the pre-industrial level.

In this report VesselBot provides a thorough analysis of Q1 2025 data; we assess the industry's progress in balancing operational demands with environmental responsibilities, providing insights that support informed decision-making for a more sustainable maritime future. At VesselBot, our unique approach to primary data collection sets us apart in the industry. Rather than relying on secondary sources or industry estimates, we continuously gather and analyze real-time operational data from container vessels worldwide. Our primary data collection methodology enables unparalleled accuracy in tracking emissions, vessel utilization, and operational efficiency metrics that form the foundation of this report.

1. *ERA5 is the fifth generation European Centre for Medium-Range Weather Forecasts (ECMWF) atmospheric reanalysis of the global climate covering the period from January 1940 to present. All quoted temperature statistics covered in the global climate highlights are derived from ERA5.*

The Changing Landscape: Major Factors Impacting Maritime Operations

Climate Change and Extreme Weather Events

Global CO_2 concentrations have risen at an alarming rate, driven by climate change, directly affecting maritime operations. Global variations in CO_2 emissions are given in **Fig. 1**, which **shows that concentrations** (in parts per million, ppm) **since 2003 have increased by 50 ppm.**

Last year, extreme weather events reached record high levels, driven by climate change, with constant high temperatures fueling heatwaves, droughts, wildfires, storms, and floods that cost the lives of thousands and displaced millions.

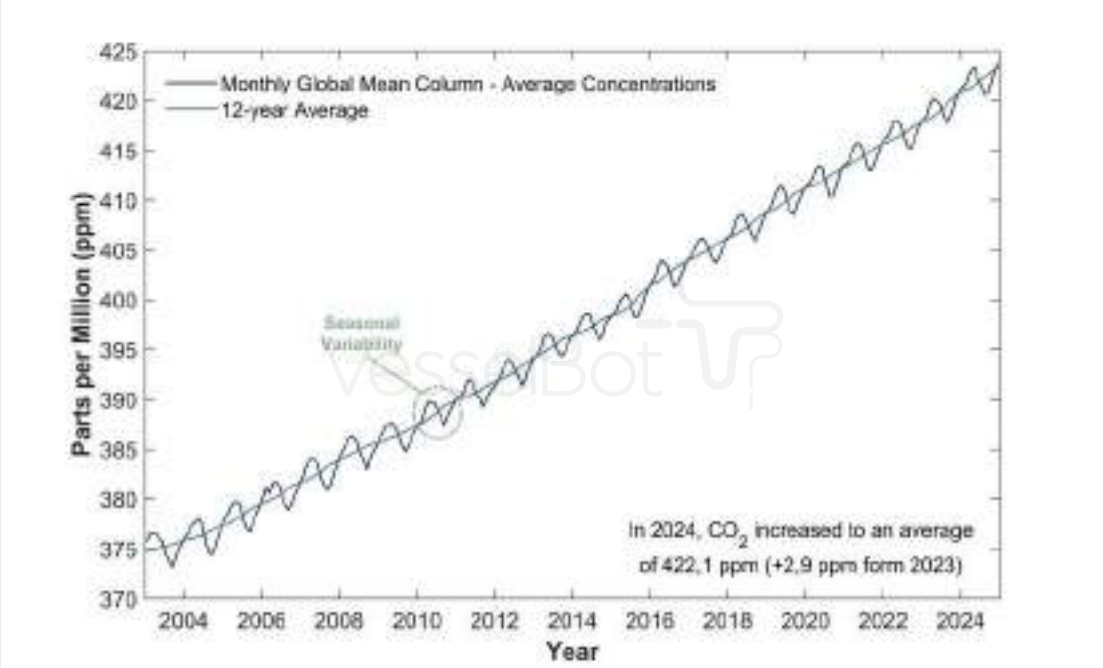


Figure 1: Global rise of CO2 emissions from 2003 until 2024. Concentrations since 2003 have increased by 50 ppm, while from 2023 by 2.9 ppm.

> “ Addressing climate change should be the primary goal for 2025

At least 3.700 deaths were linked to 26 significant events, with the total death toll likely much higher. **Climate change added 41 extra days of dangerous heat globally**, particularly affecting vulnerable small island nations and developing states. Although El Niño influenced many events, climate change was found to play a more significant role, including the historic drought in the Amazon.

The Amazon rainforest and Pantanal Wetland faced severe droughts and wildfires, leading to loss of biodiversity and threatening global climate stability. The Amazon's role as a carbon sink makes protecting it crucial for mitigating climate change. Additionally, warmer seas and air fueled stronger storms, such as Hurricane Helene and Typhoon Gaemi, show that climate change has intensified Atlantic hurricanes and increased the likelihood of powerful typhoons in the Philippines.

Rising global temperatures also led to increased rainfall and 15 devastating floods. Addressing climate change should be the primary goal for 2025.

Extreme weather events are becoming increasingly frequent and severe, already impacting maritime operations this year:

- In March 2025, an MSC-operated containership lost some of its cargo in a storm while underway in the Atlantic Ocean off the coast of Portugal. The Portuguese-flagged *MSC Houston V* traveling from Piraeus, Greece, to Liverpool, UK, when it encountered rough seas and wind gusts of up to 48 knots as Storm *Martinho* hit the waters off Cape St Vincent. At least 15 containers were lost overboard when the vessel suffered a partial stack collapse, and many others were damaged or hanging off the starboard side.

- Also in March 2025, extreme fog conditions led to the collision of containership *Solong* with the tanker Stena Immaculate off the coast of East Yorkshire, UK, with a high volume of jet fuel being released in the ocean. Toxic nurdles (plastic pellets), sized between 1-5 mm and weighing less than a gram, entered the water at the point of collision, affecting wildlife if ingested. These pellets were also washed ashore on Brancaster Beach and along the Norfolk coast in the UK.

A faster shift away from fossil fuels is essential, as the burning of oil, gas, and coal is the primary driver of climate change and extreme weather.

Industry Initiatives and Environmental Legislations

Despite agreements at COP28 to transition away from these fuels, new oil and gas fields are still being launched. A quicker transition to renewable energy will help create a safer, healthier, and more stable world. Increasing financial support for research and development of alternative energy is urgent. At the same time organizations such as *Biofuelwatch*, the *Global Forest Coalition* (GFC), and *AbibiNsroma* Foundation are urging the IMO to exclude biofuels from its *Global Fuel Standard* and instead focus on clean energy alternatives.

