Shady Routes

How Big Retail and their Carriers Pollute along Key Ocean Shipping Corridors
Acknowledgments

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Executive Summary

The current shipping crisis is shining an international spotlight on the relationship between retail companies and their cargo carriers.
Goods imported via maritime shipping to the U.S. by Walmart, Target, Amazon and IKEA between 2018–2020 accounted for an estimated 20 million tonnes of carbon dioxide equivalent emissions (CO2e). These goods were predominantly shipped by a small group of major maritime cargo carriers who have long-term relationships with each company. The most common shipping routes for these goods are between Chinese and West Coast U.S. ports, where vessels left idling due to the current shipping crisis are pushing pollution levels for port communities to all-time highs. Until recently, the massive climate disrupting and human health harming emissions from international container shipping — and the companies that are buying their services — have sailed under the radar of public scrutiny.

Retail brands and cargo carriers are winning big in the current swell of consumer demand fueled by the COVID-19 pandemic, reporting record breaking profits. The shipping crisis is also an opportunity, and these companies can choose to be industry leaders and early adopters of zero-emission technology, or they could put short-term profit over public health and the climate by making empty net-zero commitments that put off action on climate change until it’s too late. Retail brands and cargo carriers are both major contributors to global greenhouse gas (GHG) emissions, and both have the opportunity and the profit margins to take big strides towards zero-emission maritime shipping by taking immediate steps to reduce their emissions and investing now in new emissions-free ship technology.

Nearly every item in our daily lives — our clothing, furniture, cleaning supplies, office supplies, electronics, food — was at some point transported across the world’s oceans onboard a container ship, as approximately 90% of global trade is transported on oceangoing vessels. As a result, international shipping is a major greenhouse gas contributor, accounting for 3% of global emissions. If it were a country, it would be the world’s sixth largest climate polluter. While every deep sea cargo carrier plying our oceans today burns fossil fuels, emissions-free solutions are already being scaled up. Steps can also be taken now to significantly reduce the pollution from existing ships. But, reducing and ultimately eliminating maritime emissions will not happen without bold commitments and concrete action from the companies paying cargo carriers to transport their goods. The retail brands that fill our homes and lives with their products bear a direct responsibility both for the pollution that the maritime shipping in their supply chains creates and for taking the necessary actions to demand emissions reductions now and 100 per cent zero emissions shipping this decade.

This analysis takes an in-depth look at four major retail importers into the United States: Walmart, Target, Amazon, and IKEA. It maps the relationships between these companies and the cargo carriers they hire to transport their goods. For the first time, customers can take a look behind the curtain to see how these household brands move their products from the countries where they are produced to the U.S., the cargo carriers with whom they do business, and the emissions that result from this dirty trade.

Walmart relies heavily on one ocean carrier, CMA CGM, a French container transportation and shipping company that made $31.5b in revenue in 2020. CMA CGM is the biggest polluter amongst all carriers, accounting for 68% of Walmart’s ocean shipping emissions in 2020 and 33% of emissions across all four companies. CMA CGM is one of the world’s biggest buyers of fossil gas vessels, which emit 70–82% more lifecycle greenhouse gas emissions than those fueled with petroleum distillate marine gas oil.

Walmart should break up with CMA and/or or from fossil gas. However, if the two industry giants could work together on zero-emissions solutions, they could propel the decarbonization of ocean transport.

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Target’s top carriers are Asia shipping specialists — Yang Ming, Evergreen and Cosco — and their U.S.-bound shipments heavily favor West Coast routes. Target saw a swell of demand during the pandemic, with digital sales doubling. Their fulfillment by store model, doubling of their digital sales, and top sales in California suggest that they will continue to favor West Coast routes, and keep clogging these ports with harmful emissions. They are investing heavily in chartered vessels to keep stockpiling goods to keep up with elevated consumer demand due to the pandemic.

Amazon has unique control over their shipping supply chain and appears to be consolidating this control rapidly. Their own shipping heavily favors West Coast routes from China and as they increase their control over parcel delivery, they are bringing more shipping and other transport traffic and pollution to the ports of LA and Long Beach. It remains to be seen if the company’s growth in their transportation business will be an opportunity for greener technology or will outstrip their climate targets and lead to greater emissions.

IKEA is increasingly shipping from China to the U.S. via Europe, predominantly with MSC. Ocean transport from the EU to the U.S. follows rail transport from China to the EU. The use of rail transport may be why their emissions seem to be decreasing and why they favor East Coast routes to Philadelphia and Baltimore.

Target and Amazon have played an outsized role in the current congestion and pollution crisis at the Ports of Los Angeles and Long Beach. For months, fossil-fueled cargo container ships have idled off the shores of the San Pedro Bay Ports, bringing higher levels of asthma and cancer-associated air pollutants including particulate matter, nitrogen oxide, and sulfur oxide into the port-adjacent communities of San Pedro, Wilmington, and West Long Beach.

