Shipping Advances

International shipping produces more emissions from energy use than all but five countries, producing 2.7% of global carbon emissions annually (EESI, 2012). Despite this huge percentage the International Maritime Organisation (IMO) has estimated that shipping which emits around 870 metric tonnes per year of carbon dioxide will double or triple this figure by 2050 under business as usual conditions (IMO, 2009).

Globally we are seeing a trend towards bigger, more efficient ships which has the potential to reduce the industry's total emissions. As ships increase in size the transport cost and emissions produced of freight transport per tonne kilometre decreases. Larger ships may have a higher capital cost but with high fuel costs and low freight rates, shipping lines are finding out more and more that the only way they can remain competitive is by ordering larger ships designed with efficiency in mind. The past few years has seen Maersk and China Shipping Container Lines put in orders for what will be the world's largest container ships at over 18,000 TEUs.

To get an idea of their carrying capacity if all the containers on a Maersk Triple E, a ship designed to be the most efficient container ship per TEU of cargo, were stacked one on top of the other they would touch the stratosphere, 46km above the earth. If they were put side to side they would stretch over 100km.

The increase in ship size does not seem to be abating anytime soon. 30 years ago ships were typically in the order of 4,000 TEUs, and 10 years ago they had grown to 10,000 TEUs. Fuel and other operational costs will continue to make bigger ships all that more economical.

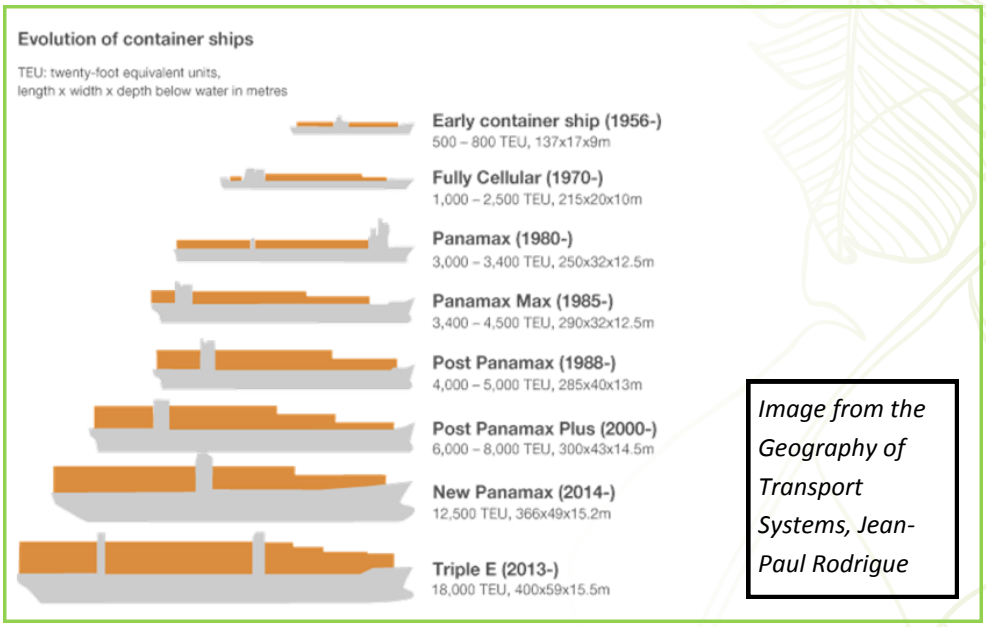

Image from the Geography of Transport Systems, Jean-Paul Rodrigue

Current Developments

As well as increasing the size of a ship there are a number of alternative options are available to the shipping industry to reduce their emissions. One of the more simpler ideas is to reduce sailing speed. A 10% reduction in speed would decrease fuel consumption by 15 to 19 percent, while a 20 percent reduction would decrease consumption by 36 to 39 percent (International Council for Clean Transportation, 2011).

However most ports serve ships on a first-come first-served basis, therefore ships would be penalised with longer waiting times for not travelling to a port as quickly as possible. To address this issue many within the industry are

looking to replace this system with a "Virtual Arrival System" where ships would be assigned a time slot at their destination port soon after setting sail. Ships can then lower their sailing speeds and arrive on time, avoiding the often one to two day wait, reducing port congestion, fuel costs and emissions (Price, 2011).

'Outside the Box' Developments

Of course there are shipping technologies being developed that think more outside the box in the bid to reduce the total greenhouse emissions from international shipping.

OCIUS, an Australian company, reckons hundreds of thousands of dollars, if not millions, could potentially be saved by companies annually across the varying shipping routes of the world through harvesting energy for bulk shipping from the wind. OCIUS have been designing and supplying their patented SolarSailor and Hybrid Marine Power technology since 1999. The idea behind their wind for energy concept is to have rigid wing sails that open up from a tiny wing into a much larger wing effectively doubling or quadrupling that area. The masts may also be folded down onto the deck of the vessel where it sits flush with the opening of the cargo hulls. This concept may be retrofitted to existing vessels, and stows away neatly with minimal hull penetration.

The company estimates that commercial shipping operators could save between $296,000 to $473,000 on a return Los Angeles to Shanghai voyage.

While the company has had great success in delivering their applications on small to medium sea crafts such as the world's first parallel hybrid electric solar ferry service to the Hong Kong Jockey club (which offers 50% reductions on emissions compared to the more regular ferries), applications to larger freight vessels have been much slower at this time.

The company had hit its stride in 2008, having inked an agreement with Cosco, China's biggest shipping company to retrofit giant solar sails to some of Cosco's tanker ships. The solar wings would be almost 115 ft. long, and early SolarSailor estimates had Cosco recuperating their costs within 4 years. Unfortunately for the company COSCO have since decided not to continue, illustrating perhaps the difficulties of implementing green energy designs into the shipping industry.

Solar Power Potential

Current green technology applications in cargo shipping is being led by the Japanese company NYK Line, who in 2008 launched the world's first cargo ship partly run on solar power, the M/V Auriga Leader. With 328 solar panels covering its upper deck, the ship produces enough electricity to continuously power 10 homes and can be used to transport 6,400 cars at a time. Though the ship still primarily relies on bunker fuel, it's a step towards the company's goal of zero emissions by 2050.

To work towards this goal, NYK Line has designed the concept ship NYK Super Eco Ship 2030 as a milestone for 2030. The idea behind the concept is not only to make it clear what the industry needs to develop technically in the long term, but also to lead the development of shipping operations, including cargo handling and traffic infrastructure.

The concept ship is being developed in collaboration with Monohakobi Technology Institute (MTI), Elomatic, a marine consulting company from Finland, and Garroni Progetti S.r.l., a ship designer from Italy.

To help lower emissions to the target of 69% the ship would be powered by 9MW of solar panels covering the entire topside cargo area, retractable sails between each cargo bay and modular LNG fuel cells, the ships main power source.