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Innovating to hit net-zero goals

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Sustainability

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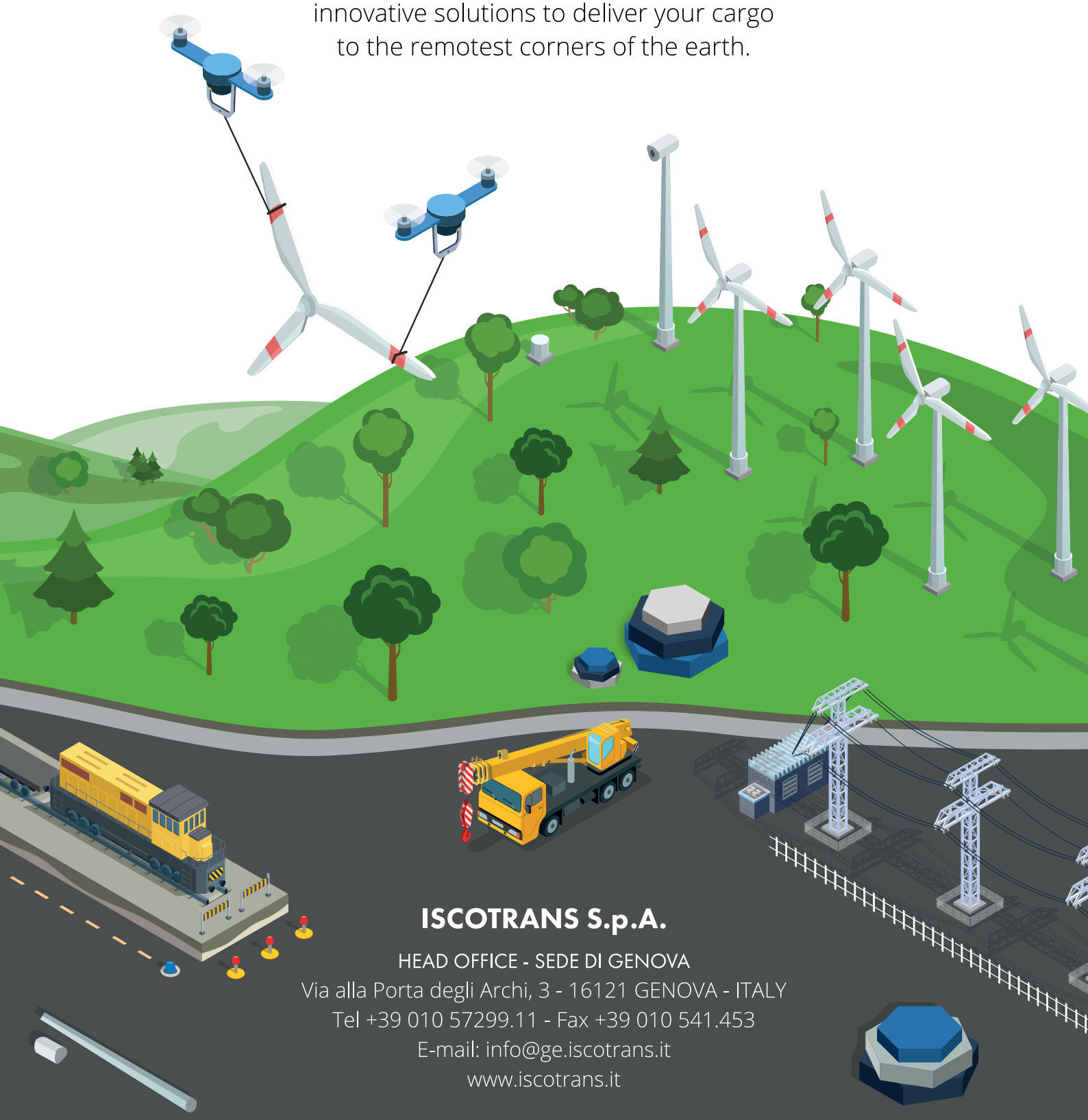

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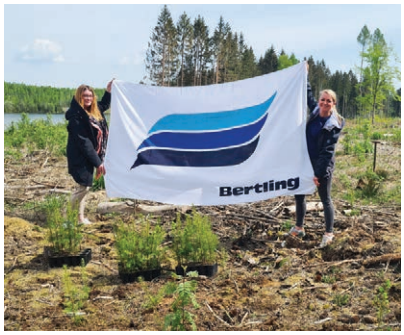
CONTENTS



06 Forwarders
While freight forwarders have a relatively light direct carbon footprint, their choices and decisions are central to the success of the heavy lift sector in its efforts to achieve sustainability.

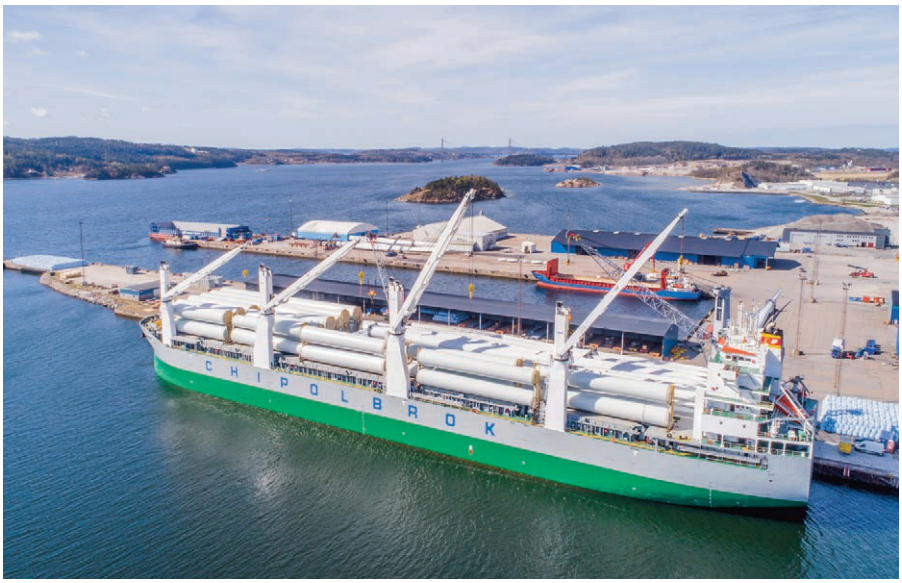
10 Insight
DHL Global Forwarding is among the major freight forwarders playing its part in the drive to improve the industry's green credentials.

12 Shipping lines
Maritime transport has a target of reducing greenhouse gases by 50 percent by 2050, compared with 2008 levels. However, as well as the technical challenges there is the question of who shoulders the risk and cost.

18 Ports
The World Ports Sustainability Program has set out a roadmap towards a more sustainable future for ports by 2030. Some of them are already well on the way to meeting this target.

20 Equipment
For equipment operators, fuel usage is the most significant aspect of their carbon footprint. Creating a sustainable fleet of equipment is high on the agenda.

22 Insight
David Kershaw spoke with Francisco Rodrigues, global sector lead – offshore wind, and Gavin Kerr, global cranes director, of Mammoet on various facets of the transition. Innovation will be critical in meeting ambitious targets.



Innovating to hit net zero

There is a pressing need to preserve the integrity of our planet for generations to come. Most would agree that it is imperative to strive to achieve parity between greenhouse gas (GHG) emissions and removal – the much-vaunted net-zero.

Earth's environment is changing rapidly: polar ice caps are retreating; extreme weather events are increasingly common; and the countries located around the equator are feeling the worst of the impacts. Said another way, those living in the world's poorest nations are paying the highest price.

For the minority that believe that humanity's GHG emissions play little-to-no role in climate change, I argue that point as moot. Fossil fuel, the backbone of the global energy system, is finite and a replenishable, viable alternative is needed. I would hazard that the answer to our long-term energy needs can be answered (in part) by looking up to that fusion reactor that illuminates our days, rather than burying our heads in the sand and searching for black gold.

Of course, the situation is more complex than that. There is a question of fairness – developed nations have the means to change, if not always the will. The developing world must rely on the resources it has, or can acquire cheaply, to sustain its people and power economic growth. Why should they foot the bill when the Western world has already profited from resources that have damaged the environment?

Moreover, Russia's invasion of Ukraine and subsequent disruption of oil and gas supplies demonstrated that nations are in no condition to turn those fossil fuel taps off just yet.

Ultimately, proliferation of renewable energy technology has brought down its levelised cost: the invisible hand of the market at work. A problem is that the market's goals, which are driven by profit, stand in contrast to time-driven targets set out in the Paris Agreement on climate change. Right now, due to technological limitations and a lack of intervention from governments, we are behind schedule.

There is also the issue of energy density. Crude derivatives and gas are, for want of a better word, explosive. You get 'bang for your buck'. Electricity generated by wind, hydro and solar can be fed into the grid, or ➤➤➤

Front cover: From China and Vietnam to Sweden, DHL Industrial Projects successfully discharged onshore wind farm components. The cargo consisted of six wind turbines, including towers, blades and all other accessories. Utilisation of the large newbuild vessel Herbert made unique project combinations possible and mitigated the need for additional vessels.

stored, but it will not give you the required kick to fly a large aircraft, power a ship or run a smelter, for instance.

Thankfully, progress has been made in this arena and, like many ideas, the simple ones are the best. For example, Earth has quite a lot of water and separating the H2 from the O via electrolysis (powered by renewables) leaves us with the most reactive element in the universe. That hydrogen can combine with nitrogen (also found in abundance) to form ammonia. These gases are currently leading the charge when it comes to new ways of powering the planet's activities.

Problem solved? Not quite. The application of theory to real-life scenarios rarely plays out as you might like – especially when the elements involved are combustible or highly toxic to humans.

Technological tools

Before this descends any further into high-school chemistry, it is fair to say that while we may not have decarbonised heavy industry yet, there will be the means to do so. That is a comforting thought. It is a major piece in the global decarbonisation jigsaw that looks almost ready to fall into place. This is before we factor in other alternatives such as biofuels, synthetic fuels and ethanol, for instance. Our multifuel present will be replaced by a multifuel future. The more things change, the more things stay the same.

