

A catalyst for positive change

**How Cargill is working to
decarbonize shipping**

Published June 2023

Full steam ahead on decarbonization

In 2022, Cargill Ocean Transportation saw our largest carbon emissions reduction since we set our goals and started measuring in 2017. Our greenhouse gas emissions fell significantly compared to last year, landing 1.25% below the 2017 baseline level.

Although we are pleased with this result, we don't want to get overconfident, and we are certainly not about to rest on our laurels. We are still above our target trajectories, both for the Sea Cargo Charter (SCC) carbon reduction target of at least 50% by 2050, and Cargill's company-wide goal of a 30% reduction by 2030.

In fact, 2022 emissions reductions for the dry bulk shipping sector as a whole, including Cargill, were mostly the result of a more sluggish economic environment. When demand slows down, so do cargo vessels. And slower vessels emit less carbon. When the demand accelerates, so do ships and emissions, which is what we saw when economies began to open up again after the first part of the COVID-19 pandemic.

It illustrates that decarbonizing shipping will not be a linear process. This sector is not like most others. You can't simply plug into a renewable energy source and declare the job done. In a business built around vessels that remain in service for decades, emissions can only come down structurally if we systematically implement carbon-saving technologies at scale.

In this process, Cargill wants to be a catalyst – and we're already making sizable investments for the future.

In this report, you can learn how we facilitated orders for the first commercial methanol-powered vessels and a first-of-its-kind retrofit for another vessel with wind-assisted propulsion – large, rigid sails helping the engines. We are also playing an active role in creating the world's first fully climate-aligned shipping lanes, known as green corridors.



While we're being very public about raising awareness of these issues, behind the scenes, we are assisting ship owners and our customers on their own decarbonization journeys. Every day, we're collaborating with customers to help them understand their own carbon footprints and ways to reduce them. Meanwhile, we're working with owners to install power-saving devices on their ships and financing these measures.

These are all things that can be done right now, without any exotic new inventions. If we use the remainder of this decade to implement these technologies at scale, we will see emissions from shipping begin to fall sharply in the 2030s.

To be sure, that's a big job with a significant price tag. That's why it is Cargill's ambition to use our position at the center of the value chain to spur change. We're investing significant sums in wind and methanol, not only because we want to shoulder our fair share of the risks with our commercial partners, but because we know that once these technologies prove their value in actual commercial service, the barriers for wider adoption will come down.

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We want to use our position at the center of the value chain to spur change

The time has come to move out of the research phase and into widespread adoption in the real world. The technology is ready, and the urgency is here. Now is the time to go full steam ahead and tip the balance. We are grateful to have the opportunity to play the role of first mover and catalyst for positive change

Jan Dieleman
President, Cargill Ocean Transportation

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This report covers the calendar year 2022.
Information in this report is for that time period, unless otherwise noted.
For our previous decarbonization reports, visit **our website**.



About Cargill Ocean Transportation

We are a leading freight-trading organization that charters around 650 vessels worldwide at any one time. Founded in 1956 in Geneva, we benefit from the rich heritage and expert capabilities of Cargill's global operations in food, agriculture and commodities trading.

Our customers, including other companies as well as Cargill's own internal businesses, are at the center of everything we do. We provide services that combine the latest digital technology with green solutions to make shipping safer and more sustainable.

1,913

different ships operated

4,067

voyages

225,117,367

tonnes cargo carried

Our global network



Our progress in 2022

In 2018, the International Maritime Organization (IMO) set a greenhouse gas (GHG) emissions reduction target for shipping of at least 50% by 2050, against a 2008 baseline. This target includes reducing the carbon intensity of ships by at least 40% by 2030.

In line with Cargill's overall Scope 3 reduction target, Cargill Ocean Transportation will support our internal customers, such as Cargill's agricultural supply chain business, by reducing their chartered vessels' Energy Efficiency Operational Indicator (EEOI) by 30% by 2030, against a 2017 baseline.