IKEA is increasingly shipping from China to the U.S. via Europe, predominantly with MSC. Ocean transport from the EU to the U.S. follows rail transport from China to the EU. The use of rail transport may be why their emissions seem to be decreasing and why they favor East Coast routes to Philadelphia and Baltimore.
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Introduction

As of 2021, the shipping industry accounts for nearly 3% of the world’s greenhouse gas (GHG) emissions, more than the emissions from global air travel and equivalent to the annual electricity usage of almost 200 million homes. Since maritime shipping was not part of the Paris Agreement, the effort to reduce emissions in the industry has been slower than in other sectors. The West’s appetite for consumer goods, exacerbated by the impact of the pandemic, is driving the growth in the industry and increasing its portion of global GHG emissions. Current business-as-usual (BAU) scenarios project emissions will grow up to 50% over 2018 levels, an increase of up to 500 million tonnes of CO2. Additionally, while the IMO noted that increased ship size and operational improvements aimed at creating better fuel efficiency have resulted in a decrease in emissions intensity, annual absolute emissions are still increasing. With net zero goals aimed at reductions by 2050 deemed insufficient under a 1.5C warming scenario and the first zero-emissions ships expected to become available by 2024, the shipping industry has a responsibility to decarbonize this decade.

This report reveals the close relationship that major retailers have with key carriers and the intensification of those relationships in 2020. Major retailers represent long-term, steady income for carriers, and supporting retailer shipping capacity needs through the crisis has been an important aspect of carriers’ strategies. CMA CGM recently stated that their capacity priority was for long-term relationship customers, suggesting that their relationships with key retailers are more important than the spot-market capacity sales to smaller companies. Hapag-Lloyd quickly followed suit. Arguably, as more business goes to fewer carriers, the effort to curb the industry’s emissions becomes a joint venture. Since shipping is such an integral part of global supply chains, companies looking to achieve net zero goals must engage the sector and find ways to reduce the climate impact of getting their goods to market, and their increasing relationship with key carriers is the opportunity they need.

Approximately 90% of the world trade is transported by sea, a method of transport that has historically been so cheap that even the most low value goods could be shipped without concern for the impact on business profits. The pandemic has fueled the growth in e-commerce and consumption of these consumer goods, as people stuck at home who had the disposable income to afford travel and entertainment in non-pandemic times spend that money on goods they can use at home. Over 18 months from the start of lockdowns in the U.S., retail sales are still 18% above pre-pandemic levels, and winter holiday shopping is still to come. Companies such as Walmart, Target, Amazon and Ikea have responded to the demand by increasing supply, but the supply chains to move the products to market have been hampered by Covid-19 related delays that have limited effective shipping capacity. The competition for limited maritime shipping space has driven costs sky-high. The delays and demands have also led to troubles at ports, especially in China and the U.S. In most major U.S. ports, ships are lining up for days to drop off cargo and containers (full and empty) are stacking up to beyond port capacity.

Target and Amazon have played an outsized role in the current congestion and polluting
tion crisis at the Ports of Los Angeles and Long Beach. For months, due to COVID-19 era and holiday season increase in demand for imported goods, a record-breaking 100 fossil-fueled cargo container ships have idled off the shores of the San Pedro Bay Ports, bringing higher levels of asthma and cancer-associated air pollutants including particulate matter, nitrogen oxides, and sulfur oxides into the port-adjacent communities of San Pedro, Wilmington, and West Long Beach. With Target and Amazon focusing much of their fossil-fueled shipping through these ports, they are directly responsible for harming these communities. Full containers of goods are waiting for trucks and trains that also cannot keep up with demand, while empty containers cannot be ‘back-hauled’ fast enough from some ports and are scarce at others. The mayhem in the shipping industry is a sign of the times, and most analysts do not expect a return to pre-pandemic shipping, with its low costs and available capacity. The silver lining in this situation is that the industry is ripe for transformation. The current supply chain crisis has revealed that there is room in the industry and its customers to absorb the cost of the transition to fossil-free zero emissions shipping. The sky-high cost of shipping and maxed-out capacity has resulted in the highest ever profits for carriers, lining their pockets with profits while the system strains under the weight of the overload. Maersk, Hapag-Lloyd and CMA CGM all reported over $3 billion USD in profits in the first half of 2021, an estimated 2500 percent increase over the first half of 2020. For the same period, cargo volumes were up 27% over pre-pandemic levels. Carriers are using their profits to invest heavily in their fleets, buying up available capacity (used ships) and setting records for new orders for container ships. Flush with cash and needing to invest in their fleets, carriers should invest in building out the technology to bring zero emissions shipping to scale, rather than doubling down on fossil fuel technology that is out of step with emission reductions targets. Smaller, zero-emissions ships would support net zero as well as respond to the need to diversify the maritime shipping map, by reducing the number of large ships in favor of smaller, more versatile, zero-carbon vessels.

