Havila Jupiter and PLP240 on Kincardine (3)

Tried, tested, improved: adapting and developing processes and assets for the offshore wind industry

Words: Rob Lindsay, Business Development Manager, Global Offshore

With a focus on a greener, cleaner future, governments, environmental charities, energy industry bodies and major energy companies are imposing ambition carbon reduction targets. This has increased the impetus on innovation within the offshore wind industry, and with it, an onus on a reliable and cost-effective supply chain.

The International Renewable Energy Agency has reported that a green energy transition will only be possible with a significant scaling up of offshore wind capacity. For offshore wind, the global cumulative installed capacity would need to increase almost ten-fold by 2030, to 228 GW, and substantially towards 2050, with total offshore installation nearing 1000 GW by 2050.

In order to achieve this, the next phase of the energy transition will require continued implementation of new technologies, such as floating offshore wind, which is offering new possibilities for wind farm locations. According to DNV GL, the technology is predicted to grow globally, rising from approximately 130MW today to more than 10GW in 2030 and 250GW by 2050.

With more than 80% of the world's best wind resources located in vast areas of deep, open water, floating turbines and technology will prove to be critical in unlocking the most potential from renewable power offshore.

Floating technology enables developers to construct further from shore, unlocking areas previously unsuitable for offshore renewables construction, but like any innovative solution, it also comes with challenges, including those also seen at fixed-bottom sites.

One of the greatest challenges for floating offshore wind is ensuring a cost-effective construction campaign.

Following initial successful small-scale floating offshore wind sites, including demonstration projects and prototypes, floating offshore wind is now recognised as a commercially viable option. The Levelised Cost of Energy (LCOE) is predicted to drop to a global average of €40 per MWh by 2050 if the technology overcomes its main challenges: confidence and costs.

To mitigate the challenges and risks during the construction phase, which can lead to increased costs and risk of downtime, employing reliable contractors with a proven track record in floating technology is paramount, and will ultimately influence the success of this burgeoning industry.

Global Offshore, part of the Global Marine Group, has already utilised their experience and specialist skills gained through decades of cable installation, maintenance, and repair for the oil & gas and renewables industries, in a range of floating offshore wind projects. In addition, with Global Marine Group's 170 years of experience in the telecoms industry, and access to a dedicated team of in-house marine engineers, Global Offshore has the requisite expertise and prior experience to


Rob Lindsay

work in >500m depths.

Adapting existing assets, innovating new assets, such as their PLP240 pre-lay plough, and transferring skills, enabled Global Offshore, with deep roots in traditional energy markets, to adapt into the emerging floating offshore wind market.

The company has a strong track record of floating offshore wind cable installations

using a variety of tried-and-tested techniques from oil & gas markets, including the use of dynamic risers to allow for platform movement, buoyancy modules and dynamic cabling.

With cable faults accounting for ~80% of offshore wind insurance claims, it is vital that adequate cable protection is ensured. In recent floating offshore wind projects, Global Offshore has tracked their performance data and established how they, and other companies in the industry, can achieve an appropriate depth of burial and sufficient cable protection for floating offshore wind projects.

In 2019, with time and cost efficiencies for their clients in mind, Global Offshore introduced the PLP240: a uniquely designed Pre-Lay Plough engineered to reduce the operational risks of cable burial by reducing the time taken for this process, as well as enhancing and complimenting the existing burial solutions available.

The PLP240 has successfully completed three pre-cut campaigns totalling more than 300km, in some of the most challenging seabed conditions for burial. One of these projects was Kincardine Floating Offshore Wind Farm, which at 50MW capacity, is currently the world's largest floating offshore wind farm and has turbines 15km offshore, in waters 60-80 metres deep.

Phase one, which commenced in 2018, saw Global Offshore provide cable installation, including the use of a dynamic riser to allow for platform movement, trenching of the 18km export cable, and cable protection using rock bags and a cast iron split pipe.

Phase two, which included the installation of an export cable and five array cables, was completed in September 2021, with Global Offshore utilising the learnings from the pilot project to improve their practices. Global Offshore employed the PLP240 plough to pre-cut and boulder clear the export route, complimented by the Q1400 trencher, which was used in isolation in Kincardine 1.