Meanwhile, the world's energy transition will need metal. Lots of it. Large quantities of steel is required, as are the various metals that play a central role in the electric vehicle and battery-storage revolutions. We all recycle, but I cannot help feeling that this industry will boom out of all recognition in the coming decade.

From a project logistics and transport engineering standpoint, the above developments bode well for future job opportunities. Lots of large, heavy components are needed across the globe, many of which have similar handling requirements to what we see today. Right now, these 'new' cargoes are competing for space with 'traditional' lots. Job security: high. Workload: very high.

HLPFI has, for many years, dedicated miles of column inches to the emergence and maturity of the renewable energy verticals, and how oil and gas markets are trying to green their activities. In this supplement, we detail what a number of the heavy lift and project logistics sector's leading players have done to reduce their environmental impact.

Companies in this sector are highly specialised and rightly lauded for their technical accomplishments, but this niche industry is not large enough to lead the charge when it comes to the global decarbonisation agenda. But that does not mean that it has sat idle; quite the contrary. Once the appropriate frameworks and regulatory environments have been established, project and heavy lift operators have demonstrated that they can adjust rapidly and with minimal fuss – despite coming off the back of more than a decade of market turmoil – as seen with the introduction of low-sulphur fuels.

Mammoet

Lots of large, heavy components are needed across the globe, many of which have similar handling requirements to what we see today.

With the market in better health than say two or three years ago, forwarders, carriers and equipment operators have been able to invest and innovate.

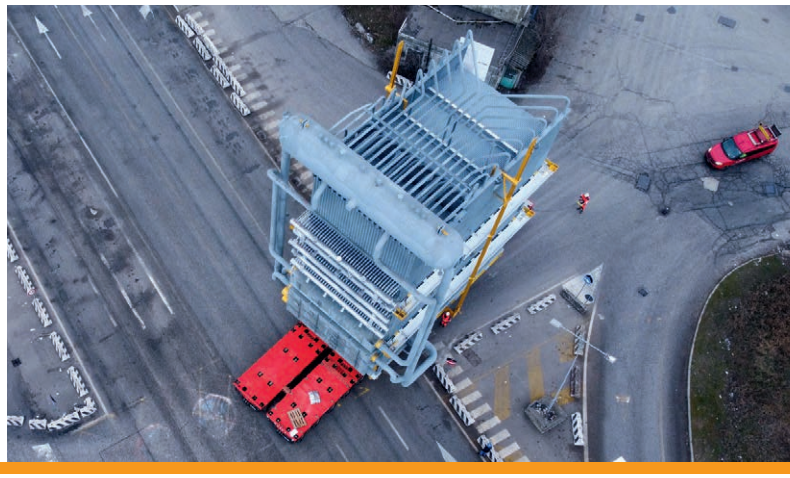
New fuels

Many have restructured to better cater to the needs of shippers. Most are analysing their scope III emissions and encouraging their suppliers to do something about their respective footprints. Of course, the question of new fuels and their availability worldwide is the yet-to-be addressed elephant in the room.

The fact remains that logisticians are intermediaries and they deliver a service at a price. Greener logistics has a cost: and many shippers are still a way off when it comes to paying the premium. But with net-zero targets formalised – China is aiming for 2060 – and growing consumer pressure for zero-impact business activities, the world will inevitably go green.

David Kershaw, Editor

Bertling



An excellent operational performance does not need many words of explanation, but one simple answer: Bertling. Track the Ecological Footprint for all transports you handle with us to know your emissions, proactively reduce and offset them to strive towards carbon neutrality.

Visit www.bertling.com/sustainability to find out more.

Forwarders face up to challenges of decarbonisation

While freight forwarders have a relatively light direct carbon footprint, their choices and decisions are central to the success of the heavy lift sector in its efforts to achieve sustainability, writes *David Kershaw*.

Freight forwarders, by design, are asset-light businesses that utilise their skills, expertise and project management capabilities to coordinate complex project deliveries. As such, a forwarder's direct carbon footprint is limited compared with the subcontractors it appoints. Forwarders also have no legal requirement to report their carbon footprints to the authorities. Nevertheless, indirect emissions are impossible to ignore in today's climate – and shippers seem to be taking a firmer hand when it comes to the environmental footprint of their suppliers.

The market for project freight forwarding activities is changing, and the companies that coordinate complex project moves are changing with it. Some have reorganised their internal structures to bring oil, gas, carbon capture and storage (CCS), biomass, hydrogen, wind and solar energy under one 'energy' banner, such is going to be their interdependence in the future. On the day-to-day level, activities are being modified and new technologies implemented to realise greater efficiencies and, in turn, minimise waste and impact.

Still, there are operational and regulatory hurdles to overcome, both in the short and long term, and the clock is ticking with 2030 emissions targets just over seven years away, and 2050 goals on the horizon.

Record, report and reduce are the three mantras of environmental logistics. One way that forwarders and carriers are adapting to the green revolution is through carbon trading and offsetting, where emissions are countered with credits that fund projects that remove CO_2 from the atmosphere. Detractors argue that this is tantamount to greenwashing, as it does not physically limit greenhouse gas emissions.

Carbon trading/offsetting needs to be assessed, audited and qualified by a third party to ensure it is being delivered.

– Tim Killen, deugro group

Tim Killen, deugro group's chief sales officer, believes it to be a "valuable short-term intervention" but agreed there is fine line to walk. Speaking at May's Breakbulk Europe 2022 conference and exhibition, he called for better and clear auditing of carbon trading/offsetting to improve confidence. "It needs to be assessed, audited and qualified by a third party to ensure it is being delivered."

Stephanie Lüning, director of tendering and marketing at Bertling Logistics, explained that the Germany-headquartered project forwarder is keen to offer sustainable

Blue Water joins carbon capture consortium

Blue Water is a member of the consortium developing Project Greensand, a pilot development exploring carbon capture potential in the North Sea, which will receive EUR26.5 million (USD30 million) in funding from the Danish Ministry of Climate, Energy and Utilities.

With the financial support, the consortium behind the project is entering its next phase. The support will allow preparations for CO_2 storage at the Nini field in the Danish North Sea to begin in 2022. The storage potential is 500,000 to 1 million tonnes of CO_2 per year from 2025, increasing to 4-8 million tonnes of CO_2 per year by 2030. This means that the Greensand area can account for all the CO_2 storage proposed in the Danish Climate Programme.

Blue Water's role in the project relates to logistics solutions, including the acquisition of special containers able to transport CO_2, the development of frames so that they can be handled safely, and chartering the vessel carrying them offshore and back again.

logistics solutions to its clients, one pillar of which is carbon offsetting. "We sell this by estimating the footprint already at the tendering stage," she stated, noting that Bertling Logistics has partnered with four global carbon offsetting projects. Highly visual IT platforms provide clients with access to the environmental data on tailor-made dashboards.

Lüning also highlighted that when it comes to reporting, "we give our customers the ability to capture and report their scope III supply chain emissions via our sophisticated IT solution".

Crucial eight years

Climate reporting obligations have become increasingly common with the pressure to improve and offer sustainability solutions coming from clients themselves. However, "with limited capacity and the rates elevated, few are really prepared or ready to pay extra with the market as it is", she explained. That is a concern. "The timeline is tight [to realise climate goals]. The next eight years will be the ones where we can make the difference."

Freight forwarders themselves, including Bertling Logistics, use generally accepted calculation and scientific principles to calculate these scope III emissions.

Bertling Logistics is also looking at its own corporate footprint and is setting annual percentage reduction goals when it comes to emissions. "Now we are looking at ways to actively reduce our [indirect] footprint," said Lüning. One way has been to review and rank subcontractors' environmental credentials, before passing this information to its people and clients to consider when appointing suppliers. She conceded that the process may be in its infancy. "This is the reality of the industry still, but we are certainly committed."

Allan Dahl Leiberg, business development manager, energy and projects, at Blue Water Shipping, said that sustainability is a fast-growing topic of its strategy going forwards.

With road transport, monitoring emissions is a growing requirement for shippers, and Blue Water is increasingly turning to those that can offer transport services utilising greener fuels. "We are also maximising the way we utilise our trailers to improve internal efficiencies, for instance," he said. Racking systems to stack pallets inside trailers to increase yields was one example given. "With seafreight, we have the option of purchasing carbon credits," he added, "sponsoring biofuels for other carriers to use. These are good ideas that we offer to our clients."

Biofuel problems

Vessel bunkering requirements have also been analysed and procuring biofuels has been prevalent where vessels and jobs allow for it. However, Leiberg noted that these fuels remain hard to get, are less efficient than traditional fuels and, unfortunately, remain much more costly.

Asma Ouchan of Smart Freight Centre drew attention to the Global Logistics Environmental Council (GLEC) – a partnership of 150 companies, industry associations, programmes, experts and other organisations, which is developing a variety of tools and frameworks that allow the supply chain to monitor and report emissions. A total of 100 multinationals use the GLEC Framework to calculate and report logistics emissions across the multimodal supply chain, for instance. At present, it is the only globally recognised methodology for harmonised calculation and reporting for multimodal logistics.

Designed to inform business decisions and steer efforts to reduce emissions, it is aligned with: Greenhouse Gas Protocol, UN-led Global Green Freight Action Plan, and CDP reporting. A formal ISO 14083 "quantification and reporting of greenhouse gas emissions of transport operations" standard is also being developed. The goal is that the principles and methodology for freight transport will be based on, and be consistent with, the GLEC Framework, and will cover both freight and passenger transport. This ISO standard would ensure a single, worldwide approach that would be widely accepted by industry, governments and investors, it said. ISO 14083 would replace the existing European standard EN 16258.

Ouchan added that she preferred "insetting" to offsetting and that companies should strive to be more efficient rather than paying to run a dirty business. Decarbonisation should be achieved by improving internal efficiencies, and she argued that it is "perceived to be too easy to just buy credits".

Reduction, rather than offsetting, is the approach often taken by carriers, which for the most part prefer to invest in new technologies and low-carbon fuels (see article on pp12-17).