Meanwhile, Walmart, Target, and Ikea are spending money on chartered shipping — a costly and unusual move that reveals the willingness for these companies to spend more on maritime transport to get their products to market. They are also shipping earlier, paying premium rates of up to $20,000 USD/FEU, and paying for warehouse storage to ensure that products are on the shelves in time. Likewise, Amazon invested over 30 billion in shipping and supply chain infrastructure in 2020. The shipping industry and major customers such as Walmart, Target, Amazon, and Ikea must invest in a zero emissions future by absorbing the cost of transition. Meanwhile, the pressure to decarbonize is intensifying, and the window to act is closing. If companies and their carriers don’t use this crisis as an opportunity to build back better now, they will have to shoulder the much larger economic, social costs and burdens of going back to business as usual. This includes the stranded assets of buying new and used fossil-fuel vessels now to address capacity demand, as well as the short-sightedness of investments in LNG technology and infrastructure, which does not have a long-term role in decarbonizing maritime transport.

The message is starting to sink in. New commitments from top companies and actions by governments are putting pressure on the industry. These companies have an opportunity to act especially when representatives from all four have been appointed to the Federal Maritime Commission’s National Shipper Advisory Committee (NSAC) where they will directly advise federal shipping policies.
The following recent developments are promising:

**Cargo Owners for Zero Emissions Vessels (coZEV)**

CoZEV is a cargo-owner led platform with the goal of accelerating maritime shipping decarbonization. They aim for companies to decarbonize their maritime freight by 2040 and catalyze full sector decarbonization by 2050. In October 2021, Amazon and Ikea joined 7 other major brands in signing the coZEV 2040 Ambition Statement.22

**First Movers Coalition**

The First Movers Coalition is a group of companies who are signalling that they are ready to jumpstart global demand for clean technologies, to make emerging solutions more scalable and accessible. They are targeting ‘hard-to-abate’ sectors such as shipping to begin their transition to net-zero emissions. Shipping members commit to using zero-emissions fuels in new and retrofitted vessels by 2030. They also set a target that at least 5% of their deep-sea shipping will be powered by zero-emissions fuels by 2030 and Cargo Owners commit to sending at least 10% of the volume of their goods shipped internationally on ships using zero-emissions fuels by 2030, and 100% by 2040.23

**Clydebank Declaration**

At COP 26 in Glasgow, 22 countries committed to support the creation of zero-emissions shipping routes — at least 6 ‘green corridors’ by 2025 with the ambition to scale up by 2030.24 The declaration set out a number of ways to achieve this goal including partnerships between ports and operators to accelerate decarbonization and identification of barriers to decarbonization such as regulations and infrastructure. The group also plans to create incentives to switch to zero-emissions shipping.

These are examples of a tide that is turning. Will major retailers like Walmart, Target, Amazon, and IKEA and their preferred carriers be the first companies to ride the wave of zero-emissions technology, or will they continue to steer towards a false horizon of short-term gain at the expense of the global climate?

24 Countries include: Australia, Belgium, Canada, Chile, Costa Rica, Denmark, Fiji, Finland, France, Germany, Ireland, Japan, the Marshall Islands, the Netherlands, New Zealand, Norway, Sweden, the UK and the US.
Methods

The shipment data underpinning these analyses was gathered from U.S. Vessel Manifest Data for imports over the period of 2018–2020. Data was collected for each company by querying for shipments from each company and all of its subsidiaries. Information on subsidiaries was gathered through various public sources including company websites, SEC filings, and shipping databases. 25 26 27

Given Amazon’s role as both company and carrier, their TEU query included “Amazon”, as well as over 20 of its subsidiaries (e.g. Audible, Shopbop, Zappos) and its shipping subsidiary: Amazon Global Logistics (AMZDL) / Beijing Century Joyo Courier Services. AMZDL is a non-vessel operating common carrier (NVOCC) that operates internationally. In China, they operate Beijing Century Joyo Courier Services as a freight forwarder. AMZDL was associated with Amazon.com for ~100,000 shipments in the dataset. Around 40,000 of these did not have TEUs and were removed from the analysis. The 60,000 remaining shipments were reviewed for their association with Amazon.com. Approximately 95% of the 102,000 TEUs in these shipments were confirmed to be related to Amazon, one of its subsidiary fulfillment centres, or a major Amazon seller through either the consignee or notifying party in the dataset.

For all companies, shipments and companies that appeared in the queries that were unrelated were filtered out. In total, approximately 1.3 million individual transactions were collected. Each transaction includes data on the company, carrier, vessel, volume in Twenty-foot Equivalent Units (TEUs), and route between the origin country and the destination at a U.S. port. Even with 1.3 million transactions that total over 2 million TEUs, the dataset. Around 40,000 of these did not have TEUs and were removed from the analysis. The 60,000 remaining shipments were reviewed for their association with Amazon.com. Approximately 95% of the 102,000 TEUs in these shipments were confirmed to be related to Amazon, one of its subsidiary fulfillment centres, or a major Amazon seller through either the consignee or notifying party in the dataset.