They argue that biofuels, including those derived from crops like palm oil and soy, contribute to deforestation, biodiversity loss, and human rights violations, with the large-scale production of these fuels often displacing indigenous peoples and threatening food security. Critics argue that biofuels prolong reliance on fossil fuels by diverting resources into retrofitted refineries for biofuel production, rather than investing in truly clean energy solutions like wind-assisted propulsion and electrification.

Hapag-Lloyd shares the same stance on biofuels in shipping and has joined others to push the IMO to reject biofuels as part of its decarbonization strategy and instead prioritize truly clean energy alternatives.

The maritime industry is expected, therefore, to undergo significant changes to address environmental concerns and meet new regulatory requirements. As of January 2024, **the *EU Emissions Trading System* (ETS) has been extended** to cover CO_2 emissions from vessels with a gross tonnage larger than 5.000 tons, entering, departing, or operating within EU ports. To ease the transition, shipping companies must gradually surrender (i.e., purchase and submit) a certain number of allowances (EUAs) for a portion of their emissions during an initial phase-in period:

- 2025: 40% of emissions reported in 2024
- 2026: 70% of emissions reported in 2025
- 2027 onwards: 100% of reported emissions.

The first surrendering deadline falls due in September 2025 in all member states, and involves emissions reported from 1 January 2024 to 31 December 2024. Companies and operators that fail to purchase and submit sufficient allowances to cover their CO_2 emissions will face a penalty of €100 per excess ton of CO_2 emitted[2]. By 31 March 2025, shipping companies must ensure that

> “ The maritime industry is expected to undergo significant changes

2. https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-shipping-sector_enum=promotion-al&utm_campaign=gateway_campaign

all emissions data for the 2024 calendar year are verified and properly reported. This includes both individual vessel emissions and cumulative company/operator-level data. These reports must be uploaded to the *THETIS MRV* platform; the EU's system for monitoring, reporting, and verifying maritime emissions. Once the data is verified, companies must submit their *Company Emissions Repor*t (CER) to their designated *Administering Authority* (AA); the EU Member State where their Maritime Operator Holding Account (MOHA) is registered.

At this stage, the *Administering Authority* is responsible for entering the verified emissions data into the *Union Registry*, the official EU system that tracks emissions under the *Emissions Trading System* (ETS). Missing this deadline could lead to restrictions, including being blocked from trading emissions allowances (EUAs), which are essential for compliance.

More than 40 large shippers, including Amazon, IKEA, and Nike, are forming the *Zero Emission Maritime Buyers Alliance* (ZEMBA) to increase their control over carriers and shipyards. In recent months, ZEMBA has invited tenders for vessels powered by e-fuels, after earlier issuing an RFP for vessels fueled by liquid biomethane derived from waste. Other items on shippers' sustainability agenda include noise-limiting measures to protect marine life from noise pollution, and improved handling of ballast water to prevent the spread of invasive species.

Regulators, meanwhile, are pressing shipyards to build ships that can be more effectively recycled during end-of-life scrapping. Additionally, the European Commission will publicly disclose the names of non-compliant companies. Starting in May 2025, the **Mediterranean region will be designated as an Emission *Control Area*** for sulfur oxides (i.e., SOx). This change is expected to influence fuel demand, potentially increasing the availability of *Very Low Sulfur Fuel* Oil (VLSFO) for East Asia.

Trade Tensions and Global Shipping Disruptions

The global trade landscape remains highly volatile due to ongoing tariff disputes, most notably between the U.S. and China. In early February, Canada and Mexico secured a temporary reprieve from new tariff threats from the U.S. administration. However, **a broader 'trade war' is escalating**, particularly as the U.S. has moved forward with tariffs on Chinese imports. In retaliation, China has imposed its own tariffs on U.S. goods, notably targeting American energy and technology sectors.

This trade standoff continues to create uncertainty in international markets, particularly in relation to import and export volumes across U.S. ports on both the East and West Coasts. The imposition of tariffs increases costs, creates delays, and disrupts determined supply chains. Businesses, shippers, and carriers are faced with higher uncertainty, which could lead to fluctuations in shipping volumes as companies re-examine their strategies.

Similarly, for the European Union, the evolving trade situation requires proactive risk mitigation strategies to address potential disruptions. Developing alternative trade routes, diversifying sources of supply, and adapting to potential regulatory changes will be essential for minimizing the impact on EU trade flows.

VesselBot has previously revealed the significant financial exposure for major container shipping lines under USTR's proposed Section 301 service fees, quantifying the potential impact on carriers serving U.S. ports and the downstream implications for American importers and exporters. In 2024, a total of 26.811.264,5 TEU (actual load) were imported to the U.S., of which 5.520.449 TEU belonged to Chinese-built vessels. This corresponds to 21% of total TEU imported to the U.S.

Furthermore, the trade uncertainty between the U.S. and Mexico has reportedly begun to affect manufacturing operations south of the border. Far East Asia-to-Mexico trade lanes could experience reduced container volumes as manufacturers, especially those dependent on U.S. trade policies, pause or delay their expansion plans in Mexico. The lack of clarity regarding the future of U.S. tariffs and trade agreements, leaves businesses hesitant to make long-term commitments to Mexico as a production base. As a result, the pause in expansion could lead to a downturn in container traffic, affecting not only Mexican

manufacturing but also trade volumes across key global shipping routes. This disruption poses a challenge to the broader supply chain, particularly for industries that rely on Mexico as a cost-effective production hub in North America.

Finally, the Panama Canal, being a vital waterway for global shipping, has become a pivotal point of political and environmental challenges. U.S. pressure on Panama to reduce its engagement with China is a significant geopolitical factor that has raised tensions around the canal's operations.

Additionally, ongoing legal disputes regarding the management and operations of the canal add to the complexity of the situation. On top of political issues, the canal is facing environmental challenges. Severe droughts that limited vessel traffic in 2024 continue into 2025. These environmental conditions have forced many shippers to seek alternative routes, adding inefficiencies to the container trade.

