

2024 Global Ocean Container Greenhouse Gas Emission Intensities



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Smart Freight Centre



Smart Freight Centre (SFC) is an international non-profit organization focused on reducing the emission impacts of global freight transportation. Smart Freight Centre's vision is a zero-emission global logistics sector by 2050 or earlier, consistent with 1.5° pathways.

SFC's mission is to accelerate the reduction of logistics emissions by fostering collaboration within the global logistics ecosystem.

SFC's goal is to mobilize the global logistics ecosystem, particularly members and partners, to track and reduce its greenhouse gas emissions to achieve 1.5° pathways.

Clean Cargo

Clean Cargo is a collaborative initiative between ocean container carriers, freight forwarders, and cargo owners.

Clean Cargo serves as a source of high-quality containership greenhouse gas emission performance information that supports members in their work to decarbonize containerized ocean cargo transportation. Specifically, the Clean Cargo secretariat collects operational and technical data from ocean container carriers to generate containership emission performance information that:

- Offers access to primary data in accordance with the GLEC standardized framework and ISO 14083.
- By providing a standardized methodology and guideline for measuring and reporting carbon emissions associated with ocean container carriers, this enables members to identify areas for improvement and track progress in reducing emissions.
- Facilitates accurate greenhouse gas emissions inventory calculations for Clean Cargo members.
- This data-driven approach allows members to make informed decisions about their supply chain choices on ocean freight procurement decisions to minimize their carbon emission impact.

Clean Cargo also serves as a forum for decarbonization best practice sharing amongst members.

2024 Greenhouse gas emission performance information



The emission performance information presented in this report is calculated according to the Clean Cargo methods for a series of Clean Cargo ocean container transportation trade lanes. The information in Table 1 represents average annual performance¹ across all reporting Clean Cargo ocean container carrier members. For 2024, there were 18 reporting Clean Cargo carriers. These carriers were responsible for more than 85% of global ocean container freight capacity (by volume).

Clean Cargo emission intensities are based on emission factors that incorporate greenhouse gas emissions related to combustion and energy use resulting from all United Nations Framework Convention on Climate Change Kyoto Protocol greenhouse gases (currently, CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and nitrogen trifluoride (NF₃)). The emission factors that underly the Clean Cargo emission intensities include emissions associated with the entire life cycle of the production and use of each energy source.

Clean Cargo greenhouse gas emission intensities shown in Table 1:

- Are calculated based on each vessel's nominal capacity, assuming a 70% vessel capacity utilization factor.
- Differentiate between emission intensities for refrigerated cargo (refrigerated) and non-refrigerated cargo (dry) based on each vessel's nominal refrigerated container capacity and the vessel's reported number of days of operation.
- Reflect emissions associated with the entire life cycle of the fuel consumed in the carriers' vessels (that is, the Table 1 emission intensities are "Well-to-Wake" intensities).

Clean Cargo carrier member data used in calculating the emission intensities undergoes third-party verification.

¹ Ocean cargo shippers and freight forwarders interested in carrier-specific emissions performance information are welcome to contact Smart Freight Centre at info@smartfreightcentre.org to learn more about membership in Clean Cargo.

Table 1 Average carrier dry and refrigerated container emission intensities in grams of carbon dioxide equivalent per twenty-foot equivalent unit-kilometer (gCO₂e / TEU-km). Intensities reflect Well-to-Wake emission factors and assume 70% vessel capacity utilization.