For all companies, shipments and companies that appeared in the queries that were unrelated were filtered out. In total, approximately 1.3 million individual transactions were collected. Each transaction includes data on the company, carrier, vessel, volume in Twenty-foot Equivalent Units (TEUs), and route between the origin country and the destination at a U.S. port. Even with 1.3 million transactions that total over 2 million TEUs, the dataset accounts for only 37% of the estimated TEUs recorded in the Journal of Commerce (JOC), the official public database of U.S. import volumes and emissions. 28 However, the coverage also varies by company. While approximately 23% of Walmart’s TEUs and 28% of Target’s TEUs are in the database, it contains 100% of IKEA’s and Amazon’s TEUs, according to the JOC estimates for the TEUs shipped per year for these companies. For analysis of Walmart and Target, only trends and relationships that could be corroborated were used since the lack of complete shipping data can skew results.

Each shipment was assigned an origin port, LOCODE29, country of origin and coordinates based on where the shipment came from (using either the port of lading, port of receipt, or shipment origin) from as well as a destination port: LOCODE, and coordinates based on the port of unlading in the U.S. The destination port was also assigned a coast (West or East/Gulf). This allowed for analysis of the most common and preferred routes used by each carrier and company according to port, country, and preference for routing to West or East/Gulf ports in the U.S. Additionally, the difference between the port of lading and the shipment origin was analysed to reveal transshipments and trade routes overland. Changes in trade routes between West and East/Gulf ports were also studied to assess whether routes were changing to avoid backed up ports. Although shipments received in all ports across the U.S. were collected, this report digs in deeper on shipments that arrived in ports along the West Coast of the U.S., including the ports of Los Angeles, Long Beach, Seattle, Oakland, and San Diego.

To estimate the total emissions emitted by these companies’ maritime imports over the three-year period, the verified TEUs for Walmart and Target were scaled to match TEUs reported by JOC. For IKEA and Amazon, the total TEUs from the dataset were used since the dataset captured the estimated emissions reported by JOC for these companies. Emissions were estimated per company by multiplying each company’s TEUs by the CO2e emissions intensity (tCO2e/TEU) established for each country in previous research. 30 These estimates were established using 2019 data only, and this methodology assumes that these estimates are static throughout the study period (2018–2020), although this limits the accuracy of the emissions estimates for major shifts in routing between 2018 and 2020.

<table>
<thead>
<tr>
<th>Company</th>
<th>TEUs* from research</th>
<th>JOC TEU* Estimates</th>
<th>Research Coverage</th>
<th>Emission Intensity (tCO2e/TEU*)</th>
<th>Est. CO2e Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walmart</td>
<td>626,012</td>
<td>2,763,800</td>
<td>22.7%</td>
<td>4.164</td>
<td>11,508,463</td>
</tr>
<tr>
<td>Target</td>
<td>533,134</td>
<td>1,881,661</td>
<td>28.3%</td>
<td>3.418</td>
<td>6,431,517</td>
</tr>
<tr>
<td>Amazon</td>
<td>463,524</td>
<td>297,633</td>
<td>100%</td>
<td>3.182</td>
<td>1,474,932</td>
</tr>
<tr>
<td>IKEA</td>
<td>393,941</td>
<td>388,480</td>
<td>100%</td>
<td>3.319</td>
<td>1,233,428</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>2,016,610</strong></td>
<td><strong>5,331,574</strong></td>
<td></td>
<td></td>
<td><strong>20,648,341</strong></td>
</tr>
</tbody>
</table>

26 Walmart subsidiaries: www.sec.gov/Archives/edgar/data/0001021408/00010214080100157/jex2i.htm
27 Amazon Global Logistics China/ Beijing Century Joyo Courier Service Co., Ltd. www.dpiusa.com/tariffs/fmc_organization_show/025852
29 LOCODE is the UN system to identify port locations across the world: unece.org/trade/uncefact/unlocode/history-1981
Ranking companies by their carbon emissions

Walmart topped the list of companies with the highest volumes traded and the most emissions. They are also the number one goods importer in the U.S. The company emitted almost double the emissions of Target, number two on the list (see Figure 1), even though their TEUs are less than double (see Table 1). This is likely due to the combination of higher TEUs and longer shipment routes for Walmart. Based on JOC TEU estimates, Walmart is responsible for around 8 times as many ocean shipping emissions as Amazon or IKEA, who maintained a steady trend comparable to the size of their shipments (see Figure 1).

Top routes by TEUs and emissions

The pacific routes between China and the U.S. are the top routes for carbon emissions when looking at all four companies combined (see Table 2). The top ten routes account for 34% of emissions of the four companies investigated (21% West Coast; 13% East and Gulf Coasts). For context, there are over 1400 unique routes in the dataset,
so 34% of emissions concentrated over 10 routes is significant. Over three years, almost a million tonnes of CO2e was emitted by ships carrying about 291,349 TEUs from Yantian to Los Angeles, a distance of about 6500 nautical miles (nm). The longest route in the list, Shanghai to Houston, had emissions of about 772,556 tCO2e to carry 186,164 TEUs over a distance of 10,000 nm. Carriers on the shortest route, from Shanghai to Seattle, emitted about 836,375 tCO2e to ship 231,349 TEUs over a distance of 5000 nm.