As a result, trade operations, particularly along the U.S. East Coast, may face increased costs and delays, further complicating the global shipping landscape. Shippers are now confronted with the need to explore alternative routes and adapt to shifting dynamics in the Panama Canal's operation, potentially raising the costs of goods and impacting trade efficiency.

According to the Financial Times, the rerouting of global trade from China to ports elsewhere in Asia is leading shipowners to move on from the era of ordering ever-larger vessels and switch to smaller crafts instead[3]. Just 6 container vessels with capacities over 17.000 TEU are due to be delivered in 2025, as opposed to 17 in 2020. At the same time 83 container vessels with capacities varying between 12.000 and 17.000 TEU are set to be completed in 2025; this is five times the number ordered in 2020.

Rates

The recent **decline in Trans-Pacific spot rates to a 15-month low**, poses as another important factor for 2025 maritime operations, especially given the timing during the annual service contract season. These contracts are important for planning and budgeting, however, the rates for these new contracts are about 15% to 20% higher than those of the current service year.

Some shippers are hesitant to sign their new service contracts, believing that the market will continue to soften, allowing them to negotiate better rates later. This resistance appears to be well-founded, as recent data shows that spot rates (the rates for one-off shipments, not tied to contracts) from Asia to the U.S. have dropped significantly. For example (see **Fig. 2**), spot rates to the West Coast have fallen to around $1.600 per 40-foot equivalent unit (FEU), which is a sharp decrease of nearly 70% from the first week of January 2025 and about 50% lower compared to the same time last year[4].

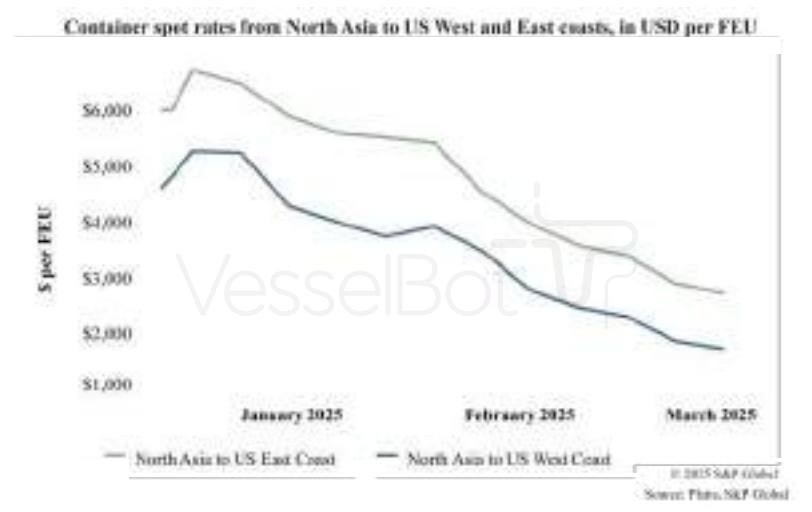


Figure 2: Trans-Pacific spot rates slide to 15-month low in March 2025.

This steep decline in spot rates signals that there may be excess capacity in the market or reduced demand for shipping services, both of which could lead to more favorable conditions for shippers who are holding off on locking in long-term contracts.

3. *Shipowners switch to smaller vessels as world trade reroutes from China:* https://www.ft.com/content/6bf382ee-ee83-4310-b3bc-a487a14cebb7
4. *Journal of Commerce – S&P Global:* https://www.joc.com/gateway/about?utm_source=email&utm_medium=promotional&utm_campaign=gateway_campaign

Research Outcomes

Statistics for the First Quarter of 2025

Maritime operations are dependent on external factors. The events described above will shape the future of maritime operations potentially for the worse.

Geopolitical, environmental, economic, and technological tensions and constraints have a direct influence on GHG emissions. Longer routes, diversions, tariffs, congestion, and the ongoing use of fossil fuels will add further pressure on decarbonization initiatives.

At VesselBot we continuously monitor operations and follow events to provide data-driven decision-making. The first quarter (from now on mentioned as Q1) of 2025 provides an opportunity to assess the progress made compared to 2024 in reducing GHG emissions, optimizing operational efficiency, and managing fleet performance. Container vessels are vital components of global trade, and their emissions are closely tied to factors such as vessel count, voyage frequency, and cargo capacity.

In this chapter, we examine the key data from Q1 2024 and Q1 2025, highlighting trends and changes in emissions and vessel performance. By comparing key metrics, including total GHG emissions, average intensity (measured in grams of CO_2 per TEU-km), total TEU handled, and vessel load factors, we can better understand the trajectory of the container shipping sector's environmental footprint and its shift toward more efficient and sustainable operations.

In the first quarter of 2025, the container shipping sector saw some changes compared to Q1 2024, reflecting both external factors and internal efficiencies. **We observed a 19.38% increase in total GHG emissions from the first quarter of 2024** with emissions in Q1 2025 being just below 60 million tons **with an average emissions intensity (WTW g CO2e/TEU km) 206,93.** This value for intensity, despite the increase in tons of GHG, marks a significant improvement in voyage efficiency, as the value reached 231,55 in Q1 2024, suggesting better environmental performance per unit of cargo transported.

The total TEU transported saw an increase, from 162,53 million in Q1 2024 to 188,8 million in Q1 2025. This was accompanied by an **increase in utilization** (load factor) from 62% to 68% (or else expressed: 0,62 to 0,68, respectively), **indicating that container vessels in operation were carrying more cargo per trip.** This improvement in utilization could

> "Total GHG emissions were increased by 19.38% from the first quarter of 2024

be attributed to optimized fleet management practices or a shift in trade patterns, leading to more efficient utilization of vessel capacity.

Our statistics for Q1 2025 show that the global trade environment remains highly volatile, due to ongoing trade tensions. The imposition of tariffs, trade wars, and retaliatory measures have created significant uncertainty in international markets. As businesses continue to reassess and adjust their strategies in response to these challenges, a decline in container trade volumes is evident.

A significant indicator of the changing market conditions is the sharp decline in Trans-Pacific spot rates, which reached a 15-month low by the first quarter of 2025. Our results showed a ~1% decline in voyages, suggesting a softening of demand and an oversupply of shipping capacity, with carriers experiencing reduced revenue per unit of cargo.