Furthermore, Cargill Ocean Transportation will support our external customers in achieving their Scope 3 emissions reduction targets, however ambitious they may be.

Sea Cargo Charter (SCC) benchmark

Carbon intensity to be aligned with reduction trajectories that achieve the IMO goal of a GHG reduction of 50% by 2050 for chartered fleet.

Progress

4.5%

above 2022 trajectory baseline

Cargill 2030 target

30%

GHG reduction per ton mile (EEOI).

Shipping's progress

1.25%

below 2017 baseline

Cargill standards

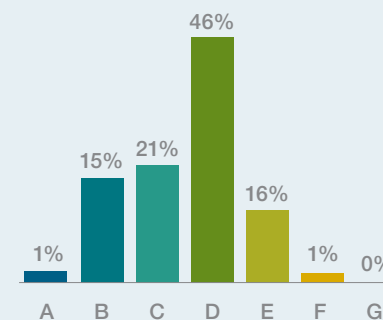
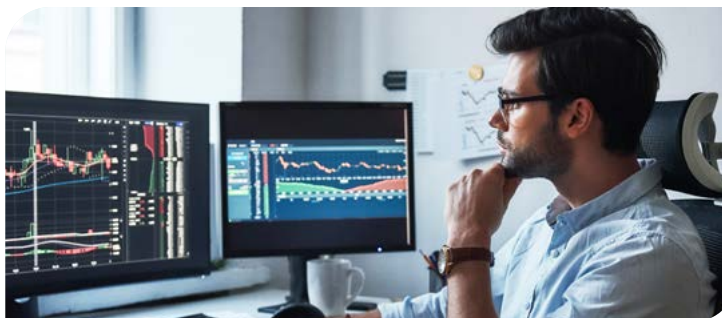
80%

of our fleet will be rated A through D by RightShip.

Progress

83%

are rated A-D



How we track our results

We track our decarbonization progress against two benchmark trajectories: the SCC's, which is aligned with the IMO's path towards a 50% reduction in emissions from shipping by 2050 (see next page), as well as Cargill's own goal of a 30% reduction by 2030.

2022 was our best year to date in terms of emissions reductions measured in EEOI (see sidebar), placing us 4.5% above the SCC trajectory and 1.25% progress in shipping to date. A notable improvement over 2021.

Despite this positive trend, we are not yet aligned with the respective target trajectories. We are making a sustained effort to improve our EEOI by deploying a range of operational and technical efficiency improvement measures, including optimized routes and more efficient ships. Although that work is reflected in the results, most of the improvement is due to weaker freight markets in 2022, resulting in lower average voyage speeds within the dry bulk fleet, which in turn lowered both emissions and carbon intensity.

Carbon intensity by vessel size

EEOI% change year-on-year by vessel size

	2017	2018	2019	2020	2021	2022
Cape		4.9	-3.4	-0.8	2.3	-11%
Handy		-0.5	-5.0	-4.1	6.0	0%
Panamax		1.6	-5.2	0.0	6.0	-4%
Supramax		-1.7	-5.4	-5.0	6.6	-2%
Tankers		-1.7	-14.0	4.1	10	8.6%

Explaining EEOI

We apply the IMO Guidelines for Voluntary use of the Ship Energy Efficiency Operational Indicator (EEOI) in our methodologies. A ship's EEOI represents its CO₂ emissions divided by actual transport work. It expresses the average carbon intensity of a ship in its real operating conditions, considering its actual speeds, draughts, capacity utilization, distance traveled, and the effects of hull and machinery design and condition, as well as weather. The unit for EEOI is gCO₂/t.nm (grams of CO₂ per tonne mile). In accordance with the SCC, our calculations include ballast voyages prior to the commencement of our charters.