Transpacific routes from China to the U.S. West Coast are the most common across all four companies (see Figure 2). However, examining the top ten routes per company highlights differences in trade patterns and reveals the preference that Walmart has for East Coast routes (see Figure 3) and the prevalence of West Coast routes for Target and Amazon (see Figures 4 and 5 respectively). IKEA’s routes are much different than the rest, with an emphasis on trade from Europe (especially Poland) to the East Coast, including Philadelphia and Baltimore (Figure 6).

The pacific routes between China and the U.S. are the top routes for carbon emissions.
Figure 3
Walmart’s TEU trade flow for the top ten routes. All routes start in China and most end at East or Gulf Coast ports, with a minority going West.

Figure 4
Target’s TEU trade flows for their top ten routes.

Figure 5
Amazon’s TEU trade flow for their top ten routes.

Figure 6
IKEA’s TEU trade flow for their top ten routes.
95% of Target’s U.S. imports come into West Coast ports. Target is the biggest contributor to West Coast port pollution of all the companies studied.

Ranking Carriers by CO₂e Emissions

CMA CGM leads the list of the top 15 carriers that move goods for Walmart, Target, Amazon, and IKEA, with a staggering 33% of the total emissions (see Table 3). This is as much as the next four carriers in the list combined. If American President Lines, 12th on the list and a subsidiary of CMA CGM, is added to their total, the company’s share goes up to 35%.

The top 15 carriers account for 97% of total emissions in the dataset, indicating a heavy

<table>
<thead>
<tr>
<th>Rank</th>
<th>Carrier</th>
<th>Total Est. Emissions (tCO₂e)</th>
<th>% of Total Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CMDU CMA CGM</td>
<td>6,726,277</td>
<td>33%</td>
</tr>
<tr>
<td>2</td>
<td>MAEU Maersk Line</td>
<td>1,893,595</td>
<td>42%</td>
</tr>
<tr>
<td>3</td>
<td>MEDU Msc Mediterranean Shipping Company Sa</td>
<td>1,869,485</td>
<td>51%</td>
</tr>
<tr>
<td>4</td>
<td>EGLV Evergreen Line</td>
<td>1,798,750</td>
<td>60%</td>
</tr>
<tr>
<td>5</td>
<td>ONEY Ocean Network Express Pte Ltd</td>
<td>1,424,900</td>
<td>66%</td>
</tr>
<tr>
<td>6</td>
<td>COSU Cosco Shipping Lines Co Ltd</td>
<td>1,418,856</td>
<td>73%</td>
</tr>
<tr>
<td>7</td>
<td>YMLU Yang Ming Marine Transport Corp</td>
<td>1,320,180</td>
<td>80%</td>
</tr>
<tr>
<td>8</td>
<td>HLCU Hapag Lloyd A G</td>
<td>884,827</td>
<td>84%</td>
</tr>
<tr>
<td>9</td>
<td>HDMU Hyundai Merchant Marine</td>
<td>706,359</td>
<td>87%</td>
</tr>
<tr>
<td>10</td>
<td>OOLU Orient Overseas Container Line Ltd</td>
<td>512,640</td>
<td>90%</td>
</tr>
<tr>
<td>11</td>
<td>ZIMU Zim Integrated Shipping Services Ltd</td>
<td>497,375</td>
<td>92%</td>
</tr>
<tr>
<td>12</td>
<td>APLU American President Lines Llc</td>
<td>404,917</td>
<td>94%</td>
</tr>
<tr>
<td>13</td>
<td>AMZD Amazon China Amazon Cn Amazon Global Logistics China</td>
<td>327,448</td>
<td>96%</td>
</tr>
<tr>
<td>14</td>
<td>CHSL Christal Lines</td>
<td>125,153</td>
<td>96%</td>
</tr>
<tr>
<td>15</td>
<td>MOLU Mitsui O S K Lines Ltd</td>
<td>82,004</td>
<td>97%</td>
</tr>
</tbody>
</table>
reliance by Walmart, Target, IKEA, and Amazon on a few major players in the shipping industry — even though almost 600 different carriers were found in the data. In the data collected for this report, CMA CGM and MSC Mediterranean Shipping are the major carriers on East or Gulf routes whereas Evergreen Line, Cosco Shipping, Yang Ming, and Amazon Global Logistics are the major carriers on West Coast routes (see Table 4). This breakdown is a function of the companies selected for the study and data coverage per company, but it highlights that the emissions that carriers release in port is a function of their major customers’ logistics needs.

If Walmart favors Savannah and Amazon favors Los Angeles, each carrier’s emissions in port will reflect this. Amazon’s own carrier (a non ves, Amazon Global Logistics (AMZD), overwhelmingly ships via West Coast routes (95% of its shipments for Amazon), reflecting the emphasis on California as a hub for domestic U.S. delivery fulfilled by Amazon and also as a major market for Amazon’s sales. For East and Gulf Coast routes, Amazon uses a variety of different carriers.

While company emissions have stayed stable, emissions per carrier have changed with changes in market share. CMA CGM

The top 15 carriers account for
97% of total emissions in the dataset
indicating a heavy reliance by Walmart, Target, IKEA, and Amazon on a few major players in the shipping industry.
has seen their share of company emissions rise substantially from Q2 2019 to Q4 2020 while MSC’s share has declined over the same period (see Figure 7). MSC’s dramatic drop in 2019 may be in part due to their temporary suspension in 2019.