Global GHG Emissions and Emissions Intensity 2025 Observations

Fig. 3 and **Fig. 4** show voyage emissions intensity (WTW g CO2e/ TEU km) and GHG emissions (tons) for major voyages conducted during the first quarter of 2025. The effect of re-routing around the coast of Africa is still noticeable as vessels following that route show the highest GHG emissions (**Fig. 5**), even higher than trans-Pacific. At the same time, re-routed voyages also exhibit highest vessel utilization (> 80%, **Fig. 6**) highlighting the industry's efforts to optimize voyages to increase efficiency.

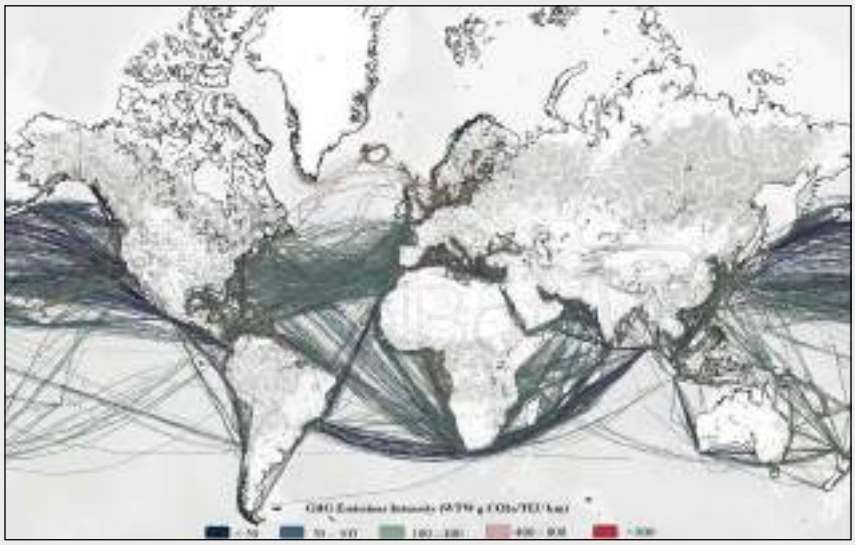


Figure 3: GHG emission intensity (WTW g CO2e/ TEU km) for voyages of the first quarter of 2025.

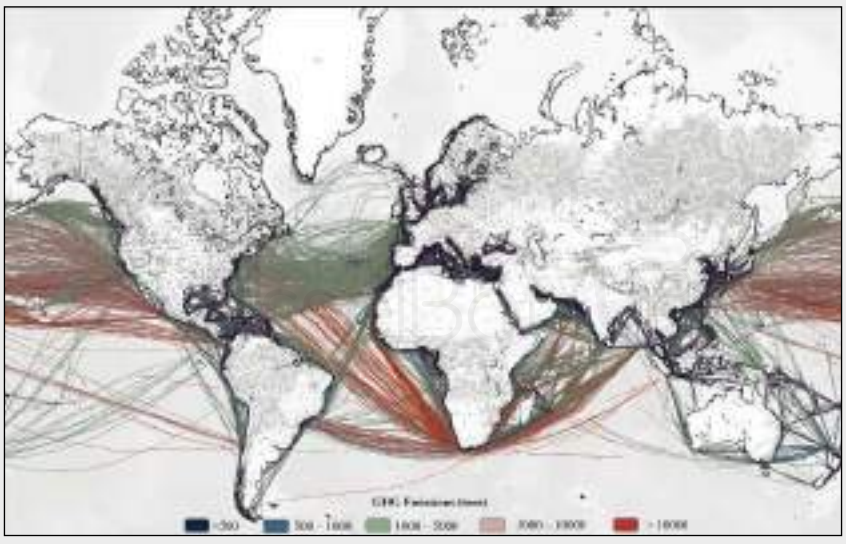


Figure 4: GHG emission (tons) for voyages of the first quarter of 2025.

Figure 5: Voyages with highest GHG emissions (tons). These voyages, in their majority, correspond to those rerouting around the coast of south Africa.

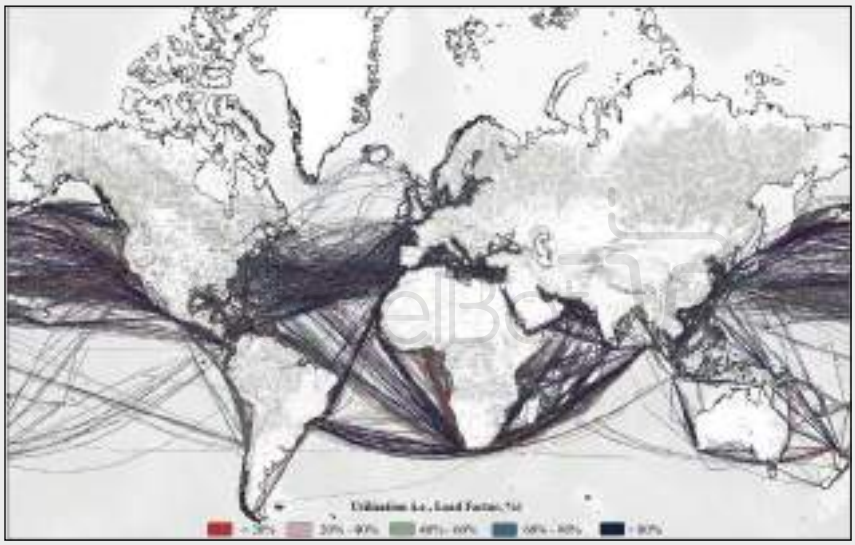


Figure 6: Vessel utilization, or load factor, varying from 0 to 100%. Overall, we observe high utilization, particularly for vessels re-routing around South Africa (dark blue).

Return to the Red Sea

The Red Sea crisis will remain the central concern of carriers until it is resolved. As much as 30% of global trade traveled via the Red Sea in 2023. Forced by the Houthi attacks (that begun in October 2023) to travel via the Cape of Good Hope, vessels travel 30% longer distances, leading to higher fuel consumption, 10 to 12-days delay, and higher CHG emissions for several ports along the coast of South Africa. For example, for the port of Durban we observed an 87,53% increase with 12.677 tons of CO2e in 2024 as opposed to 49,59 tons of CO2e in 2023[5].

