In response to demands to reduce emissions, the shipping industry is reconsidering wind power.

By Lydia Mullan

Green is the New Black

In addition to cutting a fine figure, Tres Hombres is one of the most ecofriendly vessels on the high seas.
here is perhaps no area of human endeavor that has shaped the modern world as much as trade and transport. Think of the vast network of indigenous trading routes crisscrossing the Americas, Asia’s Silk Road and the clipper ship routes round Cape Horn. Here in the United States, the country’s biggest cities, including New York, Los Angeles and Miami, were not only all established as seaports, but remain influential centers for culture and commerce today.

The shipping industry, though, has a dirty secret. Despite being far and away the most efficient means of transporting everything from cars to shipping containers filled with electronics or running shoes, it’s still a major source of pollution.

According to the Third IMO Greenhouse Gas Study 2014—an effort commissioned by the International Maritime Organization (IMO) to study the industry’s role in climate change—the world’s commercial vessels collectively burn around two billion barrels of heavy fuel oil per year. The heavy fuel oil (HFO), or bunker fuel, used by most ships is also a highly contaminated byproduct of crude oil processing. As a result, in 2016 the IMO responded to this problem by requiring all commercial shipping to reduce sulfur emissions beginning January 1, 2020.

The shipping industry, though, has a dirty secret. Despite being far and away the most efficient means of transporting everything from cars to shipping containers filled with electronics or running shoes, it’s still a major source of pollution. An especially damaging contaminant in bunker fuel is sulfur, which contributes to acid rain and the acidification of the oceans. In 2016 the IMO responded to this problem by requiring all commercial shipping to reduce sulfur emissions beginning January 1, 2020. Options included switching over to “Very Low Sulfur Fuel Oil” (VLSFO), continuing to use “Intermediate Fuel Oil” (IFO) but with scrubbers to clean emissions, or switching to propulsion systems that use liquefied natural gas (LNG).

This has left companies with some tough decisions. According to Anja Roennfeldt, senior vice-president at Global Ocean Freight Trade Management, Schenker AG, “The difference between VLSFO and IFO was $250 to $300 per ton at the time of the switch, and scrubbers to continue using cheaper fuel is also very expensive.”

So what else can be done to “green up” an industry that has roughly the same carbon footprint as Germany? As any sailor with solar panels or a wind generator knows, the output of these devices can leave something to be desired. But, of course, harvesting and converting energy to electricity is not the only way to move a boat. There are also sails, the same things that powered international trade for millennia. The result has been the dawning of a new “Age of Sail,” with companies all over the world now offering various approaches to wind-powered cargo shipping, including classics, retrofits and all-new designs.

The Classics

Whether it’s historic ships pressed back into service or purpose-built replicas, there are now a surprising number of companies using square-riggers, schooners and ketches to transport goods both around Europe and across the Atlantic. The barkentine Ceiba, for example, is an entirely carbon-neutral ship currently in build with Sailcargo Inc (sailcargo.org). “Construction of wooden ships reached its peak around 1900-1920, and this is the time period that our style of building is from,” says director and founder Danielle Doggett. “Our aim is to demonstrate that a for-profit company can be regenerative from inception. By making conscious decisions about where and how we’re sourcing our materials, we can record all of the data and make a comprehensive report on the entire process, and hopefully set a precedent for construction projects of all kinds in the future, not limited to just wood shipbuilding.”

Ceiba is being built in Costa Rica, where wood can be locally sourced and trees replanted. The materials and sourcing are at the heart of this project. “Consider any fibreglass vessel... working with fibreglass can be detrimen- tal to human health and can cause lasting adverse effects in addition to short-term skin irritation,” Doggett says. “When the waste is not properly disposed of in receptacles managed by the government or other waste management companies (creating dependency), it causes damage to the surrounding environment. When you begin to look at the cradle-to-grave consequences of a material, you begin to see the issues that surround it.”