Long term, the industry will incorporate new technologies to curtail carbon emissions. New fuels, technology and retrofitting existing equipment are required – but of course this will require large-scale capital investments over a long period.

Bonus and penalty clauses for delivery schedules in logistics contracts are common, but could something similar be inserted for emissions targets? To be held accountable with key performance indicators (KPIs) seems like a sensible plan to address supply chain emissions, but few agree that this could be integrated today.

Smaller companies

Ouchan considered whether the integration of such clauses is fair to smaller companies, many of which lack the capital to invest in decarbonisation technologies and systems. "Very large carriers can afford to do it... but smaller companies need more time."

Emissions reporting is an area of the energy transition that remains ambiguous. Leiberg described the situation as "tricky" while noting that freight forwarders themselves have two sets of reporting accounts to consider: "What we emit ourselves, and what we are indirectly responsible for through subcontractors". The potential for favourable counting by only considering what forwarders emit themselves is obvious but might not show the actual picture.

While Blue Water does not vet the green credentials of its suppliers, it does work with them to optimise footprints, vehicles and fuel usage, said Leiberg.

Bertling Logistics has partnered with four global carbon offsetting projects.

One thing that Leiberg is sure of is that the demand for heavy lift and project logistics services will grow in lockstep with the sustainable energy transition. The established wind energy sector will continue to grow. CCS projects will become increasingly attractive, hydrogen demand

The newest feature of the deugro visiotrack tool is another important step towards achieving environmental sustainability.

–Mario Hess, deugro

will foster more investment, as is the case for battery manufacturing, all of which will create work for the project logistics sector.

deugro launched its Sustainable Energy division last year. "The world is changing, clients are changing and so are we," said Daniel Cogbill, global head of the business unit. The division's mandate is to continue to find ways to add value today and in five years' time; it has dedicated subject matter experts in the UK, Denmark, Spain, and the USA. Asia Pacific will be the next region to have a presence for the global team during Q4 this year.

"Europe is a mature market [for renewable energy] but the pipeline is huge – in the UK there is a 50 GW target by 2030, for example" said Cogbill. The challenge: not enough capacity to deliver projected volumes. "There needs to be investment. Right now, it is being largely left to the supply chain to drive the levelised cost of energy through cost-effective logistics delivery, but things need to change by the way of more government investment for infrastructure build up so we do not end up with a stagnant pipeline of projects."

Plethora of challenges

In particular, he referenced the dearth of offshore assets in the energy sector. He also drew attention to a lack of port capabilities in handling and storing these cargoes, as well as the skills gap. "There is a plethora of challenges."

Tackling these challenges will require innovation. "In offshore wind, projects [in the UK] are already being delayed. Cargoes are being moved out as far as eastern or southern Europe just for storage."

Internally, other plans are afoot to make deugro's activities greener. Small steps include campaigns across the business to promote recycling and electric vehicle use, and traditional energy suppliers have been switched to greener alternatives. Employees have switched to the Ecosia search engine, which supports environmental projects internationally each time a search is completed.

Another pillar of its environmental strategy is the rollout and enhancement of its supply chain management software deugro visiotrack, which now includes a feature that measures the carbon footprint of global transports.

"As part of deugro's commitment to providing innovative logistics solutions for our clients to support global CO_2 reduction, and in line with our social responsibility for a net-zero future, the newest feature of the deugro visiotrack tool is another important step towards achieving environmental sustainability," said Mario Hess, global head of customer solutions – deugro visiotrack.

Based on a transparent and compliant calculation methodology, the overall CO_2 impact of a trade lane can be displayed through a widget within the deugro visiotrack dashboard. This enables users to record, report and potentially identify CO_2 reduction targets and optimise routings.

In this way, alternative solutions for carbon reduction can already be calculated during the transport planning phase based on the identification of intelligent routes and modes of transportation, the optimal utilisation of transportation mode capacities, and the forward-looking design of transport schedules.

Unfortunate reality

Cogbill said: "The top management and board are motivated to go ahead in these arenas, and we will use our professionalism and experience to do so." He conceded, however, that the present strain on the supply chain is challenging shippers, who are having to weigh up carbon reduction or logistics costs – an unfortunate reality.

There are many hurdles to clear on the path to 2030 and 2050 climate goals – and overcoming them will require collective efforts and investments from all supply chain players. For forwarders, industry-wide guidelines to record, report and reduce emissions are paramount. "Getting everyone aligned and to develop guidelines that work for everyone," is the next big challenge, said Ouchan.

"If we spend the next five years talking, then we will miss the 2030 targets," said Killen. The steps introduced now will be the ones that truly have the greatest benefit for future generations. HLPFI

Operating at the **leading edge**

DHL Global Forwarding is among the major freight forwarders playing its part in the drive to improve the industry's green credentials. Indeed, the company aims to set an example in terms of sustainability and is well aware of the broader context in which it acts. *Megan Ramsay* reports.

Ryan Foley, ceo of DHL's Industrial Projects (DHL IP) division said: "Over the years, Deutsche Post DHL Group has repeatedly redefined logistics, from introducing the industry's first green product, to becoming the first logistics company to commit to a zero-emissions target [in 2017]. Across industries, more and more companies are committing to climate protection targets and are requiring their suppliers to support them.

"We are committed to minimising our environmental impact, reducing our energy use, and preventing pollution in all our activities worldwide by continually improving our performance. We have set strategic global targets in Mission 2050 – Zero Emissions, which aims to achieve net-zero emissions by 2050. We will do everything in our power to reach our new climate protection target and actively support limiting global warming to below 2°C."

DHL has also set a target of reducing its greenhouse gas emissions by 2030. Without action, the company's annual emissions would likely rise to 46 million tonnes by 2030 as a result of growth in global logistics activities. Instead, the group has committed to reducing its annual carbon emissions to below 29 million tonnes.

"We will do this by committing to set an emissions target in line with the Paris Agreement through the Science-Based Targets initiative (SBTi) and investing an additional EUR7 billion (USD7.3 billion) to reach it," Foley said.

With this investment, DHL will increase its use of sustainable fuels to more than 30 percent by 2030, design any new buildings to be carbon neutral, offer a comprehensive portfolio of green products, and electrify 60 percent of its last-mile delivery. By 2030, it will have more than 80,000 electric vehicles on the road.

Management

DHL IP has established clear processes to improve its environmental performance. Adrian White, global head HSE at DHL IP, outlined: "Our environmental management procedure defines the processes DHL IP will use in its operations in support of the DHL IP health, safety and environmental policy, and the Deutsche Post DHL Group environmental protection programme, 'GoGreen'."

Specific site environmental impact assessments will be completed (where required) to identify, classify, minimise and manage all waste streams generated. Waste streams are controlled according to approved local/site procedures and the DPDHL Corporate Environmental. In addition, the GoGreen waste management programme includes the requirement for waste stream minimisation and reduction (reduce, reuse, recycle) across all DHL offices and operational sites.

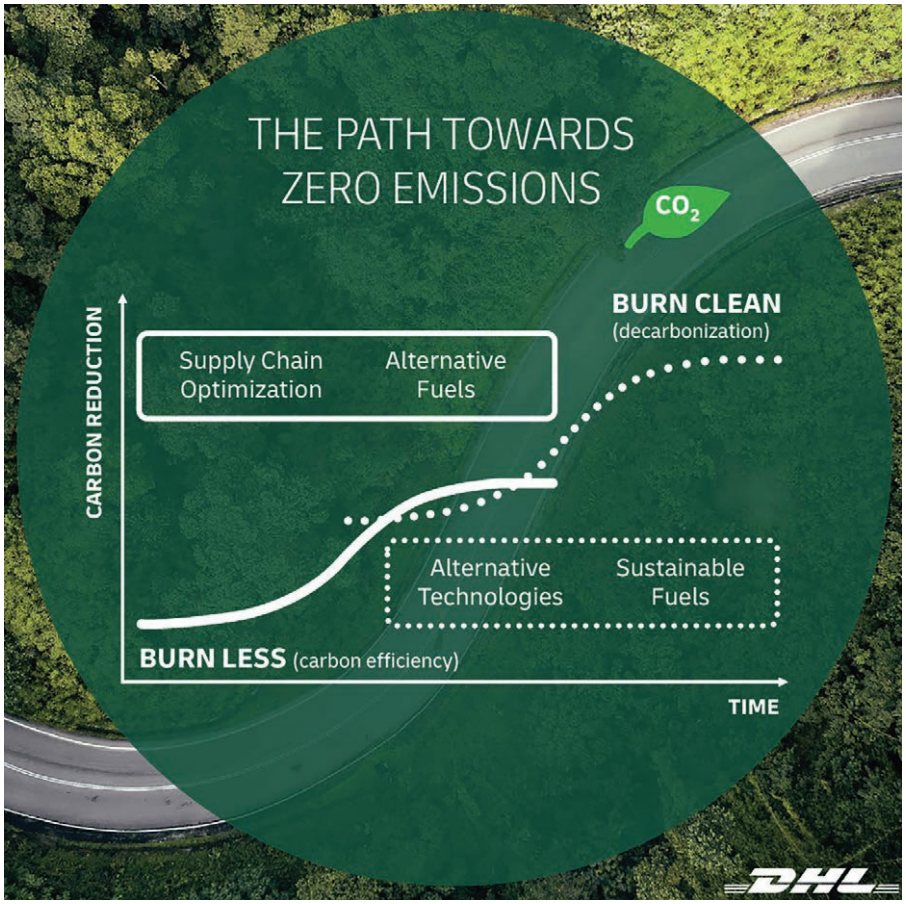
"The process of environmental management does not stop with us," White went on. "The exact requirements and adherence are also required for all sub-contractors, vendors, and suppliers used by DHL IP for project operations. This is defined within the DHL IP HSE policy and the contractor management policy."

A forwarder's environmental responsibility is by no means limited to managing its own performance and demanding the same commitment from its suppliers; working with clients, too, results in a more sustainable supply chain overall. DHL IP offers a range of tools and services to support its clients in order to achieve "our combined sustainability and environmental goals", said DHL IP vice president global business development and commercial director Andy Tite.