An agreement between Israel and Hamas to pause conflict has raised hopes over the prospect of ocean container ships returning to the Red Sea. While ceasefire is a significant step forward, that does not necessarily mean a mass return of container vessels to the area. Diversions around the Cape of Good Hope are not the ideal solution for the industry, prolonging supply chain activities and increasing the environmental impact of maritime operations.

But the situation is stable and being managed. It took many months and extreme disruption to achieve this stability, so carriers will be wary of heading back to the Red Sea too soon. This will be conducted in phases. During the first, carriers are expected to send vessels with low capacity through the area. Once this is done, they will gradually increase the size of vessels transiting the region. Overall, it could take several weeks, and maybe even months, for schedules to transition to 'normal' operating conditions through the Red Sea.

Fig. 7 shows telematics (AIS) signals of the 130 vessels passing the Suez Canal during the first 3 months of 2025. Analysis shows that the average TEU vessel capacity was 4.132,7 (only one vessel with 11.400) with the majority being feeders and intermediate belonging to CMA CGM, MSC, X-Press Feeders, Sea Lead, Hapag-Lloyd, Maersk and T.S. Lines. This suggests that carriers indeed make their return to the area in phases.

At VesselBot we expect to see some disruptions and delays at ports in the period following the complete return of vessels to the Red Sea. Vessels will likely reach their destination ports sooner than expected, leading to a surge in port arrivals. Furthermore, this might lead to disorder at the Suez Canal, but much will depend on carrier's management. Overall, shorter routes offer significant advantages, e.g., lower fuel consumption, and consequently, lower GHG emissions, On the other hand they could also develop a few challenges. For example, potential over-capacity in the market with container vessels carrying less cargo load (i.e., less utilization), reducing vessel efficiency.

This year another 200 newbuilds are due to be delivered, adding an additional 2 million TEU to the global container fleet (6% growth). If demand drops, carriers may struggle to balance supply and demand, possibly leading to financial strain or scrapping of older ships. Despite these geopolitical and macroeconomic changes, the container maritime industry is still adapting, but the likelihood of these events creating a volatile shipping market should be investigated, as it will create tensions and difficulties for companies, becoming unable to plan long-term.

Ultimately, a complete return of carriers to the Red Sea will of course depend on events stability, a rapid timeframe for negotiations, and direct indications by the Houthis that they will end attacks on shipping. Despite the ceasefire, on March 15, Houthis announced they had launched a wave of missile and drone attacks on U.S. warships, following a series of American airstrikes on Yemen. So, the situation remains unstable.

Finally, vessels traveling from South Asia through the Red Sea will be subjected to further fees. On April 1st, ocean carrier CMA CGM applied new overweight surcharges (OWS) of $100 per 20’ dry container with a gross weight over 15 tons from the Indian Subcontinent and Middle East Gulf to the Red Sea.

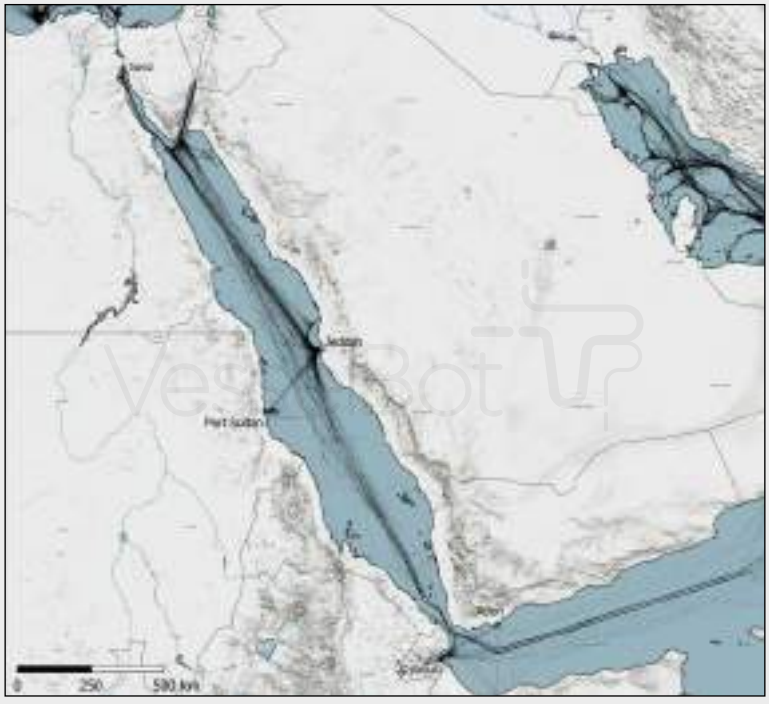


Figure 7: AIS signals of vessels travelled through the Red Sea during the first 3 months of 2025.

5. *The Red Sea Under the Microscope: A continuous Impact on Global Trade and Emissions – VesselBot. July 2024.*

Port Calls Recorded During the First Quarter of 2025

In the first quarter of 2025, the global container shipping landscape saw impressive activity across several key ports (**Fig. 8**), with **Singapore maintaining its dominant position, registering above 2.000 port calls**. Hong Kong followed suit with 1.354 calls, highlighting its strategic importance in international trade. Other ports included Kaohsiung (1.277), Qingdao (1.220), and Shanghai, which remained a central hub with a total of 1.212 calls. Ports like Busan (1.082), Port Klang West (1.143), and Laem Chabang (1.041) also demonstrated robust activity, underscoring their vital roles in the Asia-Pacific region.

Meanwhile, Europe's major players like Rotterdam (819), Antwerp (895), and Hamburg (648) continued to see strong container vessel traffic, reflecting the region's continued importance in global shipping. As global trade patterns evolve, these ports remain critical junctures in the movement of goods worldwide, providing vital connectivity across continents. It is surprising that none of U.S. ports make this list. For the first three months of 2025, a total of 338 port calls were recorded for the ports of Long Beach and Los Angeles (USLGB and USLAX). The ports of Savannah and Norfolk follow with 318 and 310 port calls, respectively (**Fig. 9**). Finally, we show the total port calls per major carrier in **Fig. 10**.