SCC target

Reduce GHG by 50%

by 2050 for chartered fleet

gCO₂/t.nm



Cargill target

30% GHG reduction

per ton mile (EEOI)

Progress in shipping to date:

1.25%

30%

Our Sea Cargo Charter results

2022 was our second reporting year under the Sea Cargo Charter (SCC) framework. Our overall results have improved, measuring 4.5% above target, compared to 5.9% in 2021. Meeting the SCC and IMO decarbonization benchmarks will require a sustained joint effort with our customers and fleet owners as economic conditions fluctuate.

The 2022 outcome was heavily weighted towards Panamax vessels, which make up the largest portion of our chartered fleet, and improved to 6.7% above target, down from 8.9% in 2021. Improvements in our dry bulk fleet's performance were partially offset by our tanker fleet, whose results were worse than the previous year, driven by a pickup in tanker markets in 2022.

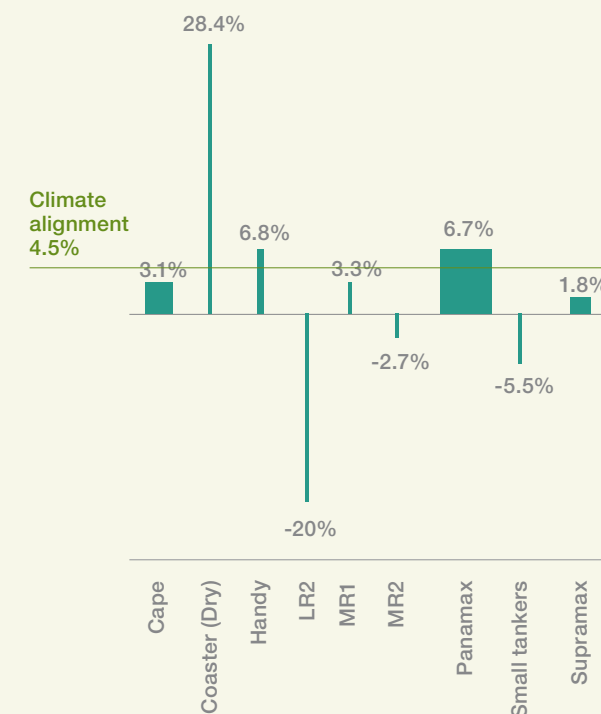
Our positive result is driven by our long-term fleet, which significantly outperformed short-term chartered vessels. Vessels on charters longer than six months achieved an SCC alignment of -2.3%, which is better than the benchmark trajectory. Ships on shorter charters fell short at 16.6% above the benchmark. These trends highlight that, while we are making progress in our long-term fleet (by targeting more efficient ships and maximizing operational efficiency), we must find ways to bring the rest of our fleet up to the same standard.

Outliers such as LR2 tankers, which represent only a small number of voyages in 2022, and dry coasters, which spent a significant amount of time in port, have negligible impact on our overall results.

SCC Climate Alignment

The length of the bars represents each vessel category's climate alignment.

Their width indicates each category's weighting in transport work, expressed in tonne miles.