Specialised team

"Within DHL IP, we pride ourselves on being a highly specialised team supported by the market-leading organisation of DHL Global Forwarding. The ability to deploy DHL IP subject matter experts to deliver to our client's expectations, while maintaining our own DHL presence in almost every location globally supported by our own assets and infrastructure, is never more crucial than on the topic of sustainability, where direct control is vital."

The tools and solutions DHL IP offers are part of the broader Deutsche Post DHL Group goals for net-zero 2050 alluded to above. The company recently cemented its ambitions with investments such as the commitment to procure 800 million litres of sustainable aviation fuel from bp.



Such initiatives culminate in the provision of carbon-neutral transport solutions for FCL/LCL and airfreight shipments on a global basis. DHL Global Forwarding clients can opt for emission-friendly freight solutions, carbon-reduced airfreight and an ocean freight product that uses sustainable marine fuels.

Where these services cannot be practically implemented, the forwarder's carbon calculator tool (which accurately records impact), supported by its carbon insetting and offsetting initiatives, still allows its clients to operate in a manner that is environmentally responsible.

DHL IP, meanwhile, can leverage all of these solutions to support its network of project logistics partners and provide tailor-made solutions that are "genuinely sustainable", Foley pointed out.

Green energy portfolio

More broadly, DHL is just one of the companies supporting the global energy transition away from fossil fuels and towards more sustainable sources of power generation, and benefiting from the business opportunities this shift brings with it.

"We are actively supporting many of our clients in their pipeline of activities," noted Lars Ingmann, vice president global head renewables at DHL IP . "This is done in a broad number of sectors including solar, waste to energy, onshore and offshore wind, and it relates to the demand, investment and delivery of green projects. With this focus on new green projects, driven by countries and regions, we are actively pursuing a reduction in our customers' carbon footprint, while diversifying an increasing green energy portfolio."

DHL IP can draw on substantial experience to support these long-term projects, having delivered over 1,000 wind turbine generators over the last decade. Its record of delivering projects in some of the most challenging geographies allows DHL IP to advise its clients on the risks involved.

For now, Ingmann said: "We are addressing requests to provide input where our clients involve us very early in their planning and execution phase, taking into account the increasingly challenging and disrupted supply chain we have seen unfold in the last few years.

"With the pandemic, port congestion, premium rates and equipment and shipping space all becoming a greater risk, it is vital that we are able to offer solutions to minimise the supply chain risk and deliver projects on time and on budget."

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Decarbonising heavy lift shipping

Maritime transport has a target of reducing greenhouse gases by 50 percent by 2050, compared with 2008 levels. However, as well as the technical challenges there is the question of who shoulders the risk and cost, writes *David Kershaw*.

Maritime shipping, by volume, is the most efficient mode of transportation but due to its scale, it contributes 2-3 percent of the world's greenhouse gas (GHG) emissions annually. If it were a country, ocean shipping would be the world's fifth-largest emitter of CO_2.

The January 2020 introduction of the sulphur emissions cap forced ship operators either to switch to cleaner fuels, namely very-low sulphur fuel oil, or to undergo scrubber retrofits. Despite much toing and froing in the build up to its introduction, this step-change was adopted with relatively little fuss, demonstrating that the shipping industry is capable of adopting and introducing new technologies profitably, if there are clear and decisive instructions from authorities. Ballast water treatment systems, too, are being rolled out across the industry to prevent the spread of non-native species internationally.

Of course, the elimination of GHG emissions is a significantly greater challenge – one that is too large for any one company, country or jurisdiction to manage alone. But collectively, steps are being taken to 'green' shipping in both the immediate and long term. By 2050, GHG emissions need to be reduced by 50 percent compared with 2008 levels, according to International Maritime Organization (IMO) goals. Environmental, social and corporate governance (ESG) issues are already influencing financing decisions, fleet renewal and regulation across the industry

The pandemic, supply chain disruption, and rising product demand have forced any vessel capable of transporting cargo back onto the water. This situation is expected to play out for at least the rest of this year.

However, the supply/demand balance in the multipurpose sector could swing closer into balance from 2023 onwards. Alphaliner said new containerships on order are equivalent to 27.9 percent of on-the-water tonnage. A 2.4 million teu tranche is scheduled to enter service next year, which should alleviate some of the constraints seen in this competing sector. That could coincide with some rapid ship scrapping activity – older multipurpose tonnage incapable of meeting current and upcoming regulations could hit the beaches or find homes in secondary markets.

New parameters

New vessel operating parameters and emissions rules take effect in 2023 – the IMO Energy Efficiency Existing Ship Index (EEXI) and its accompanying Carbon Intensity Indicator (CII) – and there is a great deal of effort on all parts to clarify compliance. The knock-on impact may be greater scrutiny for all maritime regulations.

There are technological, financial and regulatory hurdles to clear before shipping has a viable path towards the IMO's 2050 goal, including the recurring question of who shoulders the risk and cost of developing new technologies.

"Longstanding pressures on smaller shipowners to consolidate may become difficult to ignore in the pursuit of a sustainable industry, while the privacy traditionally embraced by sections of the industry may come under pressure from demands for greater transparency from investors, lenders, regulators and customers," explained Lindsey Keeble of WFW.

> **Longstanding pressures on smaller shipowners to consolidate may become difficult to ignore in the pursuit of a sustainable industry.**
>
> – Lindsey Keeble, WFW

Whenever there has to be compliance with regulations, there are going to be liabilities. In the case of EEXI and CII, that is whether owners or charterers are responsible for paying costs associated with compliance. For new charters, that can be determined as part of the negotiation.

For existing charters, BIMCO introduced its initial Transition Clause for Time Charter Parties at the end of 2021. It addresses compliance with the EEXI and allocates responsibility and costs for implementing Engine Power Limitation (EPL) or Shaft Power Limitation (SHAPOLI) modifications under a time charter party.

The clause states that if EEXI modifications are required, these shall be completed by the owners at their expense prior to the effective date, and that owners shall use their reasonable endeavours to plan and effect such modifications during the vessel's service without any loss of time to the charterers. Nevertheless, owners have the right to take the vessel out of service to effect such modifications.

What is obscure is how compliance will look in practice. "When a charterer hires a vessel, the owner is obligated to fulfil the voyage as safely and quickly as possible. If compliance with the regulations means a vessel has to operate at a lower speed, or on a slower but more efficient route, the owner may not be able to comply with the lawful orders of the charterer. That could create disputes," said Nick Austin, a partner at Reed Smith, based in London.

G2 Ocean in December 2021 successfully completed its first trial using biofuel to power the 46,500 dwt general cargo vessel Star Istind on a voyage from Europe to North America.

If not speed, another means of compliance may be cargo capacity. "Load may have an effect on carbon intensity because gross tonnage is a factor in measuring how efficiently a vessel carries its cargo," he explained.

Making the rules stick is another unknown. While acknowledging the centuries-long challenges of enforcement on the high seas, Austin is sanguine. "Enforcement is slowly getting harder to avoid. I expect there will be more pressure from the IMO on flag states and class. Documentation and certification will be key and port state control may also have a role to play. There will be greater scrutiny and it should become harder for owners in the bottom division to evade."

Longer-term challenges

The IMO minimum target is to achieve a 40 percent reduction in carbon emissions by 2030. Europe's Fit for 55 programme targets a 55 percent reduction in CO_2 emissions in Europe by 2030.

Next year, the EU will introduce its emissions trading system (ETS) that will charge transport companies for their emissions. Putting a price on CO_2 is all well and good, but it remains unclear where exactly that money will go.

Christian Hoffmann, director group strategy and marketing at Harren & Partner/SAL Heavy Lift, pointed out a fundamental hurdle for global industries like shipping, namely: "There's no global alignment when it comes to regulations, so it's complicated for a company like ours, with routes around the world."

Time is not on the industry's side but some large companies, including A. P. Møller-Maersk, Hapag-Lloyd and Yang Ming, have already met the IMO's 2030 emissions target.

Yearly emissions from the industry had shown signs of falling, according to data from Statista and Getting to Zero Coalition. Average CO_2 emissions of the global dry cargo fleet (in grams of CO_2 per teu-kilometre) stood at 48.9 in 2015. That figure was 41.7 in 2019. However, according to Simpson Spence & Young, CO_2 emissions posted year-on-year gains of 4.9 percent in 2021 and were higher than 2019. Longer tonne-mile trades, high sailing speeds and port congestion were cited as reasons for the increase.

Carbon offsetting strategies, which are increasingly adopted by forwarders (see pp 6-9), are finding little favour with carriers. Henrik Andersson, head of sustainability at ro-ro shipping group Höegh Autoliners, said

such strategies have been met with little enthusiasm by clients, "who would rather see us invest in new technologies and low-carbon fuels".

Ultimately, decarbonisation will come down to new fuels such as ammonia, methanol, hydrogen, biofuels and electric propulsion.

Alternative fuel units

Earlier this year, Clarkson Research Services said that, for the first time, the majority of new ship orders (63 percent) have been for alternative fuel units – up from roughly 30 percent in 2021. LNG led the way, making up 50 percent of the share.

Engine manufacturers are pressing ahead with power units capable of running on ammonia – Wartsila aims to have a unit that runs purely on ammonia in play by 2025. Some of the multipurpose and ro-ro ships that have been ordered will be delivered with dual-fuel or ammonia-ready notations.

Of the zero-emission fuels, some expect ammonia will garner the greatest market share – which is easier to store in bulk or refrigerated than pure hydrogen. According to recent projections, nearly 90 percent of the sector's long-term decarbonisation investments will be geared towards sustainable hydrogen and ammonia. Of these, half will be directed towards clean hydrogen production. This is because ammonia production requires a supply of gaseous hydrogen.

The pressing concern for multipurpose shipping is the availability of these fuels worldwide. Owners want to future-proof their vessels but have been reticent to place orders while availability and bunkering infrastructure is not in situ across the multiple markets that tramp operators call. Diverting voyages for bunkers is out of the question from an economic standpoint.