Our upcoming report will explore in detail port performance during the first quarter of 2025, as well as the environmental impact of container vessel operations at port locations. VesselBot's collection of primary data provides valuable information on port activities, including TEU handling and container vessel waiting times. We will report changes in previous patterns, as compared to 2024, driven by economic, geopolitical, and environmental factors and events escalating since the beginning of 2025.

> Asian ports maintain their dominant position

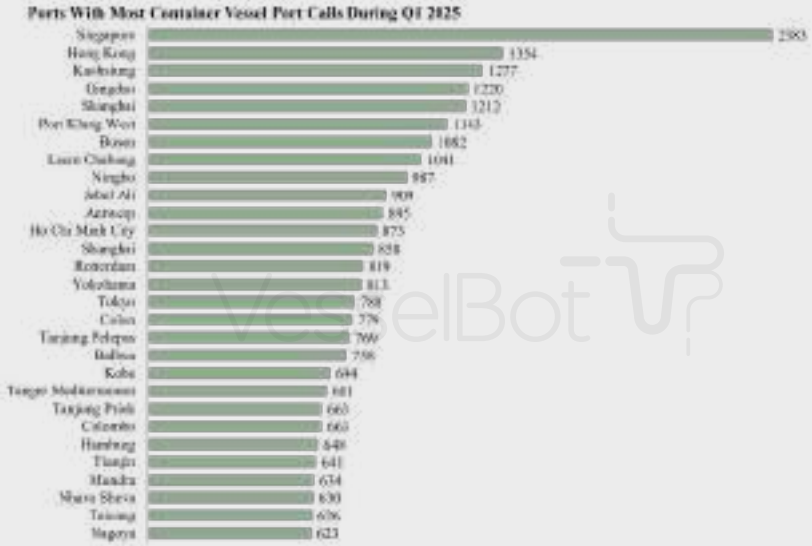


Figure 8: Global ports with most container vessel port calls during the first three months of 2025. Ports of Asia maintain their dominance. Only three Europeans make the list, but none of the U.S.

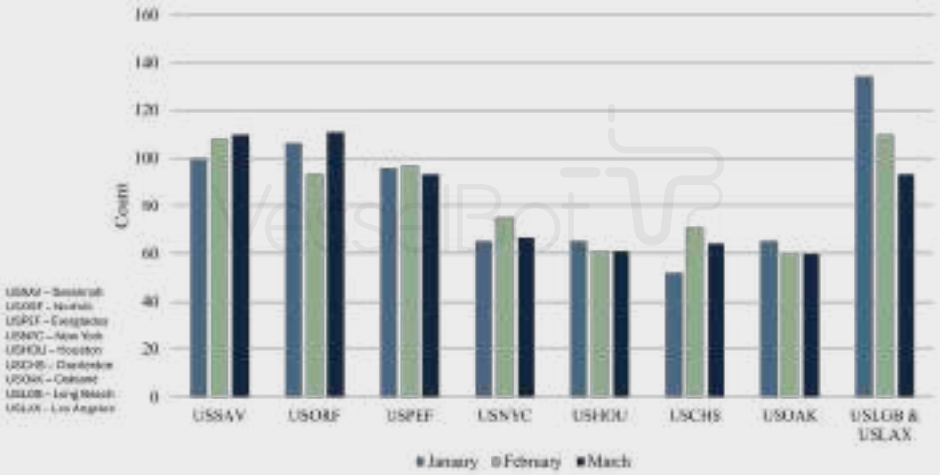


Figure 9: Total port calls for major U.S. ports during the first three months of 2025. Ports of Los Angeles and Long Beach reported record January.

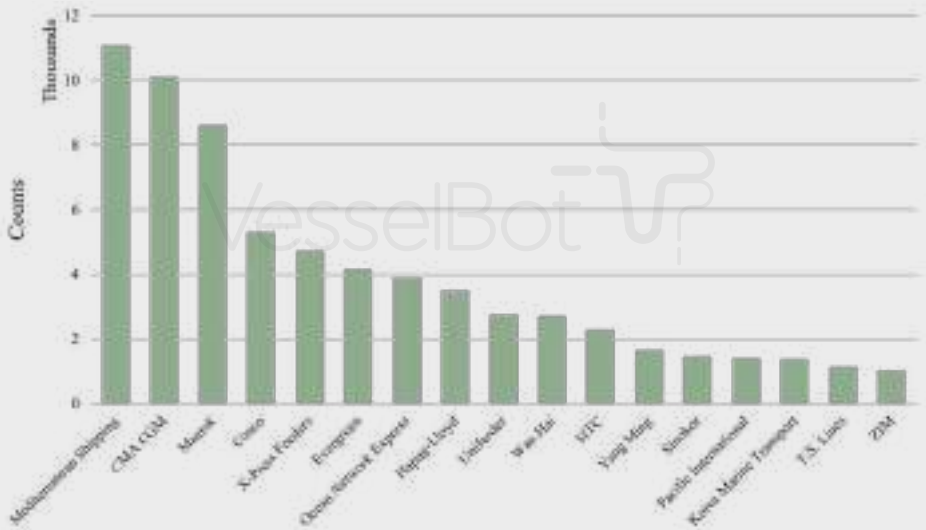


Figure 10: Port calls for major maritime shipping carriers during the first three months of 2025.

Total TEU Transported During the First Quarter of 2025

Total TEU transported during Q1 2025 was 188,8 million (188.840.197,4 TEU). **Fig. 11** shows the ports with the highest imported TEUs, calculated by multiplying vessel capacity and utilization. Ports of Asia show the highest numbers including some European (Rotterdam, Antwerp, Hamburg, Algeciras and Valencia). Ports of U.S. do not make the list, but their total imports and exports (in TEU) are given in **Fig. 12** and **Fig. 13.**