The Sea Cargo Charter

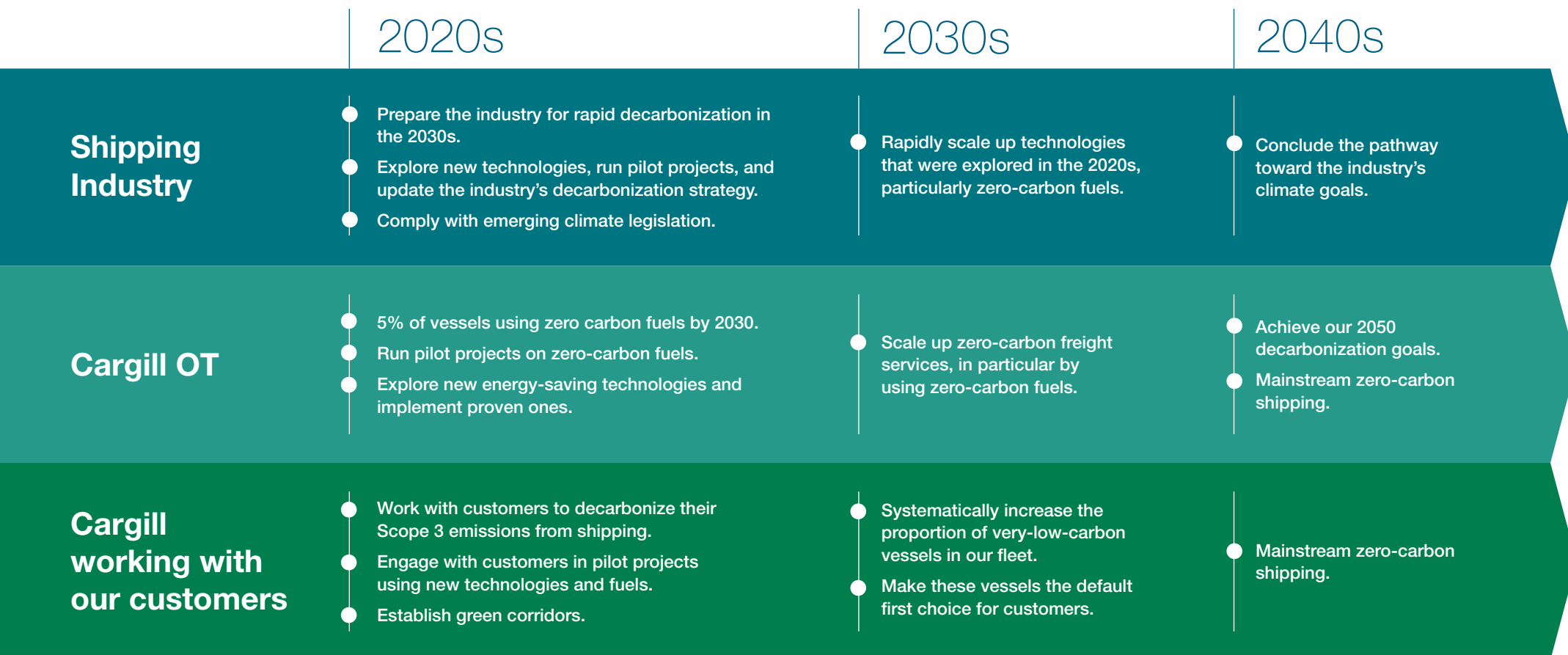
The Sea Cargo Charter (SCC) brings together 36 of the world's largest charterers of cargo ships with the aim of reducing shipping's climate impact. Cargill played a leading role in its founding in 2020. The organization provides a transparent, shared disclosure framework, based on a linear decarbonization trajectory aligned with the IMO's goal of 50% reduction in shipping GHG emissions by 2050. Using the SCC's published methodology, members assess their fleets' carbon intensity annually against the SCC benchmark trajectory. Results above the trajectory (positive percentages) indicate that additional work is required to "catch up" with the IMO goal. Results below the trajectory (negative percentages) indicate performance ahead of target. The SCC uses the EEOI (see page 5) as its carbon intensity metric. The Sea Cargo Charter Annual Disclosure Report's inaugural year was in 2021.

To learn more, visit www.seacargocharter.org

Navigating shipping: the decarbonization journey

Building a climate-aligned shipping industry by 2050 will require a sustained effort that involves all stakeholders.

Many new carbon-saving fuels and technologies will begin coming online during the remainder of the current decade. To be successful, we will have to scale these up rapidly in the 2030s, so we can achieve our climate goals by mid-century. Here's what lies ahead for the shipping industry as a whole, and for Cargill Ocean Transportation and our customers:



What we can do today

Decarbonizing the shipping industry will take decades, but we do not need to wait for futuristic technologies such as hydrogen-based propulsion and next-generation nuclear reactors. We can go a long way towards our goal using only technologies that are available today.