The PLP240 used alongside the Q1400, showed significant improvements in progress rates and burial compared to post-lay mechanical cutting solutions traditionally used.

The PLP240 has the ability to simultaneously clear boulder targets ahead of the plough share whilst pre-cutting a Y profile trench, maintaining a share depth at or below the minimum value required to attain target depth of lowering for over 99.5% of the total length ploughed. This helps to ensure that depth of lowering is met following lay or jet lowering through infill material, where required. The majority of this work was completed in a single pass, attaining progress rates of 100 – 500 m/hr, in seabed types ranging from dense sands and very stiff, boulder clay through to gravelly, cobbly sands and low strength clay, exceeding theoretical performance while increasing overall efficiency.

Where jet lowering was required, progress rates of 350 – 450 m/hr were maintained: greater than those which could have been maintained for jet burial alone. Furthermore, laying the cable within a trench has provided an element of protection and stabilisation of the product, and lay speeds of 400 – 700 m/hr are possible with accurate touch down monitoring.

Global Offshore have also had the ability to compare the benefits of a combined approach with the PLP240 and Q1400 against Q1400 alone while performing the installation and burial of a cable parallel to and within the same corridor as one the company installed and buried a few years previously. With Q1400 alone, in hybrid mode, an overall depth of lowering of 1.0m or greater was attained for 30% of a route containing stiff and over consolidated, gravelly pebbly clays, dense sands and underlying bedrock. The time taken from the commencement of lay to completion of burial was 18 days. On completion of the second cable, combining pre-cut trenching with Q1400 in jetting configuration, the overall depth of lowering was improved to >96% at or greater than 1.0m, in an overall time from start of lay to completion of jet burial of 8 days.

Havila Jupiter and PLP240

By using the PLP240 alongside the Q1400, Global Offshore was able to reduce the timescale from 18 days to eight.

Utilising specialist assets and highly skilled personnel during the installation phase is not the only critical element for successful growth of the industry, it is also pivotal to lower the cost of energy by reducing the risk of downtime and unplanned maintenance through effective cable monitoring.

The European Commission forecasts that the increase in offshore capacity will require up to 1000 more offshore substations, cable routes and onshore substation connections by 2050. Therefore, demand for offshore grid infrastructure, including subsea cables, is expected to rise.

The latest edition of Westwood's Subsea Cable Tracker H1 report revealed that demand for subsea cable is forecast to grow by 17% annually, totalling 46,470 km over the period 2018-2022, a 71% growth compared to the 2013-2017 period.

Maintaining, protecting, and preserving a wind farm's subsea cabling is key to lowering the LCOE. If a single 6 MW wind turbine, with a capacity factor of 40 percent, goes offline, the loss in revenue can exceed £10,000 per day.

On average, one repair per year is required for every 413km of inter-array cable and for every 1000km of export cable. In a 2019 report, RenewableUK estimated that over 9,600km of array cables and 6,750km of export cables will be required, respectively, between 2020 and 2024, which would mean an additional 29 cable faults every year.

With fewer than 20 versatile cable ships globally capable of effectively servicing, repairing and replacing subsea cable in deep water, this increase in faults will pose a significant risk to the industry if repair and replacement works do not benefit from reduced timescales.

To decrease the financial impact of cable damage, the offshore wind industry could utilise learnings from the extensive history of the fibre-optic cable industry to replicate cable maintenance best practice.

With ~10 cable faults currently reported every year, there is an urgent financial need to actively mitigate the risks of cable damage, by drawing on the lessons learned in the well-established telecoms market, in which cable maintenance agreements e.g. ACMA, are commonplace.

By establishing maintenance agreements with these suppliers, wind farm owners and operators can reduce transmission outage durations by approximately 60%.

Therefore, it is pivotal that offshore owners prepare by ensuring strong maintenance and repair agreements are in place with key suppliers who can ensure quick response times and reliable repairs or replacements, to limit the financial impact of any cable damages.

www.globaloffshore.co.uk

PLP240 Control Cabin