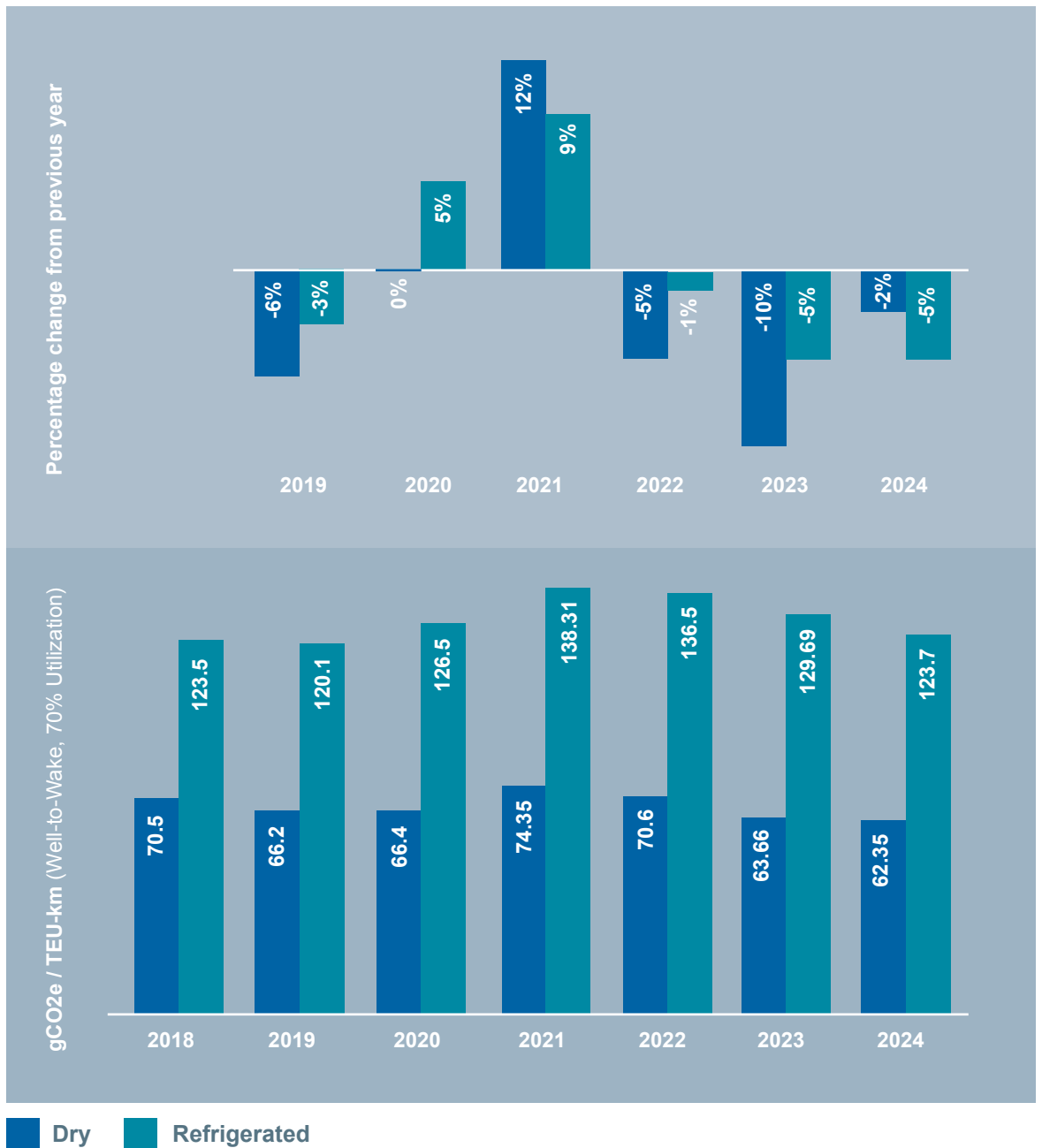
TRADE LANE	2024		2023		2022		2021		2020	
	Number of vessels: 4342		Number of vessels: 4,098		Number of vessels: 3,971		Number of vessels: 3,737		Number of vessels: 3,740	
	Dry	Refrigerated	Dry	Refrigerated	Dry	Refrigerated	Dry	Refrigerated	Dry	Refrigerated
Asia to-from Africa	76.7	140.2	72.3	140.6	83.8	151.0	87.7	155.4	75.3	143.5
Asia to-from Mediterranean/Black Sea	45.4	101.2	42.1	109.0	48.7	114.5	48.0	111.4	46.6	104.7
Asia to-from Middle East/India	68.2	131.0	64.2	127.9	68.6	133.1	73.7	137.5	60.5	121.3
Asia to-from North America East Coast/Gulf	51.3	106.5	54.1	114.0	63.1	123.4	64.7	120.4	57.8	111.6
Asia to-from North America West Coast	58.3	116.9	56.8	120.7	65.7	131.7	71.3	138.2	64.1	121.7
Asia to-from North Europe	40.8	96.2	38.7	100.6	39.6	102.1	42.3	102.0	44.1	100.5
Asia to-from Oceania	83.4	148.8	85.0	152.4	96.0	165.6	100.7	168.6	88.4	149.2
Asia to-from South America (Including Central America)	58.9	118.3	61.0	120.7	70.8	127.3	71.5	125.9	63.1	118.2
Europe (North and Med) to-from Africa	82.5	153.8	89.4	163.9	99.7	172.7	102.2	174.0	100.2	171.3
Europe (North and Med) to-from S America (Inc Cent America)	74.9	141.6	71.7	138.3	81.6	142.8	79.6	139.7	68.8	126.2
Europe (North and Med) to-from Middle East/India	63.8	121.1	54.6	121.1	63.2	129.5	68.5	132.6	58.9	119.2
Europe (North and Med) to-from Oceania (via Suez/via Panama)	79.0	136.4	78.6	139.6	81.9	141.4	82.8	139.5	81.9	138.7
Mediterranean/Black Sea to-from North America East Coast/Gulf	82.6	150.7	80.4	152.0	92.0	167.0	88.4	154.0	77.1	139.2
Mediterranean/Black Sea to-from North America West Coast	68.4	140.2	56.4	130.6	48.9	122.8	62.3	131.1	71.9	129.9
North America East Coast/Gulf/West Coast to-from Africa	103.9	176.3	111.3	180.1	131.7	192.2	134.2	193.5	124.3	201.1
North America East Coast/Gulf/West Coast to-from Oceania	73.7	129.5	74.1	133.1	80.0	145.1	109.7	173.7	103.5	156.0
N America E Coast/Gulf/W Coast to-from S America (Inc Cent America)	91.6	165.2	84.1	152.6	88.1	153.3	91.6	156.5	82.5	143.2
N America E Coast/Gulf/W Coast to-from Middle East/India	73.3	126.8	72.8	135.0	75.3	138.6	79.9	137.7	70.9	125.9
North Europe to-from North America East Coast/Gulf	78.4	142.3	78.0	143.6	88.9	160.6	92.2	159.5	84.5	144.4
North Europe to-from North America West Coast ²	84.9	155.1	–	–	76.4	142.0	88.6	170.0	75.9	134.2
South America (Including Central America) to-from Africa	117.7	200.1	101.0	174.9	138.2	206.6	110.6	186.8	122.4	200.0
Intra Africa	116.8	229.2	115.1	214.0	133.7	224.9	135.2	233.0	127.1	219.0
Intra North America East Coast/Gulf/West Coast	200.0	256.4	214.5	294.5	202.9	283.0	171.5	233.7	177.6	241.8
Intra South America (Including Central America)	100.0	180.6	100.1	176.3	116.4	193.0	108.4	176.0	103.9	177.0
South East Asia to-from North East Asia	94.4	164.1	90.1	157.8	98.6	169.6	98.1	168.3	84.0	148.4
Intra North East Asia	94.5	174.2	100.7	177.1	110.7	184.8	118.9	187.8	103.5	182.8
Intra South East Asia	118.0	197.9	116.1	195.2	125.2	202.1	117.4	193.2	112.5	194.2
North Europe to-from Mediterranean/Black Sea	94.0	165.5	64.4	131.0	73.1	140.5	104.2	173.9	95.8	160.1
Intra Mediterranean/Black Sea	139.5	255.5	137.5	240.2	158.8	264.8	148.2	250.2	134.3	239.4
Intra North Europe	150.7	248.5	141.3	234.9	140.3	232.9	143.3	233.2	138.4	221.6
Intra Middle East/India	99.6	180.7	106.3	187.2	117.6	197.1	126.1	223.2	108.9	197.1
Other	72.0	140.8	84.9	162.9	85.9	164.3	106.7	179.2	110.9	182.5
Average Across all Trade Lanes	62.4	123.7	63.7	129.7	70.6	136.5	74.4	138.3	66.4	126.5

² None of the Clean Cargo Ocean Container Carriers reported vessels on this tradelane in 2023

Emission intensity trends

Clean Cargo carrier GHG emission intensities for 2024, when averaged across all reporting carriers and across all trade lanes, were approximately 2% (dry) and 5% (refrigerated) lower than the 2023 emission intensities.

Figure 1 2018-2024 trend in global average Clean Cargo carrier emission intensities (gCO₂e / TEU-km, assuming 70% vessel capacity utilization, and using Well-to-Wake emission factors).





Overall trends and potential drivers of the intensity changes

In 2024, geopolitical tension continued to have an impact on overall operations in container shipping and the industry remained volatile. Despite this, global container shipping emission intensities fell by 2% year-over-year, driven by a mix of global economic shifts, fleet developments, and early steps toward decarbonization. In the first quarter, despite disruptions in the Red Sea that led many vessels to reroute via the Cape of Good Hope, carriers slightly improved voyage efficiency through slow steaming and optimized fleet deployment. Especially since the second quarter, newly delivered large vessels with higher fuel efficiency entered the market, adding new efficient capacity, supporting lower emissions per container transported over the year, especially trade lanes benefitting from the deployment of newer tonnage and more efficient operations. Throughout the year 2024, the uptake of sustainable marine fuels helped to lower overall emission intensities. Together, these developments reflect how operational improvements, technological upgrades, and alternative fuels contributed to the year's modest but meaningful emissions reduction.

Further to proactive efforts within the industry to enhance operational efficiency and the decarbonization of fleets, this positive trend reflects additionally the regulatory developments at the IMO level. Key regulatory drivers include the further gradual implementation of the Carbon Intensity Indicator (CII) and the Energy Efficiency Existing Ship Index (EEXI), both of which promote lower emissions through better vessel performance and operational practices, encouraging the use of cleaner technologies and fuels and set clearer expectations for the industry's decarbonization pathway.

Using the 2024 emission performance intensities

For further information on how to apply the 2024 Clean Cargo greenhouse gas emission intensities in greenhouse gas emission footprint calculations, please see the [Global Logistics Emissions Council Framework](#).

Information

For more information on Smart Freight Centre or Clean Cargo, please visit our website at www.smartfreightcentre.org

You can also contact Smart Freight Centre directly by email at info@smartfreightcentre.org, or by phone at +31 6 4695 4405.