“We have a great opportunity”, says Cargill Ocean Transportation Global Operations and Supply Chain Director Eman Abdalla. “If we’re smart about working together across our industry, we can start reducing fuel usage, costs and carbon emissions right away.”



Cargill can help with the following measures:

- 1 **Wind-assisted propulsion** reduces the amount of fuel required to propel the ship. (Page 11)
- 2 **Green methanol fuel** can eliminate lifecycle CO₂ emissions. (Page 9)
- 3 **Sustainable biofuels** are another way to reduce emissions. (Page 10)
- 4 **Energy-saving devices** such as propeller ducts and advanced hull antifoul paints increase ships' efficiency.
- 5 **Optimized routing** saves fuel and lowers emissions.
- 6 **Green corridors** facilitate low- or no-carbon shipping. (Page 12)

What other stakeholders can do:

- 7 **Data-sharing across the industry** helps ships move efficiently and saves fuel, for instance by slow steaming when possible and coordinating departures to minimize unnecessary destination wait times.
- 8 **Parceling and upsizing** ensures as much freight as possible is carried by fewer (often bigger) ships, saving fuel in the process.
- 9 **Modernized port facilities** offer alternative fuel bunkering and green power supplies to docked ships.
- 10 **Alternative fuel plants** produce methanol or biofuels.
- 11 **Renewable energy** supplies zero-emissions power to these plants.

It is our ambition to be a catalyst in the drive towards GHG-neutral shipping.

Because of our operational scale, we can help our customers find the most efficient ships for their cargo at advantageous rates. We work with fleet owners to invest in new technologies and share the economic risk by financing early adoption schemes. Using our global network and decades of experience, we connect private businesses, NGOs, technical partners, international organizations, and government agencies to facilitate green shipping.

Read the following pages to learn what we are doing.

What we can do today

Giving methanol-fueled shipping its real-world debut

A persistent problem hampering the drive to decarbonize shipping and adopt low- to no-carbon fuels such as methanol is the question of who jumps first. Taking the initiative is risky, because the investment is sizable. But if nobody does it, the technology never scales up, costs remain high, and so does the overall anxiety to jump.

Earlier this year, Cargill decided to end that “chicken-and-egg” problem by putting our weight as one of the world’s largest bulk charterers behind some of the first methanol vessels to enter commercial service. It’s the first step on the way to our goal of 5% zero-carbon ships on the oceans by 2030.

In January 2023, Cargill teamed up with Japan’s Mitsui & Co. in ordering two dual-fuel, methanol-powered Kamsarmax bulk carriers. That deal was followed in April by a similar one with Danish

fleet owner J Lauritzen, which ordered two more Kamsarmax vessels, backed by seven-year-minimum charter commitments from Cargill.