Square-rigged on her foremast and fore-and-aft rigged on her main and mizzen, Ceiba was designed by Naval architect Pepijn van Schaik and is an evolution of the coastal trading schooner Jogrul, built on Finland’s Åland Islands. With a length on deck of 118 ft, she will draw 14 ft and carry up to 250 tons of cargo in her 12,360ft hold. In addition to her sails, Ceiba will be equipped with an electric motor and a combination of solar panels and wind turbines for auxiliary propulsion and close-quarters maneuvering.

By contrast, Andreas Lackner, Jorne Langelaan and Arjen van der Veen of Holland’s Fairtransport Holding decided to use an existing hull as the starting point for their 918-grigan-
The original Flettner Rotor—powered craft, Borkau

The original wind, the cylinder is deflected or pushed toward the low-pressure side without a sail. When the cylinder spins around an axis at an angle to the Flettner Rotors take advantage of the Magnus effect in order to “sail” employing the Magnus effect. Put freigher cial shipping is the Flettner Rotor. The technology, however, is far from fuel consumption of our ships in half on good days and save an aver systems,” in part because operating at altitude means they’re catching winds more energy per square foot than “conventional sail propulsion sys

rtes come together to promote a common goal. Thus diversity only makes sense, given that when it comes to reducing pollution from any industry, there is no silver bullet. Whether it’s overcoming the infrastructure for romantic-yet-carbon-neutral ships like Grib or creating technologies to power larger, more conventional commercial vessels, the only wrong way to cut down on emissions is not doing it. No matter what the solution (or solutions) ultimately look like, though, it’s exciting to see the dawn of a new “Age of Sail.”

Looking Ahead

New Builds

Though the number of freshly minted sailing cargo ships on the water is low, a handful of designs are in the works, employing a variety of rigs. Presumably, more will follow after these vessels have had a chance to prove themselves out in the real world. An especially interesting player in this area is France’s Neoline (neoline.eu), which is currently working on a ship specially designed for “clean transoceanic sea transport, at a stable price and adapted to the logistical reality and the needs of shipper.” No small feat! The company’s design features an unusual double mainsail, with two overlapping sails forward and two slightly smaller ones aft, rigged together with scaffold- ing. A brand sailor’s wish has already signed on to have its cargo transported using a Neoline vessel. Renetou plans to send boats to the U.S. market aboard one of the ships once they’re operational. Another company with a unique new build in the works is France’s TOWT (towt.eu). Founded in 2011, TOWT has historically enjoyed an assortment of classics to transport its goods, which include things like wine, coffee and olive oil. Over the years, schooners, lugger and ketches have all been part of the fleet, plying their trade over five separate Atlantic routes. However, the company is also now working on plans for a 220ft, three-masted schooner with a projected average speed of 12 knots and a carry- ing capacity of 1,000 tons. Planned routes include those to Portugal, the Caribbean, Central America and West Africa, taking the company’s already successful model to a whole new level.

Retrofits

Another retrofit option gaining momentum in the world of commercial shipping is the Flettner Rotor. The technology, however, is far from new. Back in the 1920s, a pair of early prototypes were retrofit into the freighter Buckau, which then successfully crossed the Atlantic under sail. However, in a time of cheap oil and few, if any, environmental concerns, the technology languished until recently when designers and shipper began reconsidering it as a source of sustainable propulsion. Though they don’t look much like conventional cloth or even wing sails, the spinning cylinders actually use the same basic physical prin- ciple to prop a boat as a sail does—employing the Magnus effect. Put simply, as air passes over a rotating cylinder, its speed up on one side of the cylinder and slows down on the other, creating a pressure differential that sucks the boat forward, just like when sailing close-hauled. Several European companies, including Norsepower (norsepower.com) and Aereomarine Technologies (aereomarine.com), produce Flettner Rotors that can be retrofitted to everything from bulk freighters to passenger ferries and provide fuel saving from 5 to 20 percent without changes being made to operation (as weather routing). As is the case with kite sails, the systems are highly automated, requiring little extra crew effort. A num- ber of commercial vessels are now equipped with Flettner Rotors, including the 800ft tanker Maersk Pelican and 700ft cruise ship Viking Grace.

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