Navigating the energy transition

The latest Intergovernmental Panel on Climate Change, (IPCC), report adds urgency to the need for carbon intensive industries to define ways to decarbonise. Having considered this challenge for some time, shipping appears to have commenced a voyage with no clear destination in mind. The issue is certainly complex, with deep-sea and short-sea sectors evaluating different solutions to arrive at the ultimate destination of zero emission shipping. Short-sea shipping may focus on battery or hybrid options, combined with widespread availability of shore power. This article concentrates on deep-sea, high horsepower shipping, exploring potential options for the sector over the coming decades.

Of course, considerable debate will continue to rage over climate change impact and severity. However, for shipping, as a carbon intensive and hard to abate sector, there is no choice but to deliver solutions that will ultimately achieve carbon free ocean transportation. The rules have changed. Our customers expect, and demand, transparent progress towards decarbonisation. Regional regulations are shaping up to drive change through carbon pricing and other measures to accelerate progress. As presently structured, events are moving faster than the International Maritime Organization, (IMO), can accommodate by consensus. Consequently, the United Nations agency charged with the performance of international shipping is unlikely to provide definitive guidance quickly enough. The choice is stark; start planning and act or watch your service offering become obsolete in the marketplace of tomorrow.

Why does the shipping industry find it difficult to gain a sense of direction on this critical issue? In my opinion, we do not look far enough ahead to map what the future energy mix will look like. In the grand scheme of things, shipping is a small energy consumer and will have to follow, rather than lead, on future fuel selection. Commitment to the use of transitional fuels, (like LPG, LNG, methanol and biofuels), that still emit carbon on combustion are an essential and durable component in the transition. In common with other global energy consumers, destination fuels must be carbon free when used. We are not the only hard to abate sector facing major challenges in trying to reach this target. Aviation is a good example of an industry that will have to embrace radical change to reach the zero-carbon destination.

What does the future energy mix, that the world is in transition towards, look like? This is the key question. The answer will determine the options available to shipyards and shipping companies considering long term investment in fleet renewal. This choice must meet the expectations of the evolving market, defined by greening companies, environmental policies, regulations and increasingly strong public sentiment. The answer that is emerging as the long-term destination fuel is competitively priced green/clean hydrogen, electrolysed from saltwater using energy from renewable wind and solar. This will be coupled with efficient electricity storage to allow steady 24-hour hydrogen production.

For shipping, this plots a course towards hydrogen in various possible permutations, plus ammonia, as the future fuels of choice for deep-sea high horsepower ships. Viable methods of storage and use are under active development by major players now. Yes, radical design changes will be required for the zero-emission ship of the future, but to remain commercially viable in the new marketplace there is no other choice. The nuclear option is frequently discussed, with modular reactor technology available and attractive. But, for a merchant ship, how would you assess the operational risk, training and decommissioning costs in your business plan?

Following and not leading in the choice of future fuels will allow infrastructure to be shared and used by diverse global energy consumers. This will create a competitive and sustainable market for zero carbon fuels and associated handling technology. If shipping deviates from the mainstream fuel choice, additional infrastructure would be needed adding to the cost burden of the energy transition. This is the essence of the widely accepted 'sector coupling' process, using increased integration across the energy value chain to reduce the cost of decarbonisation.

How quickly will green hydrogen production, at scale, make a meaningful contribution to primary energy demand? Looking at the gigawatt-scale projects under development around the world, (as reported by Recharge News, at the beginning of August 2021, the global green-hydrogen electrolysis pipeline is about 260GW), it is expanding rapidly. This pipeline involves well established energy sector names. Government policy in many countries is pivoting towards the hydrogen economy. The UK issued its Hydrogen Strategy this month, commenting that *"Today marks the start of the UK's hydrogen revolution. This home-grown clean energy source has the potential to transform the way we power our lives and will be essential to tackling climate change and reaching Net Zero."* As other countries embark on similar initiatives, it is reasonable to expect strong policy support for hydrogen production and carbon reduction. With the UN Climate Change Conference of the Parties, (COP26), in Glasgow later this year, we will get much more global emphasis.

While this supply chain is being created, major engine manufacturers, containment system designers and shipyards are developing solutions for ships that will be powered by hydrogen or ammonia. Design changes are inevitable, with additional space devoted to fuel storage. While many commentators see this as a negative factor, it is probable that it will become the new normal, not a competitive disadvantage in the decarbonised charter market. Set against this, I disagree with need for the proposed IMO supervised International Maritime Research and Development Board, (IMRDB). This would only serve to delay progress, create additional administrative burden and inhibit urgently needed planning and decisions. The can does not have to be kicked down the road. Equipment manufacturers and shipyards have a fairly good idea what is inside already.

Green hydrogen depends on low-cost renewable electricity. The production process requires significant energy. It will depend on this price point to achieve cost parity with other colours of hydrogen. For example, as the cost of electrolysers and other equipment falls with scale, it is predicted that a price of about $1 per kg of H_2 may be achievable in favourable locations such as Australia. Once the impact of carbon pricing is included, grey, brown and blue hydrogen production will become less competitive, or politically acceptable, as the costs of feedstock and carbon capture are added.

For the shipping industry, this should provide access to a clean global hydrogen market with its own infrastructure. The last mile delivery system will still require maritime sector investment. However, by looking at the emerging global energy transition, it is reasonable to assume that the decarbonised fleet of the future will be part of this market. It will be a large and sustainable market. Shipping will be buying a clean fuel, of uniform quality, in competition with many other industries, rather than burning the bottom of the barrel from the refineries. This energy will command a market price, becoming the new normal for global trade and should not disadvantage clean shipping. The fossil fuelled fleet will have left the scene incrementally, as new emission free ships are built and enter service over coming decades.

My conclusion is that the path to decarbonisation is, perhaps, becoming clearer when we look at the steps being taken by global industries grappling with the same problem. Shipping

does not have to find its own unique clean fuel solution. We have company! The changes will be radical, but they will bring opportunities. It is evident that several forward-looking global shipping companies are already strategising about early mover advantage. After all, a great deal of this new clean fuel will be produced far from the consumer requiring bulk ocean transportation.

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