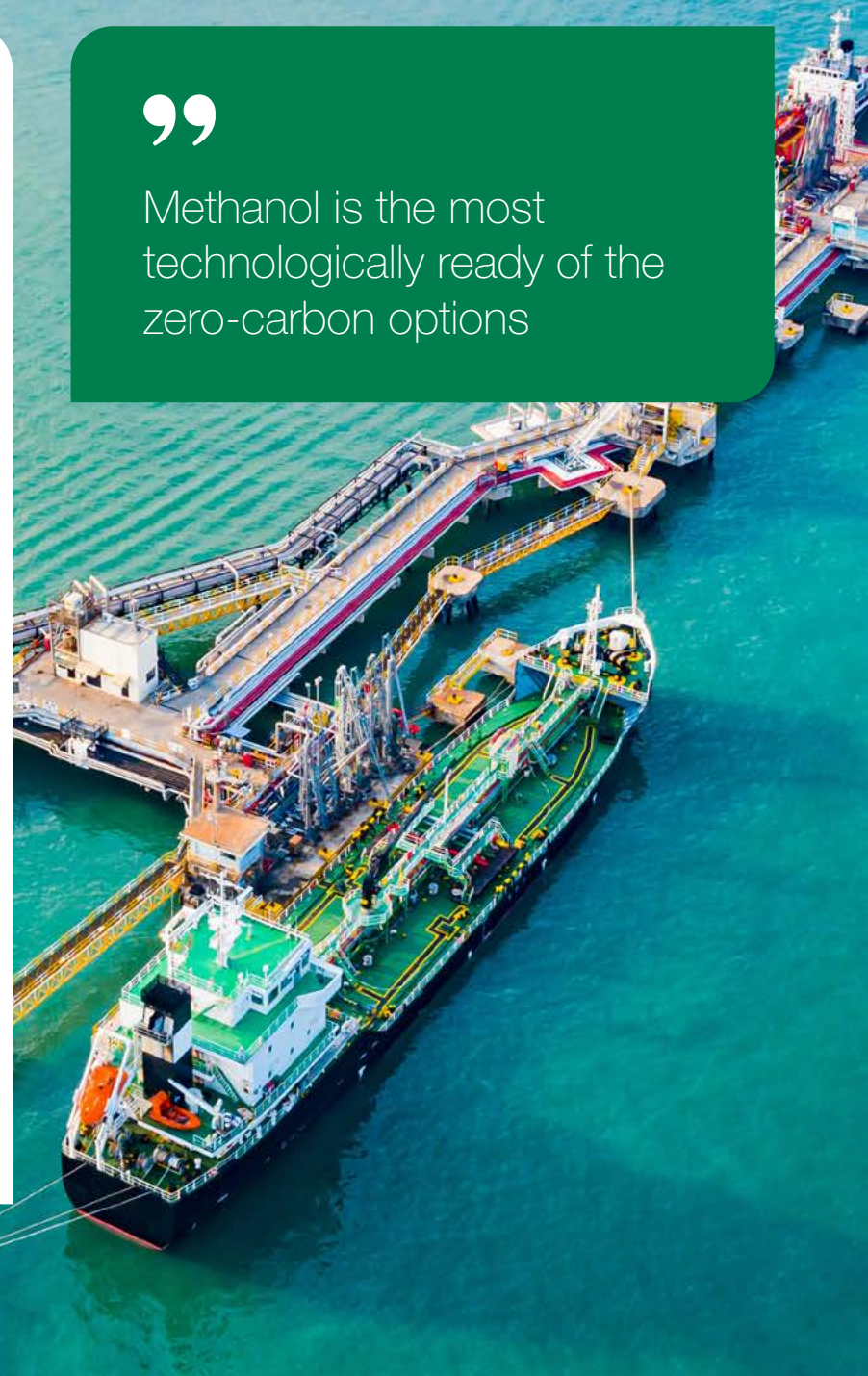
Set for delivery beginning in 2025-26, these vessels will be the world’s first methanol-fueled bulkers to enter commercial service and help customers achieve their Scope 3 climate goals.

Although these ships are also capable of running on conventional fuels, they will emit significantly less carbon, and even become capable of zero-carbon travel on green methanol. Green methanol can be made in several different ways: from biomass, or from green hydrogen combined with carbon captured from a point source or from the atmosphere. With carefully selected feedstocks of hydrogen and carbon, it can be an effective way of carrying green energy to the propeller.

“We’re excited to partner with companies like Mitsui and J Lauritzen”, says Cargill OT’s Global Head of Assets and Structuring George Wells. “Methanol is the most technologically ready of the zero-carbon options. We wanted to do something now to propel the industry forward.”

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Methanol is the most technologically ready of the zero-carbon options



What we can do today

Deploying biofuels on one of the world's busiest routes

Biofuels made from used cooking oils can reduce carbon emissions significantly compared to conventional fuels. In shipping, they also have one big advantage over other alternative fuels: they're a "drop-in" fuel, which means they can be used in conventional vessels without the need for any modification. In other words, they offer a practical way to lower climate impacts of older vessels.

Since 2021, Cargill has been offering FAME (fatty acid methyl ester) biofuel to ships traveling between Singapore and the ports of Rotterdam and Amsterdam in the Netherlands, one of the world's most densely used shipping routes.