The vessels on order with dual-fuel power systems confirm this – nobody in the deepsea multipurpose shipping sector is confident enough yet to order a ship that will run exclusively on a zero-emissions fuel.

Reporting those emissions is another area of uncertainty, although this has come into focus in Europe. Rick Bruinsma, senior project manager at Jumbo-SAL-Alliance, said: "[Mandatory reporting] is already happening but it is segmented on a global perspective. For example, vessels coming to the EU, or sailing between ports in the EU, already have to report all their emissions data." As to when mandatory requirements come into force in other jurisdictions remains unclear.

Höegh Autoliners has extended its Aurora-class newbuilding programme to eight, all of which will be built by China Merchants Heavy Industry (Jiangsu).

Social pressure to reduce GHG emissions is also encouraging lines to disclose their carbon footprints voluntarily. This data can allow customers to make informed decisions about their shipping needs, providing an added incentive for others to decarbonise.

This is not without its reporting headaches. Andersson drew attention to the fact that Höegh Autoliners is being asked as a matter of course for different emissions standards from multiple stakeholders. This reporting is not uniform or consistent across companies, areas and projects.

Hoffmann said that the industry has not yet settled on one main green fuel for the future. "Our vessels can't commit to LNG, for instance, because there simply isn't enough space on board. We need to find something that works with what we've got. The biggest constraint for us as an operator will be the availability of green fuels where we operate. Development of the fuel infrastructure network is probably the most complex issue."

In Hoffmann's view, methanol will most likely be the fuel of the future: "We are seeing some of the larger players (like Maersk) starting to adopt methanol as a key fuel source and investing in production (through 'power-to-x' facilities). That is of course a good indicator, because it will likely need private equity to develop both technology and infrastructure. Based on the technology and know-how we have at the moment, methanol looks like the most efficient option – but it will come in with the next generation of newbuilds."

According to recent projections, nearly 90 percent of the sector's decarbonisation investments will be geared towards sustainable hydrogen and ammonia production.

Progress is being made with optimising the existing fleet as well.

Friction-reducing paint

In terms of initial, easy-to-implement steps, SAL has started to use a new anti-fouling and friction-reducing hull paint. As well as minimising the need for maintenance, this paint can reduce fuel consumption by as much as 8 or 9 percent.

"Over the past two years, we have also been carrying out trials on two of our vessels with hydrogen generator technology in cooperation with a start-up company, FUELSAVE," Hoffmann went on.

Germany-based FUELSAVE's FS Marine+ technology is currently in operation on SAL's vessel Trina. It ensures a cleaner and more thorough combustion process by injecting a mix of hydrogen, oxygen, water and methanol into the air intake of a main and/or auxiliary engine, thereby reducing fuel consumption by as much as 10 percent.

"Since 1 tonne of fuel is roughly equivalent to 1 tonne of CO_2, we can achieve a reduction in emissions of up to 10 percent with FS Marine+," Hoffmann said. "There's also an improvement in terms of other emissions. The trials have been going well so far and look promising."

SAL also offers to cooperate with its clients to achieve emission-neutral shipments. For instance, Hoffmann outlined: "Using biofuel is an option if you can dedicate a vessel exclusively to a certain project for a particular client, although it's not so easy with normal tramping serving different customers."

Carbon offsetting is something that SAL is evaluating and may well offer to its customers soon, too.

The visibility of the fleet and its operations is another aspect of sustainable shipping. AAL Shipping, for instance, has

BETTER WAYS
MAKING SUPPLY CHAINS
MORE SUSTAINABLE EVERY DAY
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introduced its performance optimisation control room (POCR). The facility harnesses routing, weather and sea conditions technology to monitor and plan every aspect of each sailing. Voyage recommendations are then returned periodically to each master with optimised routing, sailing and fuel consumption recommendations.

Valentin Gherciu, head of global operations and QHSE at AAL, said: "Learning from the most recent developments in the aviation industry and employing the latest smart technologies, all adapted to the needs of the maritime industry, the POCR was developed by our sister company, Columbia Shipmanagement (CSM). Manned 24/7 by specialists in weather and shipping operations, POCR employs intelligent applications powered by AI algorithms meant to augment rather than substitute the human element."

Performance monitoring

He added: "Almost four years into operation, and with significant data from fleets such as AAL's the POCR has developed to provide a very wide range of features including optimisation of speed and consumption, weather routing and avoidance of inclement conditions, real-time vessel positioning, performance (speed, consumption, power consumption and RPM, ETA at next port, etc), and dynamic/operator verified navigation plans are offered to the user, achieving a high level of transparency. Increased efficiency in the operation of the fleet benefits all stakeholders ashore, combined with continuous support in safe and optimised route planning and execution for those onboard.

"Optimising engine and vessel performance through the ingenuity of the POCR can help to reduce emissions as well as increase the life of equipment onboard ship, boosting the return on investment for the owner as well as providing accurate equipment maintenance and condition records, which can help to boost a vessel's resale value. It can also reduce fuel consumption by between 2-5 percent as well as generate a host of other benefits such as reduced dry dock costs, improved insurance rates, and the potential for near-zero downtime of the vessel.

> **In a study by Marintek, it was estimated that fouling increases fuel consumption and emissions on an average vessel by around 15 percent over a 60-month period.**
>
> – Höegh Autoliners

POCR is also helping AAL to achieve CII measures. An online dashboard provides current and predictive performance and forecast a vessel's CII trend for a voyage, period, or simulations, said Gherciu.

In a similar vein, Spliethoff Group developed the tactical operations platform (TOP) – a portal that gives real time insight into the vessel's location, operational status and the weather.

Similar systems are being rolled out across the shipping industry and this level of monitoring also lends itself to detect performance loss. If this is due to fouling, for instance, the operator can decide to clean the vessel to bring down consumption.

According to Höegh Autoliners, a thin coat of paint on the hull of vessels can reduce CO_2 emissions by 4 percent. Höegh said: "In a study by Marintek, it was estimated that fouling increases fuel consumption and emissions on an average vessel by around 15 percent over a 60-month period."

Modern hull paints are designed to stop fouling from building up on the vessel's hull. On Höegh's fleet, where the hull paints are estimated to reduce fuel use by an average of 4 percent per vessel, that results in a reduction of around 50,000 tonnes of CO2 emissions.

The A-class AAL Shanghai transporting wind towers.

Spliethoff has also studied the large bulbous bow on its P8 and P14-type vessels to investigate ways to improve the operational performance and environmental impact. This resulted in them being redesigned to meet the lower draught and speed profile that the vessels are operated on; the smaller and flatter bulb was designed to reduce the calm water resistance at lower speeds and to reduce the added resistance due to waves.

Modifications

In its latest sustainability report, Spliethoff said: "As we have been sailing the Pauwgracht with this modified bow for over a year and a half now, all the while gathering data from the performance monitoring system installed on all P8 and P14-type vessels, we have been able to study the in-service performance of the modified bow in more detail.

"Although the monitoring time seems long, the very diversified use of the vessels still makes comparison difficult. A voyage

Wallenius Wilhelmsen upgrades Carbon Compass tool

Wallenius Wilhelmsen has introduced an updated carbon footprint measurement tool that will provide transparent greenhouse gas (GHG) emissions data – Carbon Compass 2.0.

"Today we see a growing need and interest to deliver more sustainable shipping," said Wallenius Wilhelmsen. "Reducing the impact of CO_2 emissions in the outbound supply chain is more important than ever. By presenting accurate, transparent greenhouse gas data on a global, trade lane or voyage level, Carbon Compass 2.0 ensures that customers get the granular detail they need to report on their Scope 3 supply chain emissions."

The original version of the tool was launched 12 years ago. Since then, Wallenius Wilhelmsen has seen a growing demand from its customers to receive up-to-speed GHG emissions data across their supply chains. By investing in technology and digitalising its fleet, this latest version of the tool enables Wallenius Wilhelmsen to meet these evolving needs and provide customised feedback to customers.

Carbon Compass 2.0 calculates the total GHG emissions and intensity of the ocean leg of the supply chain. Results are based on IMO emissions factors and the key operational parameters that determine these emissions, including fuel consumed, cargo weight and distance sailed.

LNG takes on role as a bridging fuel

LNG has long been mooted as a viable bridge fuel as the industry shifts away from conventional maritime fuels.

Emitting no sulphur oxides, fewer nitrogen oxides and comparatively less carbon than traditional bunkers, as well as its relative abundance, saw its adoption primarily in the tanker sector.

For tramp shipping, uptake has been limited – bunkering infrastructure is limited to the major shipping hubs. Methane – another powerful greenhouse gas – is known to slip from the power system too, diluting its attractiveness further.

via the Northern Sea Route is very different from a voyage in the Mediterranean, which again differs from a westerly Cape Horn voyage." General conclusions are that in calm waters at lower speeds the modified bulb performs better. In less moderate weather, for example during an ocean crossing, the modified bulb shows a saving in required power.

Looking at the total fuel consumption over one year, the numbers for Pauwgracht also look favourable. However, the variation in routes and seasons affects comparisons. More data is needed before a final judgement on overall performance can be made.

Biofuel trials

Other initiatives from Spliethoff have seen the trial use of biofuels. The first trial took place between June and November last year on BigLift Shipping's BigLift Baffin, which was supplied with a blend of 50 percent fatty acid methyl esters (FAME)– a biofuel made from waste streams – and 50 percent conventional heavy fuel oil (HFO).

The objective of the trial was to test whether biofuel is suitable for use in combination with HFO, and to determine whether it can be stored in a bunker tank for a longer period before being used.

As the results of this trial were positive on both points, the next step was to test the use of 100 percent biofuel. This started in Amsterdam on December 13 when Spliethoff's multipurpose vessel Flevogracht was bunkered with 100 percent FAME-based biofuel.

G2 Ocean has also given a nod to biofuel trials. In December 2021, the company successfully completed its very first trial using biofuel to power its 46,500 dwt general cargo vessel Star Istind on a voyage from Europe to North America.