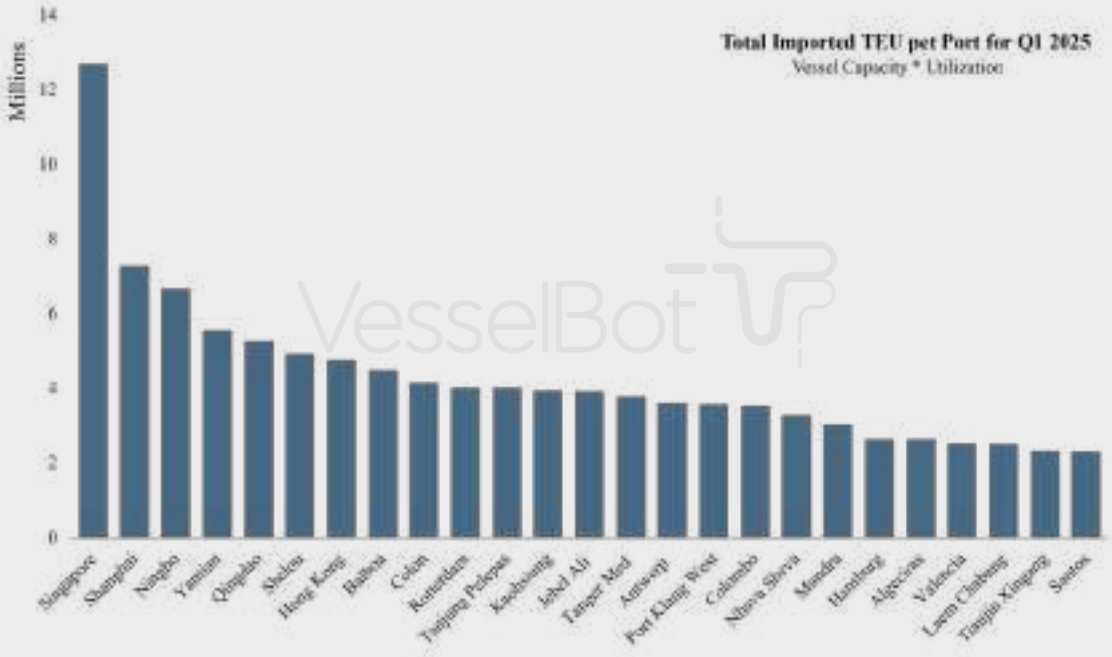


Figure 11: Global ports with highest total TEU imports.

> U.S. Ports do not report the highest TEU volumes

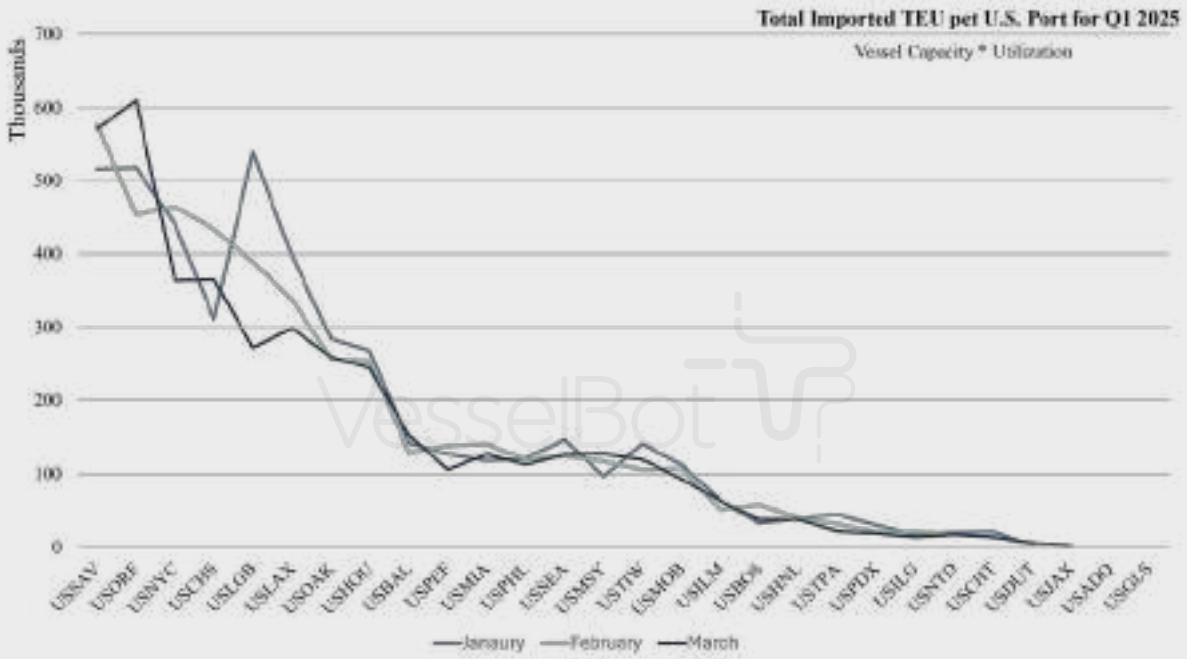


Figure 12: Total TEU imported at U.S. ports during the first three months of 2025.

