Waves of change

*Economist **Dr Martin Stopford** on shipowners' '3-D' challenge of Decarbonisation, Digitalisation and De-globalisation looming*

Politicians struggling with the emerging Covid pandemic learnt an important lesson. By the time they were sure what to do, it was too late! Luckily nightmare decisions on this scale are rare. In the maritime industry the last was in the 1960s, when deciding how to transition from general cargo to containerisation defeated a generation of 'rock solid' liner companies.

But suddenly for maritime decision-makers, it's all happening. Just as with buses where you wait ages for the first one to come along, three 'nightmare decisions' have arrived at once – decarbonisation, digitalisation and de-globalisation.

Maritime decarbonisation indecision

Last year 62,000 cargo ships moved 12 billion tonnes of cargo and their internal combustion engines (ICEs) produced 3 tonnes of carbon per tonne of Heavy Fuel Oil (HFO) used. In November 2021 the commitment to decarbonise was re-emphasised by the EU deputy head of DG Mobility and Transport, who bluntly told a conference that "we strongly believe that global regulation is what we need". So decision makers must figure out how to make the regulators happy. But the options are disturbingly unclear.

The problem is that for the maritime industry, the voyage to zero carbon propulsion stretches many years in the future. Even if the propulsion technology is available, "it will be years before we can rely purely on sustainable sources of energy". This was the conclusion of a recent study by the authoritative Danish Green Ship of the Future Project and the facts support it in two ways.

Firstly, the global supply of 'green' fuel will be limited for years to come. Deep sea ships need portable energy made from zero carbon electricity but so do many other industries with deep pockets. Currently only a tiny proportion of the electricity needed to produce green fuels is generated by renewables. For example, Figure 1 shows that in the last decade, despite the heroic growth of solar and wind, renewables have not even been able to supply the annual growth of electricity production. So ships will be competing with a long list of big players for the limited supply of green electricity.

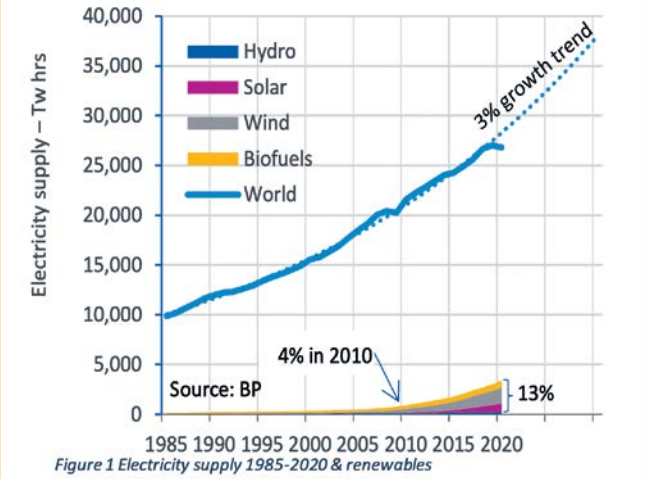


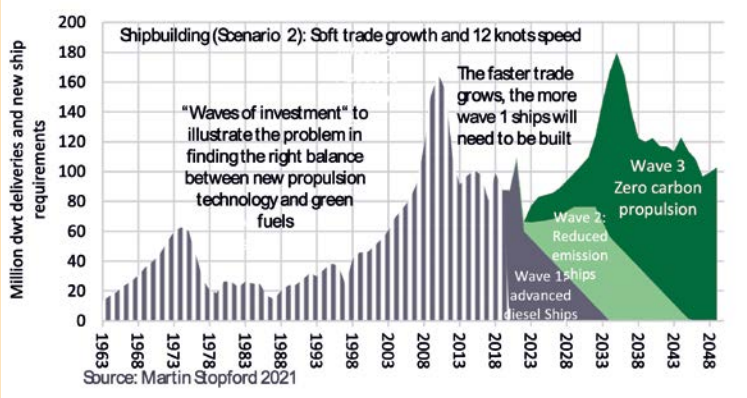
Figure 1 Electricity supply 1985-2020 & renewables

Secondly, even if supplies of green marine fuel (GMF) can be obtained, it will be eye-wateringly expensive. For example, 400 tonnes of green methanol is needed to replace the daily oil consumption of a $180 million containership at full speed. An offshore windfarm producing electricity to synthesize 400 Mt of methanol costs about $1 billion, and around $100,000/day to run.

What decarb strategy will work?

Even when the technology and fuels are available, rebuilding the fleet will take about 20 years, unless the world adopts an emergency shipbuilding programme. The Green Ship of the Future report concludes: "we must constantly seek innovations in existing assets and ensure optimal energy efficiency, to keep the negative impact on environment as low as possible and reduce overall energy costs". But that's easier said than done because, as the study showed, retrofitting opportunities are quite limited.

Most owners just want to get on with the running their fleet, but these big decisions are hard to nail down. Spend the weekend ploughing through technical reports and by Sunday evening you're confused because some of the things you were sure about turned out not to be true! The answer must be to plot the best course you can, give it to officer of the watch and get a good night's sleep!



Five key strategic variables

At least some of the technical options are reasonably clear - the main propulsion choice is between internal combustion engines (ICE) and electric motors powered by batteries and fuel cells, opening the way for all-electric ships. But there is no 'one size fits all' solution. A viable strategy will need to be adapted to five key variables: the propulsion system, the available fuels, the trade, the fleet, and the relationship with charterers.

