# These 150-foot-high sails could help solve shipping's climate problem

Harnessing the power of wind could both reduce emissions from cargo ships and extend the life of these vessels



By <u>Nicolás Rivero</u> April 22, 2024 at 6:00 a.m. EDT

### CORRECTION

A previous version of this article said Norsepower's rotor sails typically help ships save 8 to 10 percent on fuel. Those numbers came from one trial onboard the Maersk Pelican; the company says a better estimate for typical fuel savings across all ships is 5 to 25 percent. The article has been corrected.

To cut costs and carbon emissions, cargo ships are putting a new spin on an ancient technology: the sail.

These aren't the sailboats of yore. Modern sails look more like airplane wings, smokestacks or balloons, and they use artificial intelligence to catch the wind with little help from mariners who long ago forgot the art of hoisting a mainsail.

10 steps you can take to lower your carbon footprint

Sails can reduce an existing ship's fuel consumption — and greenhouse emissions — by something like 10 or 20 percent, according to maritime experts, making them an attractive option for ship owners looking to cut costs or comply with environmental regulations. Ships burn some of the world's dirtiest fuels and generate <u>roughly 3 percent</u> of global emissions, a share that's only expected to <u>rise over time</u>, according to the United Nations. The European Union created a <u>cap-and-trade system for shipping emissions</u> earlier this year, and the U.N. International Maritime Organization is <u>finalizing its own emissions</u> rules now that would penalize the owners of dirty vessels.

Rather than sending those dirty vessels to the scrapyard, companies can install sails to clean up some of their emissions and extend their ships' lives. And as the industry eventually moves toward alternative fuels that are low-carbon but high-cost, saving money on fuel will become even more important.

There are now 39 large commercial ships with sails, according to the International Windship Association, an industry group that represents sailmakers, ship owners and ship designers. That's a drop in the bucket compared with the roughly <u>100,000 cargo ships</u> <u>plying the seas</u>, but the technology seems poised to take off as sails move from test projects to real-world use. Sailmakers are building new factories to meet the expected demand. "We're at an inflection point," said Matthew Collette, a professor of naval architecture and marine engineering at the University of Michigan. "We're going to see this coming very quickly to a larger number of ships."

Here are some of the strange sails that may one day push your online orders across the seas.



### Ships with wings

The VLOC Sea Zhoushan, which sails between Brazil and China, has tiltable rotor sails for easier cargo handling operations — and going under bridges if needed. (Patrick Goossens) One of the most versatile sail designs looks and works a lot like an airplane wing.

"All we've done is taken that wing and put it vertically," said John Cooper, CEO of BAR Technologies, a company that manufactures this type of sail, "so instead of creating lift, we're creating thrust." On an airplane, wind flows over the wings and creates air pressure differences that push the plane up. On a ship, the wings work the same way — except they're angled to push the ship forward.

The wings come with sensors that measure weather conditions, and they automatically change their angle and shape to catch the wind. These sails can typically be used for most of a voyage, but they fold down to the deck if the wind blows faster than 30 knots, or when the ship is docking or loading cargo.

Last year, BAR Technologies installed two of its wings on a 43,000-ton ship designed to carry dry bulk cargo such as grains, coal or minerals. Over its first six months, the ship <u>saved 14 percent on fuel</u> as it crisscrossed the Atlantic, Pacific and Indian oceans, according to the ship's owner.



### The return of the rotor sail

At first glance, rotor sails may look like smokestacks rising from the deck, but they're actually tall, rotating cylinders that use wind to push a ship forward.

When the wind is blowing at the right angle, an electrical motor spins the rotor sails, speeding up the air flow on one side of the sail and slowing it down on the other. That creates an air pressure difference that pushes the ship forward.

Norsepower, the biggest rotor sail manufacturer, says they typically help ships save 5 to 25 percent on fuel.

Rotor sails are more than a century old; German inventor Anton Flettner patented the idea in 1922 and an experimental cargo ship fitted with rotor sails <u>crossed the Atlantic</u> in 1926. But Norsepower, which is based in Finland, says the sails have come a long way since then, thanks to lightweight composite materials and AI systems that adjust to the wind to make the sails more efficient.

"We can make a much better sail than Mr. Flettner did in the 1920s," said Tuomas Riski, Norsepower's CEO



## The Michelin Man sail

Michelin has developed an innovation — called WISAMO (wing, sails, mobility) — to decarbonize maritime transportation. (Michelin)

Michelin is developing a more experimental inflatable sail which, appropriately, looks a lot like the company's mascot.

Michelin's design works similarly to a classic sail, made to catch the wind and redirect its power forward. The main difference is that its sail is made of inflatable fabric instead of a canvas sheet, and its mast can retract down to the deck. The sail can change its size depending on wind conditions.

Like the other sails, Michelin's product operates by itself. "It has to be fully automated because today's sailors have no time and no particular knowledge about sails," said Gildas Quemeneur, who is leading the project.

243Comments



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