<table>
<thead>
<tr>
<th>Carrier</th>
<th>East or Gulf Coast</th>
<th>West Coast</th>
<th>Strongest Company Connections</th>
<th>Company Coast Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMDU CMA CGM</td>
<td>71%</td>
<td>29%</td>
<td>Walmart</td>
<td>East/Gulf</td>
</tr>
<tr>
<td>MAEU Maersk Line</td>
<td>61%</td>
<td>39%</td>
<td>Walmart, Target, Amazon, IKEA</td>
<td>East/Gulf, West, East/Gulf</td>
</tr>
<tr>
<td>MEDU Msc Mediterranean Shipping Company Sa</td>
<td>64%</td>
<td>36%</td>
<td>Walmart, IKEA</td>
<td>East/Gulf</td>
</tr>
<tr>
<td>EGLV Evergreen Line</td>
<td>16%</td>
<td>84%</td>
<td>Target, Amazon, IKEA</td>
<td>West, East/Gulf</td>
</tr>
<tr>
<td>ONEY Ocean Network Express Pte Ltd</td>
<td>74%</td>
<td>26%</td>
<td>Walmart</td>
<td>East/Gulf</td>
</tr>
<tr>
<td>COSU Cosco Shipping Lines Co Ltd</td>
<td>8%</td>
<td>92%</td>
<td>Target</td>
<td>West</td>
</tr>
<tr>
<td>YMLU Yang Ming Marine Transport Corp</td>
<td>19%</td>
<td>81%</td>
<td>Target</td>
<td>West</td>
</tr>
<tr>
<td>HLCU Hapag Lloyd A G</td>
<td>47%</td>
<td>53%</td>
<td>IKEA</td>
<td>East/Gulf</td>
</tr>
<tr>
<td>ZIMU Zim Integrated Shipping Services Ltd</td>
<td>85%</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APLU American President Lines Llc</td>
<td>36%</td>
<td>64%</td>
<td>Amazon</td>
<td>West</td>
</tr>
</tbody>
</table>

TABLE 4 | Proportion of emissions per carrier that are for routes ending on the East or Gulf Coasts vs. the West Coast
**Walmart**

Walmart emitted an estimated 11.5 million tonnes of CO2e to ship 2.76 million TEUs between 2018 and 2020. Emissions increased 4% in 2020 over 2019, and also concentrated heavily on CMA CGM as a key carrier, accounting for 68% of Walmart’s emissions in 2020, an increase of 21% over 2019 (see Figure 10). At the same time, other major carriers used by Walmart experienced significant decreases, with MSC decreasing 17% (perhaps in part due to their temporary suspension in 2019) and Ocean Network Express decreasing 6% over 2019 levels. While other carriers held on to a small portion of Walmart’s business, only Maersk made any gains in 2020, increasing from 3% to 11% of Walmart’s ocean shipping emissions. Additionally, in 2020 and again in 2021 Walmart has been chartering vessels to secure capacity and maintain inventory for the peak in demand as the shipping market continues to see capacity issues and backlogs at ports.\(^{34}\)

But despite the increase in charters, Walmart is still primarily focused on one carrier. For one of the world’s largest retailers to do that is significant, and the concentration of this relationship in 2020 suggests that Walmart is a dedicated customer for CMA CGM and the Ocean Alliance. According to CMA CGM, their clients like Walmart are looking for integrated supply chain solutions for all their shipment needs as consumer demand shifts increasingly to e-commerce and consumers require more warehousing and last mile services, rather than brick and mortar stores.\(^{35}\) CMA CGM sees this model as one where major retailers get all their shipping and delivery services from one integrated system from factory to front door.\(^{36}\)

As Walmart’s routes more often go from China to the East Coast (see Figure 2), their emissions are larger per TEU than the other companies in this study and are likely to continue to be higher over time. The routing trends with the locations of their distribution centres, which are more concentrated in the Eastern U.S.\(^{37}\) We expect Walmart’s emphasis on China manufacturing will continue as Walmart began a $1.16 billion USD investment in new warehouse space in China in 2019, planning 10 spaces in the next decade.\(^{38}\) On the U.S. side, Walmart recently invested in a distribution center near the Port of Charleston, South Carolina and opened a 2.6 million square foot intermodal distribution centre near the Port of Mobile in Alabama.\(^{39}\)

**FIGURE 10** | Trend in estimated CO2e emissions for the top 5 carriers for Walmart, 2018-2020.

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\(^{36}\) Ibid.


The relationship between Walmart and CMA CGM is the single largest source of carbon emissions in this dataset.