The company is also exploring other alternatives to fossil fuels for its vessels – together with 11 industry partners, the company is investigating the possibilities of using green ammonia to power open hatch vessels on transatlantic voyages. The project was initiated in January 2022 and is currently in its planning stages.

The study will analyse the technical, operational and commercial risks and benefits of dedicating a vessel to green ammonia fuel. The trade route used for the study has been pre-determined: the first leg is the approximately 4,700 nautical mile journey from Antwerp and Rotterdam in northern Europe to Houston and Mobile in the US Gulf; the second 4,810 nautical mile leg is from the US Gulf to ports in southeast Brazil; and the longest leg of all – and potentially the most challenging – is the 4,915 nautical mile voyage from Brazil back to northern Europe.

The final part of the voyage requires a capacity for up to 1,704 cu m of ammonia, based on an average speed of 15 knots.

SAL has three main strategic pillars for sustainability. The first is sustainability awareness: the acknowledgement that support from all stakeholders is necessary to improve sustainability and that collaboration is key – and a proactive approach to making that happen. A united approach is also helpful when working with governments and regulators to ensure legislation takes into account the practicalities of shipping.

The second pillar is responsible consumption: asking what more can be done in all aspects of operations.

For instance: "We've replaced traditional single use steel wire lashing (which takes a lot of energy to produce and has to be scrapped) with Dyneema technology – a composite string that is durable, multi-use, lighter and uses fewer natural resources," Hoffmann observed.

Plastic reduction

Other examples include reducing the use of plastic water bottles and asking suppliers to cut their use of plastic packaging.

"Our third pillar is the reduction of CO_2 emissions through measures like anti-fouling paint, biofuel, hydrogen generation and optimising our routeings and speed depending on weather conditions," he said.

"These measures are all based on our current fleet and technology – but in the relatively foreseeable future, we are aiming to move towards carbon-neutral ships. This is very high on our agenda. Whenever we order newbuild vessels, we try to push the boundaries in terms of carbon emissions."

Decarbonising shipping has been a topic of discussion for many years, and the ways in which it can be achieved have now come into view. Nobody is under-estimating the scale of the challenge and steps to reduce emissions in the short, medium and long term are being taken. Greater clarity on regulations internationally, as well as fuel availability, will be the next hurdles to overcome – both of which are needed to generate investor confidence.

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Euroports' electric mobile harbour crane from Liebherr at the port of Rostock.

A revolution on the quayside

The World Ports Sustainability Program has set out a roadmap towards a more sustainable future for ports by 2030. Some of them are already well on the way to meeting this target, writes *Sophie Barnes*.

The majority of developments in the port sector are, and will be, intrinsically linked to environmental policy and sustainability, whether becoming hubs for the renewable energy industry, deploying greener equipment, or creating surrounding energy clusters to serve as bases for the fuels of the future.

There are certainly many ways that ports can engage with sustainability. The World Ports Sustainability Program (WPSP) – set up by the International Association of Ports and Harbors in 2017 – is guided by the 17 UN Sustainable Development Goals that were laid out back in 2015 as a blueprint to achieve a more sustainable future by 2030. It aims to implement the goals through six themes – each of them covering a non-exhaustive list of potential topics: digitalisation; infrastructure; health, safety and security; environmental care; community building; and climate and energy.

Digitalisation initiatives involve port call optimisation, just-in-time arrival of ships and port management systems, to name a few, while the infrastructure theme focuses on addressing major physical and service challenges in ports. The latter includes sustainable port development projects; state-of-the-art facilities; optimising use of existing port capacity; handling increasing ship sizes; sustainable dredging projects and beneficial use of dredged material; and a focus on climate resilience in infrastructure development.

Environmental care

Under the environmental care theme, projects address the impact of port operations on air, water, soil, sediment and natural habitats. According to WPSP, potential topics include addressing air pollution, dust, noise and water pollution; protecting freshwater resources; addressing water consumption; waste collection; reuse and recycling initiatives; targeted marine litter initiatives; addressing soil and sediment contamination; protecting habitats and enhancing biodiversity.

The theme of climate and energy, meanwhile, focuses on projects that facilitate the energy transition in ports as part of efforts towards CO_2-neutral ports. This can be

projects that improve the energy efficiency of operations; establishing a circular economy or bio-based economy; deploying renewable energy; clean ship incentives; the deployment of alternative transport fuels; low and zero-carbon bunkering infrastructure; and general CO_2 reduction initiatives.

It is perhaps activities under these themes that garner the most attention from the supply chain.

Certainly, digital business transformation has been high on the agenda. Terminal operating systems, for instance, provide visibility of ships coming into and out of ports, enable them to manage operations and increase the efficiency of a port call, which will in turn address sustainability goals by reducing fuel consumption.

Thialf Heerema in Calandkanaal.

Kees Torn

Project benefits

While those systems lend themselves to container operations – repetitive processes that are easier to optimise compared with the more complex and unique heavy lift operations – there are benefits for project movements. For example, assigning the specialised personnel or the number or type of tugboats.

Back in February, Euroports stated that it would implement the Navis Master Terminal operating system across its bulk and breakbulk terminals. The agreement includes a three-phased plan for several terminals with a target to go live within three years. With a focus on Euroports' breakbulk facilities, the Navis terminal operating system will replace legacy systems, applying standardisation for greater consistency and efficiency across the company's network. With the system, Euroports said it will be able to manage breakbulk and bulk cargo, track operations and increase efficiency in administration and communication.

The electrification of equipment is also prevalent in ports' sustainability programmes. Electric cranes – such as the Konecranes Gottwald ESP.6 mobile harbour crane that was delivered to the UK's port of Blyth in May – are popping up at gateways, as are other hybrid solutions and units that are able to tap into shore power connections.

Shore power is also one way that ports are able to contribute to the decarbonisation of the broader shipping industry. The port of Valencia, Spain, will install two electrical substations, each with a capacity of 90 MW, that will enable auxiliary engines of ships to be connected to electricity while they are berthed in the port area.

The president of the Port Authority of Valencia, Aurelio Martínez, said: "The substations are the essential piece to be able to electrify the port, an initiative which is part of our real commitment to be a sustainable port in 2030. These two substations are necessary because we want to provide the port with connection points so that all the ships can connect to the grid when they dock at the site."

And, as fuel types for ships evolve so too will the ports that serve as bunkering hubs. This was highlighted by the port of Rotterdam recently when it confirmed its plans to accelerate the reduction of its carbon emissions.

The port authority said that its own carbon emissions should be 75 percent lower in 2025 and 90 percent lower in 2030 than in 2019. Eventually, it wants its operations to be entirely emission-free. "We are going to reduce our own carbon emissions as quickly as possible, while compensating in full what we still emit. From that perspective, the port authority is already carbon neutral as we speak. Because our emissions will be lower and lower in the next few years, the compensation required will also decrease more and more," said Allard Castelein, ceo of the Port of Rotterdam Authority.

We are going to reduce our own carbon emissions as quickly as possible, while compensating in full what we still emit. From that perspective, the port authority is already carbon neutral.

– Allard Castelein, Port of Rotterdam Authority

Offshore emissions

In addition to ensuring its vessels switch to biofuel in the short term and reduce its employees' air travel, the port said that shipping in the port management area – which reaches as far as 60 km off the coast – emissions should be reduced by 20 percent in 2030. To make this happen, developments include improving the efficiency of operations by optimising logistics processes; establishing shore power so that berthed ships can switch off their generators and plug in; and bunkering clean fuels such as LNG, biofuels and methanol.

Of course, another way that ports are engaged in sustainability has been and will continue to be their role in renewable energy projects. The importance of ports in that sense can be best seen in the offshore wind energy sector, where in the USA the development of wind energy ports is imperative for the sector's progress. For floating wind too, ports will need to provide adequate infrastructure to accelerate the commercialisation of these projects.

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For more information on port limitations with regard to the offshore wind energy sector – both bottom-fixed and floating – see our offshore renewables report on page 32 of the main issue.

Gearing up for a greener future

For equipment operators, fuel usage is the most significant aspect of their carbon footprint. Creating a sustainable fleet of equipment is high on the agenda.

According to Sweden-based manufacturer Volvo Trucks, national and international buyers are showing strong interest in electric vehicles. 2021 marked the launch of three new heavy-duty all-electric models. The Volvo FH, FM and FMX Electric models have a range of up to 300 km, battery capacity up to 540 kWh and a gross combination weight (GCW) up to 44 tons (39.9 tonnes).

Production of the models started in the second half of 2022 for the European market. They join the Volvo FL Electric and Volvo FE Electric which have been in production since 2019.

Mercedes-Benz Trucks aims to complete the switch of its European product portfolio to electrically powered by 2039. One of its first steps is the introduction of the battery-electric eActros for heavy-duty short-radius distribution. The eActros is equipped with either three or four battery packs, each with an energy capacity of around 105 kWh. The maximum battery capacity of 420 kWh2 enables ranges of up to 400 km.

Mercedes-Benz Trucks is also developing 40-tonne battery-electric eActros LongHaul. Scheduled to go into production in 2024, the model will have a 500 km range.

A completely new generation of trucks with a drive system based on fuel cells and hydrogen is on its way in the form of the GenH2 Truck. Hauliers should be able to use the vehicle for flexible and demanding trips of up to 1,000 km and more without the need to stop and refill, said Mercedes.

"Performance is comparable to that of a conventional diesel truck thanks to the use of liquid hydrogen, which has a far greater energy density than hydrogen in gaseous form," the company added. Customer trials are scheduled for 2023 and from 2027 the first series produced GenH2 Trucks will be handed over to customers.

Germany-headquartered MAN Truck & Bus, which has already made inroads into the electric distribution truck and city bus markets, is researching the use of hydrogen (H2) as an alternative fuel for long-distance transport.

MAN is building prototypes and will test both the use of a fuel cell and hydrogen combustion engine, which emits just water vapour. Their range of approximately 800 km is large enough for long-distance truck transports with high payloads.