The first "green" contracts of affreightment (COAs) stipulating use of the product were closed last year. Cargill worked with maritime certifier DNV to develop a reliable accounting methodology for CO₂ savings. Biofuels can be seen as a carbon "inset", because they lower the shipping industry's actual carbon footprint, as opposed to investing in "offsets", such as forestry and renewable energy projects, which aim to lower emissions elsewhere.

"It's all part of a growing biofuel business", says Global Head of Marine Fuels, Olivier Josse. "Besides our own fleet, container ships and car carriers are the main customers. We're seeing more and more interest all around."

Cargill has a powerful advantage in biofuels, because we have a shipping business as well as a cooking oils supply chain. The used oils and food waste products that serve as raw materials are sourced by Cargill's agricultural origination and processing business in Europe and processed into FAME biofuel at the company's new plant in Ghent, Belgium.

Through Cargill Ocean Transportation, the fuel is offered to ships in the Netherlands and Singapore, one of the world's biggest bunkering ports. In each place, Cargill has partnerships with suppliers who operate bunkering barges and blend the FAME with conventional fuels.

Combined with other fuel-saving measures, biodiesel can help ships lower their carbon emissions by up to 30%. Government policies such as the EU Emissions Trading System (ETS) are expected to help reduce the price gap between biofuels and conventional ones. Meanwhile, companies across the economy have ambitious climate commitments to fulfill. They are increasingly looking at shipping as a place to cut emissions.

Amid those evolutions, Cargill has an important role to play, says Josse. "We have the end-to-end structure in place to supply FAME biofuel. You can use it without any further investment. It's a solution that is ready to go right now. That's the big difference."

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Biofuels are a solution that is ready to go right now, with no further investments or modifications needed

What we can do today

Retrofitted bulker set to deliver proof of fuel savings with wind

Using high-tech sails and insights from yacht racing, cargo ships can cut energy use and carbon emissions by 20% or more while saving a commensurate amount on their fuel costs. A Cargill-chartered vessel setting sail in mid-2023 is the first to test that point in commercial service.

The Mitsubishi-owned Pyxis Ocean, an 81,000 dwt Kamsarmax bulker built in 2017, was chosen to be outfitted with two 44-meter rigid sails designed by Olympic sailing champion Bill Ainsley's BAR Technologies. One of the sails has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 955286.

"The purpose is to take the lead", says Cargill Ocean Transportation's Head of Decarbonization and Energy Transition, Keith Dawe. "Wind can be an important factor in decarbonizing shipping and

helping our customers reduce their Scope 3 emissions. Once it has been demonstrated successfully, we're confident that other owners will get on board."

One of the advantages of rigid sails is that they can be added to existing ships to substantially lower their carbon emissions. Sails can also be used in combination with novel fuels, such as methanol, offsetting their TCO (Total Cost of Operations) gap with conventional fuels.

In prior modeling, rigid sails won out over kites and rotors. While we will further test kite- and rotor-based systems, sails carry the day at this stage in terms of practicality and economy, allowing ships to use 20% to 30% less fuel.

Cargill is sharing the investment risk with ship owners by financing energy-saving technologies that further boost each vessel's efficiency and operating cost. The sails' emissions reduction potential was independently confirmed by maritime consultant the Wolfson Unit.

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Once wind is demonstrated successfully, we're confident that other owners will get on board



What we can do today

Creating a low-carbon shipping environment with green corridors

Over the next few years, many interlocking parts must fall into place to make the world's oceans more welcoming to low- or no-carbon shipping. Alternative-fuel vessels need places to bunker. Those hubs, and all the production and storage facilities they require, will need specific regulations to work safely and thrive economically. And value chain partners wishing to ship goods sustainably will have to be able to connect with each other to do business.

