COMING CLEAN

Sail is making a comeback and more and more cargoes are being transported by sail.

Chris Kelly reports.

The Maltese Falcon *in New York.*

Sail transport is reclaiming some of the commercial space dominated by the combustion engine

If you were sitting at a café, or possibly on a wharf, in Falmouth, England in late April/early May this year, you might have spied a tall ship beating her way into port. Having checked her out, you might have assumed that the ship – *Tres Hombres* – was a sail training ship or similar. She wasn't and she isn't.

She is a trading ship, a sail trader. *Tres Hombres* was returning from the Caribbean with a cargo of rum and artisanal goods some of which – the rum particularly – was to be unloaded and supplied to the good people of the West Country.

And somewhere on a slipway in Europe as you read this is the Australian schooner *Avontuur*. Built in Holland in 1920, she has been purchased for use in the Queensland coastal trade. She will be re-rigged and refurbished, taking her from her purchased length of 111ft to a 'sparred length of 144ft'. *Avontuur* will be based in Cairns and have a cargo carrying capacity of about 60 tons (roughly equivalent to three 20ft containers).

It's happening. Slowly, but with a grinding certainty, sail is reclaiming some of the commercial space dominated by the combustion engine. There are a variety of reasons for this. One is cost (fuel), another is pollution (fuel again) and another is … do you really need a reason to go sailing if you can?

As far as the cost of fuel is concerned, ships burn bunker oil. The cheapest, nastiest fuel found anywhere. It's basically sludge; a by-product of the refinement of oils for more refined applications, such as aviation fuel. If not heated (which it must be to burn) it is possible to walk on it. And although bunker oil is cheap and prices have fallen away over recent years, the costs of any journey are significant.

But perhaps more relevantly the use of high pollution fuels is increasingly regulated; they cannot be used in many sea areas of the world and are being phased out. As a result fuel costs will rise. Estimates are that the current price of

The bridge of the Maltese Falcon.

Tres Hombres *under full sail with crew aloft.*

E-Ship1. *Four large rotorsails rise from its deck to aid the ship's propulsion by means of the Magnus effect [the perpendicular force that is exerted on a spinning body moving through a fluid stream].*

approx $600 per tonne will rise to $1,000 per tonne.

Interestingly it is not legal to burn fuels containing high sulphur oxide concentrations within 200nm of the US coast, but the cruise ships berthing in Sydney Harbour burn plain old bunker fuel in close proximity to residential areas. Figure that out!

Current attempts to use sail to carry cargo fall into two broad categories. These are cooperative type ventures using traditional sailing technologies and large commercially oriented attempts to target the bulk cargo markets.

The Fairtransport model – Fairtransport is a shipping company founded in the Netherlands in 2007 and the owner of *Tres Hombres* – is a low tech model using some fundamental and time tested ideas: traditional boats traditionally constructed (i.e. proven and reliable technologies) sailing traditional routes (i.e. making best use of prevailing wind, currents etc.).

As you'd expect, getting this up and running – and keeping it running – is not without its challenges. I spoke to one of the Fairtransport founders, Jorne Langelaan, about some of these challenges.

"We've been running the ship for five years now. We started breaking even in the fourth year and now, in our fifth year of trading, we are pleased to be able to pay a dividend to our investors," Jorne Langelaan said.

Jorne explained that significant planning went into every journey; the ship runs with regular timetabling which allows customers to anticipate arrivals and departures and plan cargo movements accordingly. An understanding of the complex legislation which regulates maritime commerce is also required. Jorne, who originally trained as a shipbroker, explains:

"*Tres Hombres* is unusual because she is a sailing ship and does not have an engine. A lot of the regulation in this area assumes the ship has an engine. But the International Maritime Organisation does have a classification – ship not propelled by mechanical means – which works for us. She is certified in class by the International Register of Shipping."

Tres Hombres is a refurbished brigantine and uses pilots and tugs as required. She is used in the European coastal trade and the Atlantic trade to the Caribbean. She carries up to 35 tonnes of cargo, typically artisanal or other traditional goods. She is 23m over the deck, has a sparred length of 32.5m and carries 314m² sail. Her keel was laid in 1943 and she underwent a major rebuild in 2008.

Workers and volunteers refitting Timbercoast.

I asked Jorne about the rationale for Fairtransport generally.

"The way we are doing business is very far from the way ships are usually run. But we believe that this is the only true and ethical way to do it. We want to be part of the transition to an economy and a society that looks very different."

In the high tech, big end of town space, contemporary rigs for big ships look surprisingly similar to those used on square riggers. Readers may be familiar with the 'pleasure vessel' *Maltese Falcon* (289ft) which uses a rig known as the DynaRig. The DynaRig is a (very) modern variant of the square rig used by clippers and windjammers. The rig is carbon, unstayed, can be controlled by one person at a control position, and furls completely away into the masts.

Attempting to put this rigging concept into commercial application, and combining it with low emissions engine technology and energy efficient improvements in hull and propeller design, is the Smart Green Shipping Alliance (SGSA). This is a high tech, high commitment effort partnered by Lloyd's Register, Tata Steel, Rolls Royce and others.

Complex modelling using UK Met Office records has shown that the higher capital costs associated with the build of the Fastrig concept being pioneered by the SGSA concept can be offset in a 3-5 year period. Note that the vessel is not intended to use only sail power; it runs a standard off the shelf Rolls Royce engine using methane, which in this case is to be produced from municipal waste.