The hydrogen combustion engine however, MAN added, offers a more readily available and robust solution thanks to the well-known basic technology and could thus serve as a bridging technology.

"Hydrogen can be an interesting solution here, but then infrastructure needs to be significantly expanded. We are happy to make our contribution by developing the right vehicles," said Frederik Zohm executive board member for research and development at MAN.

Scania rolled out its first fully electric model in 2020, the Scania E-Truck, designed for urban operations with a range of up to 250 km, along with a hybrid model. The manufacturer is spending USD115.6 million on a battery assembly plant in Södertälje, Sweden. The plant, which will be built adjacent to the chassis assembly plant in Södertälje, will assemble battery modules and packs tailored to Scania vehicles

It will be some time before all-electric vehicles achieve widespread adoption. Uptake will be slow in areas lacking appropriate power generation capacity and grid infrastructure. In a bid to tackle the shortfall in Europe, Mercedes, Volvo Trucks, and Traton established a joint venture to develop and operate a high-performance network. Still, for heavy project moves, the reliable diesel engine will be hard to overthrow but there have been recent examples of new fuel adoption as the technology becomes viable.

Ainscough Crane Hire went carbon neutral in April 2022.

In April of this year, the UK's Ainscough Crane Hire said that it had become the first company of its kind to become a carbon-neutral business.

Carbon-neutral milestone

This milestone, according to Ainscough, has been achieved through the move to hydrogenated vegetable oil (HVO) fuel for its 400-plus cranes and 30-plus transport and heavy goods vehicles (HGVs), as well as wider environmental initiatives across the business, such as increased use of stage V engines in the fleet, encouraging sustainable life choices among staff, smart lighting, upgrades to heating systems and UK-based residual carbon offsetting.

One of the benefits of HVO is that it can be used as a direct replacement for diesel, meaning Ainscough did not need to modify its fleet. It also has a storage life of over 10 times that of traditional diesel.

For Ainscough ceo Peter Gibbs, however,

> **We will continue to invest in innovation and support new technology that enables us to continue to deliver safe and efficient lifting solutions**
>
> – Peter Gibbs, Ainscough

there is still more work to be done. "We will continue to invest in innovation and support new technology that enables us to continue to deliver safe and efficient lifting solutions while simultaneously doing our bit to protect the planet for future generations, helping to create a sustainable future for all."

In terms of lifting equipment, Liebherr has been working on its electric product ranges. Back in December 2020, the manufacturer unveiled its first battery powered crawler cranes – the 200-tonne capacity LR 1200.1 unplugged and the 250-tonne capacity LR 1250.1 unplugged.

It added the LR 1130.1 unplugged and LR 1160.1 unplugged during June. It said the electro-hydraulic drive of the new cranes has the same performance specifications as the conventional version. The battery is charged using a conventional jobsite electric supply; operations can continue as normal while charging.

Liebherr has been offering a hybrid drive concept consisting of a diesel engine and an electric motor for its maritime mobile harbour cranes for over 20 years. The diesel engine is used exclusively for moving the crane along the quayside. As soon as the crane has reached the desired position, the machine is connected to the local power grid by cable. The actual handling of goods is thus possible without emissions.

In the 2021 sales year, Liebherr reported increased demand for these types of mobile harbour cranes – compared with 2019, the number of units equipped with an electric motor doubled. It added that more than a third of all Liebherr mobile harbour cranes on order at that time have an e-drive installed.

Sarens has made inroads with the electric SGC-90 ring crane, which was deployed for its maiden project – the replacement of two large columns as part of the turnaround of Valero's refinery in Pembroke, UK.

The crane, named the Little Celeste, was developed in response to market demand for heavy lift cranes with capacities greater than 80,000 tonne/metres. It has a ring diameter of 35 m, a maximum counterweight of 2,700 tonnes and maximum load moment of 99,000 tonnes. It can be configured in a variety of ways, with main boom lengths of 100 m, 120 m or 130 m, and a small jib of 200 tonnes.

While all Sarens' other SGCs are hydraulic, the SGC-90 can be connected to the electric grid and be fully powered without a traditional fuel source. Little Celeste can also recover and reuse the electricity it generates each time it lowers a load. When connected to the national grid, it recovers all produced energy and feeds it back, reducing energy consumption by up to 40 percent, it claims.

Crane manufacturer Tadano, meanwhile, outlined its sustainability goals last year. It said it will reduce CO_2 emissions from its business activities worldwide by 25 percent, and by its products by 35 percent.

The company added solutions such as its E-Pack, as well as hydro-treated vegetable oil (HVO) compatible engines.emissions.

The E-Pack, an electro-hydraulic unit, features an integrated 32 kW electric motor that enables Tadano AC 3.045-1 City and AC 4.080-1 cranes to work with zero emissions. It will be rolled out to other models in future.

A large number of Tadano cranes are able to run on alternative diesel fuels already. For the European market, this means that all Tadano HK superstructure engines, all CC lattice boom crawler cranes, the GTC 1800EX telescopic boom crawler crane, and nearly every all-terrain crane can be operated with paraffinic and synthetically produced diesel fuels in conformity with DIN 15940, without any modifications. This includes reduced-emission fuels such as HVO, gas-to-liquid and biomass-to-liquid fuels.

The manufacturer will also commercialise its first electric rough-terrain crane in 2023. Currently in development, the crane will be able to drive to the jobsite and complete all lifting operations using battery/electric power, rather than diesel, to deliver zero-emissions operation.

SPMT innovation

In terms of transport equipment, Mammoet has partnered with manufacturer Scheuerle, part of the TII Group, to transition its SPMT fleet from diesel to renewable energy.

The sheer force required for SPMTs to deliver in moving heavy items has presented significant barriers to finding an equivalent solution to diesel, said Mammoet. That barrier has now been overcome with the electric power pack unit (ePPU), which was recently used with four axle lines of SPMTs to replace a production vessel at a chemical plant in the Netherlands.

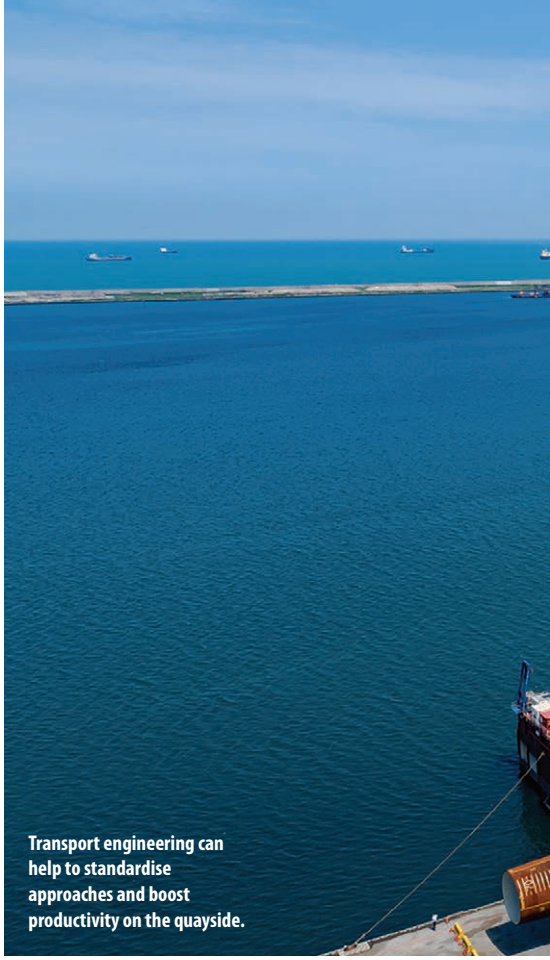
"The ePPU is a really important step in how we support our customers with decarbonising projects," said Ludo Mous, operations director at Mammoet Europe. "But in this case, the benefits were not limited only to a lower carbon footprint. With work taking place in a highly confined area, we would have been highly conscious of the emissions generated by a typical diesel PPU and would need to carefully manage operatives' exposure to it. By using an electric model, we removed this issue completely, while also creating a much quieter working environment."

More needs to be done to ensure electric power is sufficient for use in larger scale SPMT projects, but the technology is now proven and ready to be rolled out across a broader range of work.

HLPFI

Storm force changes ahead in wind market

***David Kershaw* spoke with Francisco Rodrigues, global sector lead – offshore wind, and Gavin Kerr, global cranes director, of Mammoet on various facets of the transition. Innovation will be critical in meeting ambitious targets.**



Transport engineering can help to standardise approaches and boost productivity on the quayside.

The installation targets set out for the offshore wind energy sector are gargantuan. But are they realistic? "If you look back at the overall number and what has been achieved so far – and, typically, we take numbers excluding China for easier comparison – I think they are ambitious," said Francisco Rodrigues. "You are talking about doubling or tripling installed capacity per year versus what has been done so far. That seems like quite a jump, especially because you are bringing offshore wind to new areas that are maybe not as developed in terms of supply chain or industry overall."

He noted that in terms of big ticket investments, such as jack-up rigs, there seems to be a new commitment every month. But other critical areas of the supply chain find themselves lagging behind. "I think we are bit behind in terms of port infrastructure overall and investing in ports to support the industry," said Rodrigues, adding that installation targets might be achieved a few years later than planned.

Gavin Kerr cited Ireland as an example of where port infrastructure may hinder installation goals offshore. "Ireland right now has wonderful ambitions. What they do not have is port facilities, except for maybe Belfast, which can realistically be used for marshalling. It means that they are reliant on European ports to support at least the first wave of projects in Ireland. Those ports are already more or less close to capacity serving the existing North Sea projects."

This issue can be seen internationally. Kerr added: "We have an infrastructure developed in Europe where offshore wind is a bit more mature than in other markets – APAC being next, and the USA is emerging. But all these emerging markets do not have suitable infrastructure, and that also goes for the grid connections, and that is before we even talk about cranes, barges, jack-up vessels. Right now, I think that in general the supply chain is pretty aligned in saying no, we do not have enough physical assets to keep up with the demand."