Their close connections and possibility of expanding their working relationship into warehousing and last mile transport is an opportunity for both businesses to build the increased consumer demand for goods and the subsequent increase in demand for and price of shipping. Both could use the opportunity of this windfall to invest in zero emissions technologies. Already in 2021, CMA CGM announced that they would offer low-carbon shipping using biomethane, but the routes chosen (between European ports) will have no impact on transoceanic shipping for Walmart in the near-term.40

Target

Target emitted around 6.4 million tonnes of CO2e from 2018 – 2020 to ship an estimated 1.8 million TEUs. Target relies consistently on Yang Ming, Evergreen and Cosco, with approximately 58% of their ocean shipping emissions coming from these three carriers. While Target has the most diversity in its top carriers, using carriers from different alliances, they focus on transpacific specialists. The top ten carriers for Target account for 95% of the company’s emissions.

As with Walmart, Maersk is one of the few carriers for Target whose share of TEUs and emissions were increasing between 2018–2020, with Maersk’s share of Target’s emissions increasing 10% from 2018–2020, from 7% to 16% (see Figure II). In general, Maersk has profited greatly during the pandemic, with Q3 2020 being their best quarter on record ever and their pool of money and the subsequent increase in demand for and price of shipping. Both could use the opportunity of this windfall to invest in zero emissions technologies. Already in 2021, CMA CGM announced that they would offer low-carbon shipping using biomethane, but the routes chosen (between European ports) will have no impact on transoceanic shipping for Walmart in the near-term.40

FIGURE II | Trend in estimated CO2e emissions for the top 5 carriers for Target, 2018 – 2020.

Emmissions from Target’s Top 5 Carriers

Trend in estimated CO2e emissions for the top 5 carriers for Target, 2018 – 2020.

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>COSU Cosco Shipping Lines CO</td>
<td>10,600</td>
<td>12,400</td>
<td>13,800</td>
<td>15,100</td>
<td>16,800</td>
<td>18,500</td>
<td>20,200</td>
<td>22,400</td>
<td>24,700</td>
<td>26,300</td>
<td>28,100</td>
</tr>
<tr>
<td>EGLV Evergreen Line</td>
<td>9,500</td>
<td>11,200</td>
<td>12,600</td>
<td>14,000</td>
<td>15,700</td>
<td>17,400</td>
<td>19,100</td>
<td>21,200</td>
<td>23,200</td>
<td>25,300</td>
<td>27,400</td>
</tr>
<tr>
<td>MAEU Maersk Line</td>
<td>8,400</td>
<td>10,100</td>
<td>11,500</td>
<td>12,900</td>
<td>14,600</td>
<td>16,300</td>
<td>18,000</td>
<td>20,100</td>
<td>22,200</td>
<td>24,200</td>
<td>26,300</td>
</tr>
<tr>
<td>OOLU Orient Overseas Container Line</td>
<td>7,200</td>
<td>8,900</td>
<td>10,300</td>
<td>11,700</td>
<td>13,400</td>
<td>15,100</td>
<td>16,800</td>
<td>19,000</td>
<td>21,200</td>
<td>23,300</td>
<td>25,400</td>
</tr>
<tr>
<td>YMLU Yang Ming Marine Transport Corp</td>
<td>6,000</td>
<td>7,700</td>
<td>9,100</td>
<td>10,500</td>
<td>12,200</td>
<td>13,900</td>
<td>15,600</td>
<td>17,800</td>
<td>20,000</td>
<td>22,100</td>
<td>24,300</td>
</tr>
</tbody>
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45 Ibid.


Target’s reliance on West Coast shipping routes and their increase in shipping and sales due to the pandemic makes Target a major contributor to the ongoing port pollution crises at Los Angeles, Long Beach, Seattle, and Tacoma.

Amazon

Amazon.com emitted an estimated 1.5 million tonnes of CO2e from 2018–2020 to ship approximately 463,500 million TEUs of goods. The most common ocean shipping routes are between manufacturing hubs in China and the Ports of Los Angeles and Long Beach. In 2018, more of Amazon’s shipping landed at ports on the East Coast, but by 2020, West Coast routes were used more often, with shipments and emissions at the twin ports of Los Angeles and Long Beach surpassing East and Gulf Coast ports in 2019. Over the same period, shipments to Oakland and Seattle stayed steady. This is indicative of the concentration of Amazon’s shipments via Amazon Global Logistics China (AMZD), operating predominantly between China and LA. This is reflected in the increased emissions associated with AMZD between 2018 and 2020 (see Figure 12).

AMZD is a non-vessel operating common carrier (NVOCC), or ocean forwarder, which means that other carriers are shipping cargo on the company’s behalf under bills of lading issued by AMZD. AMZD carries Amazon orders plus other ‘fullment by Amazon’ shipping (for example, Chinese companies selling to the U.S. market) which creates additional complexity regarding how to allocate TEUs and emissions to the company for TEUs associated with AMZD. In this study, >95% of the TEUs carried by AMZD were allocated to Amazon.com. By using AMZD, Amazon is exerting more control over its internal supply chain and marketplace network, and even building out the capacity to sell its end-to-end service to shippers outside of its marketplace. AMZD is now among the top ten NVOCCs on the transpacific route, disrupting what was once highly volatile and out of their control and replacing it with something they can master and capitalize on.