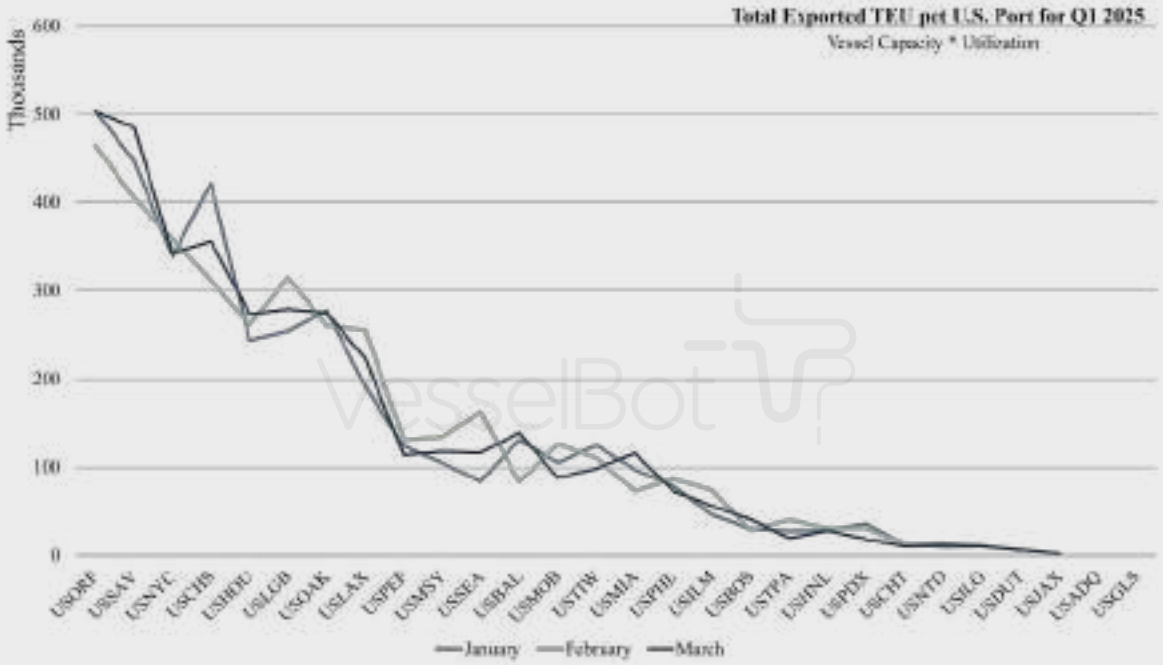


Figure 13: Total TEU exported at U.S. ports during the first three months of 2025.

Conclusions

In conclusion, the year 2025 will shape the future of maritime shipping industry, with various developments influencing both operational efficiency and environmental performance. Despite the challenges imposed by geopolitical events such as the ongoing Red Sea crisis and U.S. tariffs, along with various intense climate events, the industry has demonstrated a notable ability to adapt and respond to external pressures. Uncertainties due to macroeconomics, and upcoming newbuild deliveries, are likely to lead to over-capacity in the market, but for the time being the container shipping industry keeps the momentum and has adapted to changes. The decline in Trans-Pacific spot rates, while providing a temporary

relief for shippers, also highlights the ongoing volatility in the market, driven by fluctuating demand and excess vessel capacity. This, in turn, has affected service contracts, with many shippers opting to wait for better market conditions before committing to new deals. **While the short-term outlook may seem uncertain, the longer-term shift towards more efficient operations, characterized by higher vessel utilization and improved emission intensity, is a positive sign for the industry's sustainability efforts.**

The environmental impact of maritime shipping remains a significant concern. While global GHG emissions have increased, emissions intensity is showing signs of improvement. The effect of re-routing vessels around the coast of Africa, for example, has resulted in higher emissions but also reflects the industry's ongoing efforts to optimize voyages and improve vessel utilization. **This shift towards maximizing load factor is essential for reducing the environmental footprint of the shipping sector**, even as it navigates the complexities of longer and less efficient routes due to geopolitical disruptions.

Port activity in the first quarter of 2025 underscores the dominance of Asian ports in global trade, with Singapore, Hong Kong, and several Chinese ports continuing to serve as critical hubs. However, **the absence of U.S. ports on the list of top port calls highlights a shift in trade patterns**, but with some U.S. ports experiencing a relative increase vessel activity and TEU volumes in January (e.g., USLAX and USLGB).

This shift could reflect changing trade dynamics, potentially influenced by tariff policies and global supply chain disruptions. Further details on port performance during the first quarter of 2025, as well as the environmental impact of container vessel operations at port locations are to be presented in our upcoming report. Our primary data collection will put port activities under the microscope, investigating TEU handling, container vessel waiting times, and GHG emissions within port basins. We will report changes in previous patterns (i.e., 2024) driven by economic, geopolitical, and environmental factors and events escalating since the beginning of 2025.

Looking ahead, the future of maritime operations is increasingly intertwined with the adoption of alternative fuels and retrofitting initiatives. **While progress has been slow, the industry is starting**

to embrace innovative technologies aimed at reducing emissions. Retrofitting ships has gained significant attention and importance in recent years as the maritime industry and maritime transport strive to address environmental and climate challenges and must comply with international and/ or regional regulations. Despite some progress in building yard capability in the U.S. and Europe and strengthening supply chains, there has been little advance in uptake of alternative fuel conversions in 2024.

The conversion of the Maersk Halifax (a 14.000 TEU container vessel) and two smaller vessels for X-press Feeders are the only cases since the very first methanol conversion in 2015 on the RoPax Stena Germanica.

In April 2025, *CMA CGM Tiga* was the first container vessel to equip a WinGD7X82-2.0 main engine that combines *Selective Catalytic Reduction* (SCR) and *Alternative Maritime Power* (AMP) systems significantly reducing sulphur and nitrogen oxides (SOx and NOx). This engine is able to achieve an *Energy Efficiency Design Index* (EEDI) 53.6% below the baseline, surpassing IMO Phase III standards for environmental performance. *CMA CGM Baalbeck*, connecting Southeast Asia to Australia, is a new vessel running solely on LNG delivering 35% reduction in GHG emissions and is ready for biomethane and e-methane marking another significant step towards sustainable shipping.

Overall, the maritime shipping industry in 2025 is navigating a complex landscape marked by environmental challenges, geopolitical instability, and market fluctuations. However, **the continued push toward operational efficiency, technological innovation, and sustainable practices signals a path toward a more resilient and environmentally responsible future**. While there are certainly challenges forward, particularly in balancing supply and demand and adapting to shifting trade routes, the sector's ability to innovate and adapt will be crucial in shaping the industry's long-term trajectory.

At VesselBot, we closely track and analyze changes in global transportation emissions, ensuring that we provide accurate, up-to-date data to support informed decision-making. Our approach centers on the continuous measurement, reporting, optimization, and monitoring of GHG emissions worldwide. This allows us to help companies stay agile, adapt swiftly, and effectively pursue their sustainability goals.

About VesselBot

VesselBot is a pioneering technology company that brings transparency to value chain emissions through its groundbreaking Supply Chain Sustainability Platform.
Leveraging sophisticated technology and supply chain expertise, VesselBot enables companies to accurately and efficiently calculate their carbon footprint across the entire value chain. This includes emissions from both purchased goods and transportation emissions from all modes (vessels, airplanes, trains, and trucks). By providing high-accuracy, primary, and modeled data throughout the value chain, VesselBot's platform facilitates compliance with ESG regulations while helping organizations optimize their entire supply chain network, improve operational efficiencies, and reduce greenhouse gas emissions.

For more information
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VesselBot
Enabling Sustainable Supply Chains

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