Methanol and ammonia will work with internal combustion engines, which would be more robust for the demanding deep-sea trades. Short sea is a better environment to develop the more innovative electric propulsion, powered by batteries and fuel cells. Ferries and short-sea cargo vessels spend much of their time in ECAs and the distances are less demanding.

Both technologies are confidently being developed and inevitably innovation is likely to come in a series of waves, illustrated by the scenario in Figure 2, as technology improves and shipyards and investors gain confidence.

Turning to the zero carbon fuels, they are a mixed bag with many drawbacks compared to HFO. But availability is likely to be the biggest problem. Realistically we have no idea when green fuels will be available through the global bunker system, and at what price. With many industries competing for limited supplies, the price likely to be high. If long term contracts are required by suppliers, the participation of cargo interests willing to underwrite them will be important (as it was in the 1960s for the construction of supertankers etc).

Digitalisation - creeping up on industry

Meanwhile the I4 revolution is opening a Pandora's box of satellite communications, the cloud, and data streaming etc. There is no doubt that if shipping companies can apply this technology in the way car manufacturers, cab companies, and land-based logistics services are already doing, sea transport will take a giant step forward, especially in the short sea trades.

But for most maritime leaders, including shipyards, it's an uphill struggle. Information is jealously guarded, so systems integration is difficult. Today's companies were not designed for digitalisation and nor were the maritime regulations they must comply with when they invest in the next generation of maritime transport. Developing technically viable global regulations, like developing integrated digital systems, is easier said than done!

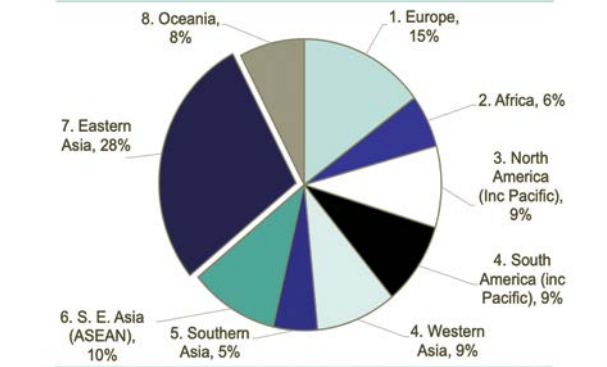


Figure 3 Seaborne exports & imports 2020 (% weight)

An even bigger problem is that professional and technical staff with practical digital skills are thin on the ground. Regulations like Standards of Training, Certification and Watchkeeping (STCW) were designed for a very different era when craft apprenticeship was the norm. This can obstruct innovation and block the infusion of the bright young technicians. So qualified marine digital engineers may turn out to be even scarcer than green fuel.

De-globalisation – new trade phenomenon

A third less obvious, but equally pressing challenge is that the tide of globalisation is on the ebb. Climate change, geopolitics, I4 technology and regional evolution are all pushing in that direction. My guess is that in coming decades, globalisation will increasingly focus on regional trading blocks, described by the great historian Ferdinand Braudel as Weltwirtschaft ('world economy').

This is likely because multi-nationals who developed global trade are retreating to their home base. There are many reasons why this will continue. Higher transport costs (today's system was designed when bunkers cost $12/tonne), and I4 technology will narrow the inter-regional cost differential. Consumer tastes will change. The dominant Eastern Asia region (see Figure 3 E. Asia is mainly China, S Korea and Japan) will develop differently from the mature North Atlantic economies. Resource pressures and decarbonisation will push security of supply up the agenda.

Finally, the fossil fuels trade, which today accounts for 40% of seaborne trade, will shrink and may eventually disappear. Will it be replaced by new global trades in green fuel or will the energy trade be intra-regional?

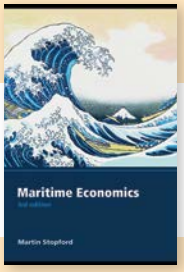
Maritime tactics in a changing world

Decarbonisation, digitalisation and de-globalisation have all been around for years, but have suddenly surfaced, like a nagging headache that has suddenly turned into a fever. Every maritime company needs some sort of vision of its role in the coming decades.

The building blocks for are clear enough. Internal combustion engines, electric ships, zero carbon fuels, I4 technology, the cloud, data streaming, intelligent algorithms, and new customer relationships will all be needed to build something better than we have today. But introducing zero emission vessels, obtaining supplies of green fuels, introducing digital systems that really work and identifying tomorrow's customers will be a tough call.

The starting point must be to build organisations capable of managing this change – at company, industry and regulatory level. A new generation of entrepreneurs, professionals, technicians and enthusiasts will be needed - all educated and dedicated to making the new maritime vision a reality.

Maritime executives, like the politicians managing the pandemic, cannot be sure. But the lesson from the Pandemic is you have to start somewhere and the sooner the better. ●



This article was prepared exclusively for SMI by eminent shipping economist and technology commentator Dr Martin Stopford, whose authoritative textbook Maritime Economics is now in its 3rd edition, based on a paper entitled 'Restructuring ocean shipping and supply chains for the 21st Century' first published by the OECD Forum.