Global growth for offshore wind must lead to zero emissions goal

Words: Leo Hambro, Director at Tidal Transit Limited

Tidal Transit's Eden Rose at Sheringham Shoal Offshore Windfarm

The 2nd offshore wind boom is upon us and this time it is going global. During 2021 project installation will be underway in UK, Denmark, Germany, Netherlands, Belgium, France, Norway, Spain, Portugal along with US, Vietnam, Taiwan and China. By 2025 many more countries will join this rush to install the cheapest form of largescale renewable power available.

The last 10 years of this sector has been about major efficiency gains. This has been brought about by giant leaps in generating capacity, huge economies of scale and general efficiency throughout the supply chain. Turbines can now be erected and commence operation within 24hrs or less. Installed redundancy has reduced the need for regular intervention. Key failure points have been removed. All of these and many more have helped offshore wind find its place as the keystone within the generation mix for decades to come.

With this in mind, and looking to further enhance the efficiency of this green industry, one must note that the means of access to these offshore farms heavily relies upon a marine logistics fleet which currently has a hefty carbon footprint.

Whether it be the installation vessels, survey boats, cable layers, jack-ups, SOVs, CTVs or helicopters, the amount of fossil fuel used to get to an installed turbine and to service it for its 25-year life would scare many green lobbyists. 370+ CTVs using up to 2,000 litres per day is only a small part of the overall picture. But what about the gigawatts of power that these vessels help produce. Why use diesel when electricity is even more plentifully and readily available.

Well it doesn't take a naval architect to tell you that it is harder to walk in water than it is on land. Therefore, we must accept the fact that the energy requirements to move people and their cargo by water is going to be high. Also, sadly the energy density of diesel (45MJ/KG) is still over 20 times greater than an efficient Lithium battery (2MJ/KG), despite Elon Musk's efforts.

This might lead many to conclude that it is simply not worth doing due to the cost of batteries and the huge tonnages that would be required to replace like for like capabilities. Or one might think that the only reasonable step would be to make a headline grabbing symbolic gesture in adopting a hybrid solution to at least allow some of the fuel to be offset by battery power. I hear you saying, 'but what about hydrogen?', due to the fact that it can be green sourced and has an

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energy density even greater than diesel. But no… If we are to seek efficiencies while also moving away from fossil fuels, then we cannot allow 10 MW of electricity to be used

Karoline Electric Fishing Boat

1890 Electric Boat

to make hydrogen to then turn it back into electricity and only be left with about 1MW of electricity to put through a motor. That can't be a sensible solution unless electricity is free and we are not there yet! This is especially true when considering that currently 98% of the commercially available hydrogen originates from non-renewable sources. Hydrogen clearly has its benefits due to its ability to store energy and for long haul marine transport it could be the saviour of the oceans but for near coastal and for small vessels the future is electric.

So how is it that other sectors of the marine industry have already made the switch without the plentiful supply of electricity that the offshore wind industry has. Electric boats were being used on the Adirondack lakes of Upper New York State as early as 1880. Over 130 years later, the last decade has brought commercially viable solutions such as 2014's first electric car ferry (Ampere), 2015's first electric commercial fishing boat (Karoline), 2018's first electric container carrier (Yara Birkeland) and 2020's First Fully Electric tug (TBN – hopefully E.T. 'Electric Tug' and not Tuggy McTugface). Following several firsts there have been many more similar crafts delivered thanks to innovative battery manufacturers such as Corvus Energy and EST-Floattech with energy density increasing dramatically too.

Following the first of class vessel type, there have been several major ferry conversions. Regulations in the Netherlands will soon ban diesel powered commercial crafts from the canals of Amsterdam. Other cities will follow suit and this will lead to many more conversions and new builds. These types of transits can easily be done without considering a change in operating profile due to the energy usage being low.

However if you look at the battery capacity required to take a 70 ton CTV to a windfarm at 20+ knots in 1.5m Hs seas 20 miles from the coast, before spending up to 2 hours pushing on to turbines (deploying and collecting technicians) and then another hour in transit back, you could easily exceed the capacity of 50 tons/6MWh of batteries rather than 2 tons of diesel. It is feasible but a tough challenge for a vessel designer and there are limitations around displacement and impact forces that need innovative solutions to handle.

Additionally, there is very limited

Tidal Transit's E-CTV Electra

Ampere Electric Ferry

infrastructure today to be able to charge 6MW, or even 1MW of batteries without cutting power to the local town. However, the industry has a solution already built into it – by having a 6MW turbine, in theory there is the ability to connect and charge the same capacity battery and charge it on site within an hour or so. Major developments in offshore charging intended for SOVs being trialled will also enable 1MW+ charging capacity for CTVs. Note that Ionity's fastest car charger is currently 350kw with potential to upgrade to 500kw while Tesla's fastest is only 250kw.

With the above restraints in mind and the continual increases in energy density, a viable starting point needs to be found through either a choice of nearshore projects and/or an acceptance of a different operating profile, to minimise the need for capital intensive infrastructure upgrades.

Many windfarms that have already been installed are very nearshore and don't require a 20+ mile transit. Also consider a change in operating profile. Is it necessary to do 25 knots all the way there and back? Finally, and most importantly, how can you get a recharge from the turbines with the cheapest form of power available, direct from source and with no transmission or substation losses rather than digging up roads and ports.

Without wanting to give away all the answers (note our Electra e-CTV), we are fortunate to be in an industry full of innovators and we are delighted to see offshore charging buoys being developed along with battery swap barges and radical new vessel designs being marketed to maximise hull efficiency. Also, not to belittle the enormously costly efforts that several operators are going to with the development of some very clever hybrids, this can also work with some of the existing fleet allowing for retrofit, such as Electra, and not increasing the carbon footprint further by building new lightweight aluminium or composite hulls.

Our global industry has very ambitious growth targets over the next decade and beyond. 40GW in the UK is only part of the global potential of 234GW by 2030 that is being planned for. These ambitions maybe limited by the availability of installation hardware as well as all other types of marine installation and service vessels.

Therefore, this is the perfect time to make sure that any new builds are either focused on zero emissions from new, or via retro fit during their planned operating lives to minimise the need and the carbon footprint of replacements? We all have our part to play and the smart money is green!

www.tidal-transit.com

New Zealand, Electric Tug (TBN)

About Tidal Transit Co Ltd

Founded in 2011 and based in North Norfolk

A fleet of 6 CTVs

All using MAN Engines

A team of 41 people

100% record of over 120,000 safe transfers

88.38% Fleet Utilisation since new

98.63% Vessel availability while on charter since new