As Amazon focuses on building its own shipment and parcel delivery services, AMZD dramatically increased its share of Amazon’s ocean shipping emissions. This is while the company’s overall emissions stayed relatively stable over the study period. In 2018, AMZD was only 7% of Amazon’s ocean shipping emissions, but by 2020 they accounted for 33%.

This trend came at a loss for other carriers such as APLU and ONEY, especially on West Coast routes. Amazon’s top 10 carriers account for 78% of total emissions, the lowest of any of the companies, suggesting that outside of their preference for their own shipping on West Coast routes they still use various different carriers to move products. The growth of AMZD is perhaps a sign of the times in the shipping industry. As stated before, CMA CGM and other major carriers are aligning international operations with the demands of online retail customers to provide more end-to-end distribution services including warehouses and last mile transport. This may signal the end of alliance-based shipping as carriers move into the ‘Amazon’ model of integrating their service all along the shipping route to create tighter schedules and greater

FIGURE 13 | Trend in estimated CO2e emissions for the top 5 carriers for IKEA, 2018–2020.

IKEA
IKEA emitted 1.3 million tonnes of CO2e between 2018–2020 to ship 425,201 TEUs. Emissions for IKEA are on an overall downward trend, with a decrease of 16% between 2018 and 2019 and a further decrease of 8.5% between 2019 and 2020. MSC is IKEA’s top carrier — accounting for almost half of IKEA’s emissions overall. The decrease in IKEA’s emissions are mostly associated with MSC (see Figure 13). The top ten carriers account for 99% of IKEA’s emissions, suggesting that the company concentrates most of its business among its top carriers. This is the highest proportion for top carriers among all the companies.

In response to both the demand and the delays caused by the pandemic, IKEA has also been chartering its own vessels. The historically high demand has meant that IKEA stores cannot carry stock consistently, even though they have taken extraordinary actions to keep goods flowing. IKEA has been transporting goods via rail from China to Europe, which is aligned with the company’s strategy to reduce carbon emissions by using rail transport as much as possible. For example, EVR Cargo in Estonia reported securing contracts with IKEA to use the new China-Estonia route to get products into Europe. The rail option is cheaper than transporting by sea and may have fewer emissions.

The top port of lading for IKEA’s shipments to the U.S. is Bremerhaven, Germany. 21% of the products shipped from this port originate in China and all of those are destined for U.S. East or Gulf Coast ports. This suggests that transshipment via rail from China and then maritime transport from Europe to the U.S. is an important route for IKEA products to reach U.S. markets. Such a shift could be part of IKEA’s strategy to reduce the carbon emissions from their shipping. They recently committed to coZEV along with Amazon, and have a decarbonization strategy for shipping and trucking. However, their strategy is to scale up biofuels for use in shipping, which presents its own issues with land-use and deforestation.
Conclusions

This report reveals that the top retailers and their preferred maritime cargo carriers are major polluters of our climate and U.S. ports — especially those on the West coast. But there is now a moment of opportunity where record breaking profits for retailers and cargo carriers are at a nexus with increasing consumer demand for emissions-free shipping, opening up new avenues and increasing motivation for the decarbonization of the container fleet.
In order to be leaders in this new era

Amazon and IKEA must make stronger, more immediate commitments to zero-emission shipping.

While Amazon and IKEA have made initial commitments to achieve zero-emission ocean shipping by 2040 and decarbonize a small portion of their ocean shipping this decade, with Amazon committing 10% of its freight on zero-emissions vessels by 2030, these commitments do not correspond with the fierce urgency of port community health and the climate crisis. Amazon and IKEA must take steps now to reduce their emissions with wind-assisted propulsion and slow steaming and commit to 100% zero-emissions shipping this decade.

Walmart and Target must take responsibility for their maritime pollution and commit to zero-emission shipping.

We call on Walmart and Target to immediately incorporate wind-assisted propulsion and slow steaming to reduce ocean shipping emissions and commit to 100% zero-emissions ocean shipping by 2030. Thus far, Walmart and Target have been silent on the topic of their ocean shipping emissions.

In order to be leaders in this new era

Walmart, Target, Amazon, and IKEA can play leadership roles in creating fossil-free shipping corridors across the Pacific, starting with Yantian (Shenzhen) to Los Angeles and Long Beach and Shanghai to Seattle.

Policymakers and ports should join them. Transpacific shipping routes from China to the U.S. West Coast are the most common trade routes of all four companies. These findings affirm the imperative of creating fossil-free shipping corridors across the Pacific, catalyzing the phase out of all fossil-fuel maritime infrastructure along these trade lanes accordingly.

All four companies must commit to annual public reporting and transparency regarding their maritime shipping:

this report reaffirms and builds on our findings in our Shady Ships report that it is impossible for the public to conduct comprehensive oversight of ocean ship emissions without access to proprietary data sets. We urge Walmart, Target, Amazon, and IKEA to provide comprehensive annual public reports of the maritime operations in their supply chains including their cargo carriers, percentage of cargo carried on zero emission vessels, primary trade routes, and their associated maritime GHG emissions.