Researchers are looking to a surprisingly old idea for the next generation of ships: wind power

By Tristan Smith

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In many ways, it's an obvious solution. For many centuries, world trade over the oceans was propelled by wind power alone. Now that we're seeking an alternative to the fossil fuel-burning vehicles that enable our modern standard of living, some people are turning again to renewable solutions such as wind to power our tankers, bulk carriers and container ships. Globalisation and economic growth might mean a direct reversion to the wooden sailing boats of yore makes no sense, but there are several 21st-century ideas that could make wind-powered shipping commonplace again.

Ship design certainly has a way to go to return to its heritage and take advantage of the wind's free, renewable resource in the same way we have reinvented the windmill to produce electricity. However, it's worth remembering wind turbines took a long time to evolve into the structures optimised and deployed at scale we have today. In fact, they're still developing. Scientists and engineers have debated for years about the relative merits of two, three or more blades, of horizontal versus vertical configurations, and of onshore versus offshore generation.

For ships, the design process for wind technologies is potentially even more complicated and multi-dimensional. There are soft sails, rigid "wing" sails, flettner rotors (a spinning cylindrical vertical column that creates lift using the Magnus effect, originally conceived by Flettner in the 1920s) and kites all vying for a share of this market. Soft sails are fabric sails, most reminiscent of existing sailing ship designs, examples include the Dynarig and Fastrig. Rigid wing sails replace the fabric with a rigid lifting surface like a vertically mounted aircraft wing - for example the oceanfoil design.

A flettner rotor is a vertical cylinder rotated by a motor. The rotation modifies the air flowing around the cylinder to generate lift much like the lift generated by an aircraft wing (it's referred to as the Magnus effect). While there are many examples of all four, so far it's the kites and the flettners that have seen the most significant implementation on large merchant ship designs.

Notable examples include the work that Cargill and Wessels have done trialing kite systems , and the experience of two separate operators, Enercon and Norsepower with installations of different flettner designs on different ships. These trials have produced important full-scale experience, lessons about costs, performance data, and evidence for investment cases. All of which are undoubtedly taking us closer to the tipping point when wind once again becomes a 'no brainer'.

Enercon's E-Ship 1 with flettners Carschen/Wikimedia Commons, CC BY-SA

Trials of these new technologies, in combination with the history of wind turbines, can help us understand why any transition to modern wind-powered ships won't happen overnight. For one thing, no one yet knows which of the many

candidate designs will be the most successful.

Modern wind-powered shipping technology also carries a significant engineering challenge that wind turbines don't: it needs to be mobile. It's not as simple as bolting a rig to the deck. The highest safety standards have to be maintained and the rig must pose no constraints to loading and unloading cargoes in an uncertain and wide range of different ports (many of which might be obstructed by bridges).

Resolving these issues will take time, money and investors with the appetite for risk and stamina to see an emerging technology from a prototype to a fully developed new product. But I believe the change will happen because of the price of fossil fuels and environmental regulation. Wind power is free so the technology will become a worthwhile investment once it can be clearly evidenced that the saving from moving away from fossil fuels outweighs the costs of installing and operating a wind-powered ship.

Many think that threshold oil price has already been achieved and exceeded, as evidenced by the large and growing number of projects proposing wind propulsion solutions, even allowing for the recent fall in oil prices.

While there is currently only weak regulation on shipping's greenhouse gas emissons, the sector - like all those producing carbon dioxide - is likely to face more stringent controls as its emissions continue to grow. Exactly what form such controls will take remains the subject of further ongoing work. But any meaningful regulation would reinforce the case for wind-powered shipping as a favourable investment.

Shipping is a vital, if somewhat hidden, part of modern economies. Decarbonising those economies is the only way to avoid destroying them (and the environment). Wind power presents an astoundingly obvious and elegant solution to these combined challenges. But it will languish in the sidelines until we see rapid change from investors, politicians, or ideally both.

ABOUT THE AUTHOR

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