One approach to bring that complex network of rules, relationships and infrastructure into existence is known as "green corridors". A green corridor, in essence, is a shipping route between two ports or regions that meets all the conditions to support (near-) zero-emissions shipping. But there is one big hurdle: as of today, green corridors are purely conceptual. For that reason, Cargill is applying our scale, expertise and global network of longstanding relationships to help make them a reality.

Since the 2021 COP 26 climate conference in Glasgow, Scotland, about 20 different green corridor initiatives have been proposed. "But each projected corridor is different, and

implementing even a single one requires a large amount of trust and cooperation along the full value chain and across borders, if only because the investments – and risks – involved are sizeable", says Cargill's Decarbonization Project Manager, Emma Skov Christiansen.

"The challenge is creating the critical mass required for take-off. We need everybody on board: fleet owners, companies up and down the value chain, governments, international organizations... The more we can spark these collaborations, the more we'll create a resilient network, share the burdens and essentially de-risk the effort," Skov Christiansen said.

Cargill is playing the role of thought leader and facilitator, helping to identify and unite the key players, and moving the process along from desktop study to real-world testing. To that end, the company is working with specialized NGOs including the Getting to Zero Coalition and the Maersk McKinney Moller Center for Zero Carbon Shipping, and with global political players like the EU, which has put its weight behind green corridors.

"Cargill's tangible investments in green shipping technologies demonstrate our willingness to take responsibility", says Cargill Decarbonization Specialist Chris Hughes. "We're prepared to take that risk, so we can learn what it takes. And we always push to have the customer in the room, because in our view, there is no transition without customer collaboration."

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The more we can spark collaborations, the more we'll create a resilient network



What we can do today

Finding carbon savings for fleet owners and customers

Up and down the value chain, companies in the shipping sector are looking for practical and economical decarbonization solutions. But not every company has the expertise to identify, implement and finance these measures. From our position at the center of global commodity supply chains, Cargill can help partners aiming to lower their carbon footprint with expert advice.

We're working with partners upstream and downstream to find ways to cut fuel usage, carbon, and cost. A dedicated technical team works closely with fleet owners to lower their ships' emissions. Tailored packages may include installing fixed ducts in front of propellers to make them more efficient, special hull paints that stay smooth, and high-tech rigid sails – or simply installing LED lighting.

In many cases, Cargill works with ship owners to finance installation on the vessels that we charter long-term. Cargo ships often stay in service for 20 to 25 years. These devices can help decarbonize vessels that were designed before emissions reductions became a core focus of the industry. Over time, the investment pays for itself in the form of saved fuel.

Cargill recently also invested in Zero North, a voyage optimization tool that allows us to build a “digital twin” (or copy) of each vessel we operate, understand how it performs, and give it precise instructions on optimal speeds and routes to save fuel and reduce emissions.

To many customers, the amount of carbon they can save by reducing shipping emissions remains opaque. It also varies significantly by industry. At the same time, GHG reduction goals are getting more and more ambitious, and companies are looking to cut carbon along the value chain.

Increasingly, Cargill is seen as the go-to expert on decarbonizing shipping. That is why we are spending a lot of time sitting down with our customers, briefing them on our growing list of low-carbon options and working together to determine the best ways to reduce their carbon footprint from shipping, tailored to their specific commercial needs and sustainability targets.

“In the end, you need to offer customers the tools to achieve their goals,” states Patrick Jourdain, Cargill's Global Customer and Business Development Lead. “In a way, shipping is like a ride-sharing app: Do you want to book the standard car or the green one? We can now offer the green one.”

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Shipping is like a ride-sharing app: Do you want to book the standard car or the green one? We can now offer the green one

Driving progress through partnerships

Decarbonizing shipping is an exceptionally complex effort that will take decades to complete. No company, state or organization can do it by itself. True progress requires sustained partnership between private business, national governments, intergovernmental organizations, technical partners and NGOs.

In addition to working internally and with our customers to drive down maritime carbon emissions every day, Cargill works toward that same goal in partnership with the following organizations:



