CargoMetrics Maritime Emissions - Global Benchmark

Better-Built Data™

Version: Containers (Monthly)

Company

Since 2009, CargoMetrics has been a leader in the analysis of global maritime trade. Our Company has a heritage rooted in data science, financial markets, and maritime innovation. Our data power high-value applications used and trusted by some of the world's leading hedge funds, investors, banks, financial exchanges, and maritime shipping & logistics firms.

Maritime Emissions – Global Benchmark Product Family

The CargoMetrics Maritime Emissions - Global Benchmark products represent the most comprehensive and insightful carbon (CO_2) emissions and fuel consumption data available. The products are derived from our industry leading digital representation of the physical characteristics and real-world operation of vessels.

Highlights

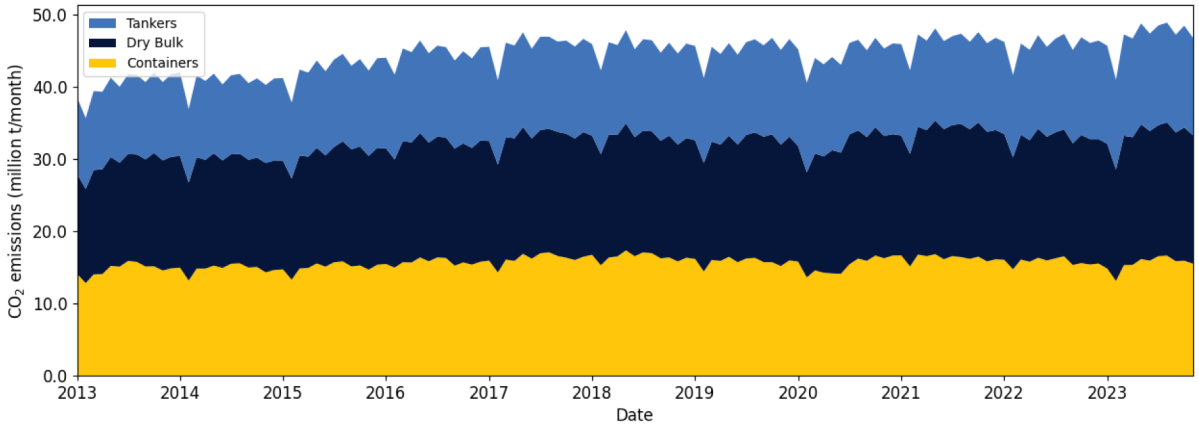
The Maritime Emissions - Global Benchmark products measure maritime shipping CO_2 emissions and fuel consumption and provide

- **Comprehensive global coverage** of commercial shipping vessels
- **Transparency** by vessel class (tankers, dry bulk, containers) and size
- **History** from January 2013 to present
- **The ability** to benchmark and monitor vessel and fleet emissions and fuel consumption in order to analyze, learn, report, and make data-driven decisions

Our Company's approach to data production and monitoring is fully systematic.

SPECIFICATIONS	
Time Period	January 1, 2013 to present
Vessels	Tankers 5,000 DWT and larger Dry bulk 5,000 DWT and larger Containers 200 TEU and larger
Metrics	Carbon emissions, fuel consumption, vessel count, distance, capacity, cargo mass, capacity-miles, tonne-miles
Coverage	Global
Frequency	Daily (12:00 UTC); weekly; monthly
Data Outputs	CSV file
Data Delivery	AWS Data Exchange
Audience	Ship owners/operators, cargo owners, marine insurers and investors, regulators, multinational corporations, financial exchanges, carbon traders

TOTAL EMISSIONS FOR TANKERS, DRY BULK, AND CONTAINERS PER MONTH, 2013-2023



For more information about this product or to request a trial, contact sales@cargometrics.com.

Use Cases and Market Applications

The Maritime Emissions - Global Benchmark products are well suited for a wide range of applications, including:

- Benchmarking specific vessel or fleet CO_2 emissions and/or fuel consumption against a representative vessel or the global fleet
- Estimating CO_2 emissions for a vessel's upcoming voyage or sequence of voyages
- Estimating the Scope 3 maritime shipping emissions contributing to the carbon footprint of a multinational retail or industrial corporation
- Calculating the cost of CO_2 emissions for freight contracts and FFA trading (see case study in Exhibit 1)
- Monitoring and analyzing the volume, trends, and changes in maritime CO_2 emissions and fuel consumption
- Developing and enhancing carbon trading models and related price forecasts

Methodology

Products are derived from our patented maritime system that has been powering high-value applications for over a decade. The system produces a comprehensive representation of all dimensions of maritime trade – all vessels, voyages, cargoes, emissions, and geographies throughout time. Our perspective is global and our approach is fully systematic with true point-in-time organization of data and deployment of physical modeling, statistical modeling, and machine learning techniques.

The Maritime Emissions product suite is derived from our Company's observation of vessel movements and behavior and our fuel consumption model. The fuel consumption model is applied at the individual vessel level and takes into account each vessel's physical characteristics and our proprietary hydrodynamic propulsion model. The fuel consumption model was developed by our Company's expert naval architects and marine engineers. The model has been validated against on-board fuel consumption flow meters, voyage records, and live sea trials that span the global tanker, dry bulk, and container fleets.

Our methodology reflects an emphasis on trustworthiness, consistency, and repeatability.

Key Features

CargoMetrics' vessel movement and behavior model encompassing:

- Continuous observation and modeling of voyage activities and vessel states for over 100,000 vessels
- Assessment of propulsive power requirements for each vessel under varying speeds and drafts
- Estimation of non-propulsive power requests for different vessel types, sizes, and activities (maneuvering, loading, discharging, transiting)

CargoMetrics' vessel fuel consumption model encompassing:

- Vessel characteristics including vessel type, cargo capacity, length, breadth, design speed, design draft
- Vessel engine data including main engine models, types, tier, fuel types, diesel generators, and boilers
- Our hydrodynamic model that defines propulsive requirements according to operational profiles (speed, draft, weather, fouling)
- Our propulsive models that match engines and propellers' power with hull requirements

Product Types

Maritime Emissions - Global Benchmark products are available for tankers, dry bulk, and container vessels in daily, weekly, and monthly formats.

Daily Product – Each file (published on day T) contains a daily time series through day T-4 of CO_2 emission and fuel consumption metrics for tankers, dry bulk, and container vessels with complete history derived from the most up-to-date data available on day T.

Weekly and Monthly Products – Separate products are available for tankers, dry bulk, and container vessels in weekly (Saturday to Friday) and monthly formats. The Weekly and Monthly products are derived from the Daily product. The Weekly products are published on the following Thursday; the Monthly products are published on the 6th day of the next month.

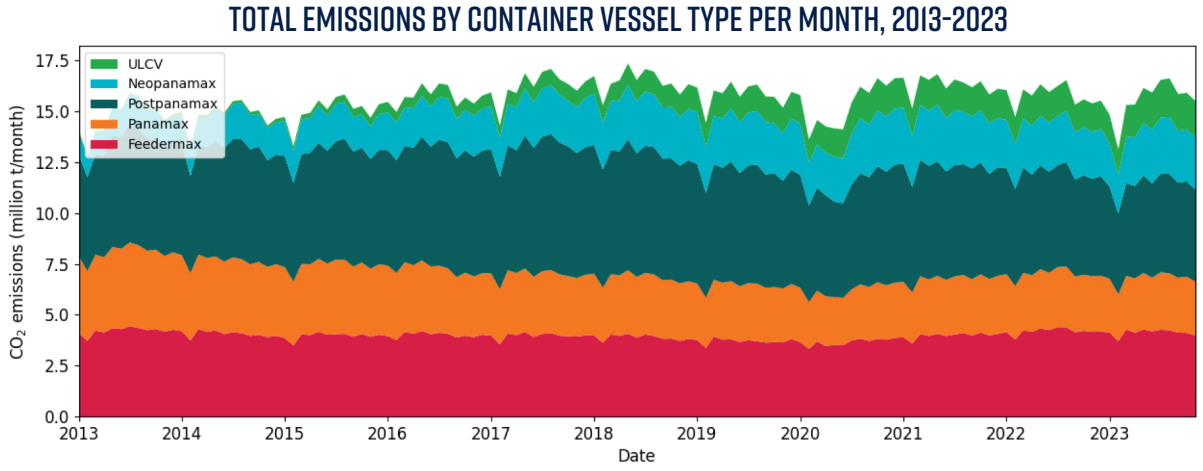
Data Snapshot

CargoMetrics Maritime Emissions - Global Benchmark – Containers (Monthly)

Activity month start	Vessel type	CO2 emissions (t/month)	Fuel consumption (t/month)	Distance (NM/month)	Avg. count (vessels/day)	Avg. capacity (TEU/day)	Capacity-miles (TEU*NM/month)	CO2 per vessel (t/month)	CO2 per capacity-mile (g/(TEU*NM))
2023-11-01	containers_all	15,507,591	4,979,958	32,300,982	5,394	25,871,491	174,070,499,328	2,875	89.09
2023-11-01	feedermax	3,980,279	1,278,191	14,853,988	2,870	4,469,377	24,365,981,631	1,387	163.35
2023-11-01	panamax	2,638,430	847,280	5,453,804	816	3,339,118	22,354,563,785	3,233	118.03
…	…	…	…	…	…	…	…	…	…
2013-01-01	postpanamax	5,003,832	1,606,881	7,264,473	837	5,764,621	50,231,084,149	5,981	99.62
2013-01-01	neopanamax	1,134,771	364,411	1,336,408	153	1,923,039	16,682,884,765	7,395	68.02
2013-01-01	ulcv	80,051	25,707	79,242	10	147,747	1,177,722,954	8,110	67.97

The time series in Tidy Data format enable subscribers to analyze, learn, and unlock insight using combinations of vessel type, vessel count, distance, time and other factors.

Sample data and the data dictionary for this product and the daily and weekly versions are available on AWS Data Exchange.



CargoMetrics also provides bespoke data products and professional services

Exhibit 1:

Case Study - A financial exchange uses Maritime Emissions - Global Benchmark to enhance carbon costing model

A financial exchange's carbon freight index calculates a Capesize Freight Forward Agreement (FFA) rate that includes the theoretical cost of CO_2 for Capesize dry bulk vessels. It assumes Capesize fuel consumption is constant over time, while other model inputs change on a daily, weekly, or monthly basis depending on data availability.

Instead of using a constant value for fuel consumption per vessel per day (e.g. 29 tons/day, the constant horizontal line), the exchange adopts CargoMetrics' Maritime Emissions - Global Benchmark daily Capesize fuel consumption per vessel (the fluctuating line).

Maritime Emissions - Global Benchmark provides a systematically-measured dynamic input that can be updated at the same cadence as other inputs to more accurately reflect the state of Capesize activity and market costs over time.