The net result is fuel consumption of 46 to 55 percent less than a conventional ship on the same route.

It might be assumed that use of wind power to move cargo and people is predominantly a first world issue. It isn't. Our near neighbours, the Pacific Island nations, are almost entirely dependent on imported fuel for their complex trans-oceanic and inter-island transportation needs.

Ninety five percent of fuel used in these countries is imported. Shipping in the Pacific has always had its challenges. These include "minute economies at the end of long routes, imbalance in inward/outward loadings, financing barriers, high operational risk, high infrastructure costs".[1]

An interdisciplinary team at the University of the South Pacific (USP) is systematically researching and analysing barriers to the reintroduction of sail and alternative technologies across the Pacific.

"There is a large push in the Pacific to break fossil fuel dependency. This is necessary because of the crippling effects of this dependency on the budgetary position of Oceanic states.

1. Turning the Tide: the need for sustainable sea transport in the Pacific, Newall, Nuttall et. all, University of the South Pacific 2013

There is a need to transition to low carbon sea transport. Dr Peter Nuttall of the USP explains.

"Our research, which is supported by global studies, confirms that the barriers to such transition are not technological – there are plenty of technical options for low carbon transport – but are centred on policy problems. Sadly, the biggest problem is in the policy mindset of the bilateral and donor communities.

"There is no understanding of the critical importance of sea transport to the connectivity of maritime countries and communities. So we see Australia, NZ, Europe, ADB, the World Bank, UNDP, UNEP, USAID etc. pumping over $1billion in development and aid financing into electricity generation replacement by renewables but so far not a single cent in low carbon sea transport.

"This is despite a demonstrated capacity for such funds to make a real difference," Dr Nuttall said.

Hopefully it is only a matter of time.

One shipping project underway and nearing completion in the Pacific is led by a former Tongan MP, Dr Sitiveni Halapu. Dr Halapua has been the driving force and primary instigator of the creation and build of the *Vaka Fanaua*.

Aaron Beattle of Lifestyle Yachts and the Vaka Fanaua *– a lug rigged trimaran intended to be owned and operated by the local community in the Tongan Niuas group.*

The *Vaka Fanaua* is a Dick Newick designed lug-rigged trimaran intended to be owned and operated by the local community in the Tongan Niuas group and used for a shipping service to and from those islands. The project has been funded entirely by donations from the Tongan diaspora.

The Niuas group are some of the most remote islands in the world and are closer to Samoa than to the main Tongan group Tongatapu and its capital Nuku'alofa. Currently these islands are serviced by a 1,500 tonne conventionally powered cargo boat funded by 100% foreign aid and subsidised and run by the Tongan government.

The upside when the *Vaka Fanaua* – built in New Zealand by Lifestyle Yachts – goes into service is considerable: not only will the community enjoy increased autonomy and control, but the aid which would otherwise be spent providing this service can be directed elsewhere.

Fuel savings will be in the region of 80%, which in turn will reduce the fuel dependency of the islands. It doesn't take a visionary to imagine what a fleet of similar boats could do to empower the peoples of the Pacific. That such an outcome would also make a material contribution to the economies of the region and reduce pollution is a very happy by product of a magnificent idea.

However, attempts to commercialise alternative ship propulsion technologies are not limited to sail.

They include non-wind assisted technologies such as solar and the use of alternative fuels, such as bio fuels. Even in the wind assisted technology space there are a range of approaches. These include wingsails or rigid sails, soft sails, towing kites or skysails and Flettner rotors (cylindrical structures mounted on the deck and spun mechanically).

Wingsails, towing kites and Flettner rotors are in commercial use. It seems as if there is plenty happening in this space, and that, as time passes, more and more reliance – and faith – will again be placed in the wind.

Of course – on the long view – it wasn't so long ago that the bays, rivers and harbours of Australia were a swathe of masts and rigging. Ships from all the world journeyed here, and our trade and the world's trade was dominated by sailing ships.

It wasn't just large ships crossing the oceans; sail dominated water transport large and small. Ferries across rivers and harbours, coastal traders, big ships, small ships; all used wind power as they plied the waters.

For a while the decline of sail seemed terminal; the machines and their inexorable logic marched on as ship after ship went to the breakers or found a lonely home in a forlorn estuary.

SV Nordlys *ghosting along prior to her refit.*

But sail has survived. [Regular readers may remember the wonderful story by Bruce Stannard about Alf Stackhouse – *The Old Man and The Sea* (*Afloat* Feb'12). Alf, 86 years old at the time, has been sailing his 50ft sail trader *Alcheringa* II among the islands of Bass Strait for most of his life. If someone told Alf that sail had died, I suspect he would have laughed at them.]

It has survived in small to medium endeavours such as fishing and trading (primarily in remote and less developed regions of the world) and there are now clear imperatives impelling commercial interests to look again at sail for transporting significant cargoes. Let's hope – for romantic reasons if no other – that sail will return in a big way.

Australia is an island nation, founded by sail. What a thing it would be if we could gaze out on our harbours and bays and see again a sailing ship bringing us cargoes from the other side of the world. Whether it's on a 300ft foiling catamaran or a 100 year old schooner, now that would be a thing to see. ⚓