One promising point, however, is human capital. Kerr believes the issues with recruiting and retaining suitable qualified staff may be somewhat less acute than in other areas of the business, with oil and gas sector staff transitioning with their companies to the renewables field. Furthermore, "I think we have got a huge pool of highly trained and capable technicians on the onshore wind side of the business with transferable skills into the offshore setting. So, I think labour, for a change, is actually less of an issue."

> **I do not think anyone has tested out the serial production of floaters and that is where I think we can look at maximising the output while minimising the utilisation of assets.**
>
> – Francisco Rodrigues, Mammoet

The offshore wind energy sector is already suffering from a lack of staging and marshalling capacity, while components are becoming larger and more complex. Transport engineering can help to standardise approaches and boost productivity on the quayside.

Production and repetition

Rodrigues said: "Wind is about production and repetition overall. So, when we talk about these projects, we talk about doing the same processes 100-200 times. So, it is really about going on the detail to try to maximise cycles, being as lean as possible on resources."

He said that while bottom-fixed turbine installation has become standardised, "when components get bigger you still find new ways to do things, helping the industry with new concepts on how to handle XXL monopiles, extra-large jackets and 15-16 MW turbines".

Floating wind remains in its nascent stages, with only a few prototype/pre-commercial projects in the water. This area is somewhere that Mammoet believes it can really assist clients. "I do not think anyone has tested out the serial production of floaters and that is where I think we can look at maximising the output while minimising the utilisation of assets," said Rodrigues.

"Typically, we look at such jobs with high demands on lifting or transport capacity and

we try to help the developers, fabricator and designers of the floater to industrialise their process a bit better and get to a target of one floater per week output – which is as fast as OEMs can build turbines. That is the trend that everyone wants to sell. That is what we are trying to do."

He added that Mammoet has been involved in a number of pre-commercial floating wind projects and is in talks with clients about the upcoming fourth round allocation in the UK, as well as a few other projects in France. "We want to help our customers with mutualised assets for multiple activities... reduce mobilisation of multiple assets, and also reduce CO_2 emissions – because everything you move is putting out emissions."

Continuing on the issue of ports, Kerr said: "It is not just about expanding existing port facilities but creating new capacity in the emerging markets.

"If we consider how we are we going to at least give ourselves the best chance possible to reach installation targets, you need to have all of the assets being as productive as possible. Any asset that is going from one continent to the next is not productive.

"For example, Mammoet has five 5,000-tonne ring cranes. We can provide global coverage through our global network so that we can always be as close as possible to the projects to maximise the uptime of the asset, which ultimately maximises the uptime of the project itself."

Other areas where Mammoet feels it has added value is in finding the balance between the onshore and offshore parts of the logistics process. "The offshore part is not something that we actively participate in, but we understand what creates value offshore. Then we look to the onshore part to see how we can streamline the supply chain for an optimum schedule that reduces the critical path," said Kerr.

"If clients take a very traditional procurement approach, where they start to split all of the contracts up, you will end up with a siloed procurement approach, and you are going to end up with a siloed solution where everybody tries to have the cheapest solution on all the individual contracts," Kerr explained, noting that this rarely creates the most efficient installation solution.

I think what is really interesting to imagine is a future for offshore wind where pretty much everything can be done, either onshore or close to shore.

– Gavin Kerr, Mammoet

He argued that better results are realised with an integrated approach. "You see a lot of overlap in the scopes, managing the interfaces and coming up with the optimum solution for the total project. That needs a lot of collaboration and a lot of cross-pollination between the contractors."

Floating wind prospects

Floating wind is becoming more important to the power mix, but Rodrigues feels it will not supplant traditional offshore wind installations in terms of installed capacity. "There are a number of countries and areas that can only use floating wind as their source of energy... but I do not think it will be the biggest by far." He added that, right now, it is difficult to scale up in terms of volume – it is still a young technology with issues surrounding bankability and insurance. "But I think everyone believes in the technology and the first time you see a 500 MW or 1 GW floating project, the LCOE will really go down and then it will be a serious contender." He believes there will be a greater likelihood of mixed parks featuring both floating and fixed-bottom installations, going forwards, which should help to de-risk the newer technology.

Kerr added: "I think what is really interesting to imagine is a future for offshore wind where pretty much everything can be done, either onshore or close to shore. Almost a production line of floating foundations coming up to an installation asset, and then you are just integrating the turbine before towing it offshore.

"What we are finding on Highwind Tampen is that each turbine is getting integrated in about one week. I would say that is quite productive relative to maybe what we expected a few years ago. I think that productivity improvement could be interesting for offshore wind, with much less handling and onshore operations taking a bigger chunk of the supply chain scope in comparison to fixed-bottom installations."

Kerr said the multifaceted energy transition is also spurring a skills and expertise shift. "The fundamentals around heavy lifting or managing heavy loads on water, it is broadly similar – for a 3,000-tonne substation, the skills you need to manage and to install are the same as with the 3,000-tonne floaters. So, I think in that sense a huge amount of knowledge already exists within the supply chain that can be

Clients are looking to their supply chain to reduce their carbon footprint.

that can be leveraged."

Referencing Mammoet's heavy cranes division specifically, Kerr broke down the company's mix of work. "In 2021, about 30 percent of the revenue associated with globally managed large cranes was coming from renewables. Within that asset portfolio this year, that will more than likely go above 50 percent. I do expect that for the higher asset classes, offshore wind can easily end up being more than 70 percent in five years' time.

"That is less to do with the transition from petrochemical investment toward renewable investment. It is more the changing investment landscape in petrochemicals. Developers are not turning to new construction and adding capacity in the exact same way that renewables are – they are adopting a more sustainable approach within their existing asset portfolio in terms of carbon capture and sustainable fuels like HVO, for example. This requires more brownfield construction, which requires high-capacity cranes but with smaller footprints.

"Some think that just because renewables are happening that the traditional segments are all of a sudden going to disappear – they are not. It is just that their strategies require different types of assets. But we definitely see a migration of the higher-end resources going towards offshore and the high-capacity, small base units going more toward the traditional segments – brownfield projects such as steel production and refining.

"This shift also helps with resource availability. The assets are not fighting with each other and it means you can continue to serve the markets in parallel."

Design leadership

Mammoet has recently launched its E-SPMTs, introduced HVO into some of its transport operations, launched the Focus30, and introduced the electric-powered SK6000 ringer.

"Our clients are looking to their supply chain to reduce their carbon footprint. I think we are at the forefront there in terms of design leadership to reduce GHG and lower our carbon footprint. It will eventually become a requirement in terms of contracting, but also even government policy. In the Netherlands, for example, for urban environments they are looking for these low-carbon emission solutions. So that will only get more important."

Kerr added: "One of the reasons that we are struggling as a supply chain to keep up with the level of demand is the fact that the demand landscape is changing so quickly."

He cited that 8 MW turbines were proposed for Highwind Tampen, but OEMs are already prototyping 15 MW turbines and are talking about 20 MW models in the future. Normally, when investing in assets, be it a land-based crane or an offshore vessel, you would look at a 30-year lifetime with some level of retrofitting at the mid-life point.

"If you invest in an asset that you typically look for a return on over three decades but becomes obsolete after five years, your investment proposal is over. Instead, you need to focus on designs that are modular, scalable and totally flexible. That is what we are aiming for with our SK series."

Kerr described the SK series of ring cranes as investments into a system, rather than just an asset. "An SK 190 can become a SK 350; it can become an SK 6000. It can add a jib.

"The SK system is modular and allows us to basically go up a size within a 12-month period. So as the market starts to grow in terms of turbine size, we can adapt much quicker. I think that is a way forward for everybody to follow – fixed assets and fixed designs are just not going to cut the mustard with offshore wind until we come to a point when turbines literally cannot get any bigger."

System innovation is another area of focus. "We are remotely accessing the 'black boxes' of our assets where you can get real-time information – how many hours was the engine running today and on what level of power? How many litres of fuel did we consume and what is that in terms of CO_2 output?

> **I think big data is a new topic for people in this industry – I think we have not scratched the surface in terms of what is possible.**
>
> – Gavin Kerr, Mammoet

"This is for internal and external reporting, giving our people and customers a real view of exactly what the supply chain is doing in terms of meeting or helping them to meet their own environmental targets.

"I think big data is a new topic for people in this industry – what is the future of big data within the heavy lifting and project forwarding environment. I think we have not scratched the surface in terms of what is possible."

Remote possibilities

Kerr also considered the development of remotely operated lifting equipment and referenced a test project Mammoet completed recently: a terminal crane located in the Netherlands was controlled by an operating engineer situated in Louisiana, USA.

"We had a supervisor onsite to monitor the lift, but it was operated from behind the laptop. So, you could imagine a future where you have five cranes based globally, where typically each crane, especially on the higher capacity, is maybe doing one lift per day – an operator would be starting off with a lift in Indonesia and then finishing with a lift in Sao Paulo at the end of the day – that future is absolutely tangible and realistic."

Kerr added: "Operators will not need to take multiple long-distance flights or be away from their families for extended periods. We have not even scratched the surface in terms of what is possible. It is not about trying to automate to replace operators, it is actually trying to keep up with the changing working cultures – people are less open to going away for eight weeks at a time, living in camps.

"The ways of working and the wants of the newer generations are completely different than what we had 10 years ago. Automation capabilities are not to replace people, but to facilitate the new generation's preferences in terms of their working needs."

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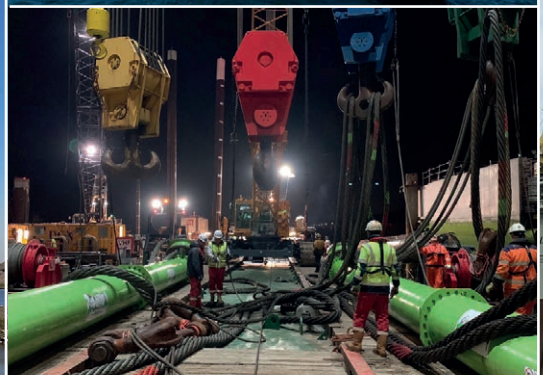
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