

The Journal

OF PORTS AND TERMINALS

Edition 158
2026

Ports as Powerhouses





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Margherita Bruno,
Managing Editor

Foreword

Welcome to our first journal of 2026! This edition opens at a time when the role of ports is being fundamentally redefined. Once measured primarily by throughput and turnaround times, terminals are now being judged on a much broader set of criteria: carbon intensity, energy resilience, digital maturity, and their ability to act as enablers of cleaner, more reliable supply chains. The question facing port operators today is no longer whether change is required, but how quickly and how credibly it can be delivered.

Across global trade, expectations have shifted. Regulators, customers and communities alike are demanding progress on decarbonisation, while operational performance must remain robust in the face of geopolitical volatility, climate disruption and persistent pressure on margins. Ports sit at the centre of this tension. They are among the most energy-intensive nodes in the supply chain, yet they are also uniquely positioned to become catalysts for system-wide transformation.

This edition brings together perspectives from leading terminal operators and port ecosystem stakeholders who are actively navigating this transition. What emerges is not a single blueprint, but a shared recognition that sustainability, efficiency and competitiveness are no longer competing priorities. Instead, they are increasingly interdependent.

Several contributions illustrate how electrification has moved from pilot phase to core operational strategy. Replacing diesel equipment with electric alternatives is no longer framed as a long-term aspiration, but as a practical and immediate lever for emissions reduction. Examples from DP World and Hutchison Ports demonstrate how electrified cranes, terminal trucks and automated yard systems can deliver measurable carbon

reductions while simultaneously improving reliability and capacity utilisation.

Electrification, however, is only part of the picture. As several authors note, shifting emissions from diesel to electricity raises a critical second question: where that power comes from, and how resilient it is. Contributions from PSA International explore how renewable integration, energy storage and long-term power partnerships are becoming central to port competitiveness, not just environmental performance. Energy security, once largely taken for granted, is now a strategic concern – particularly as terminals scale automation and electrified fleets that depend on uninterrupted power.

Alongside energy, digitalisation runs as a unifying thread throughout this edition. Ports are no longer simply physical interfaces between sea and land; they are increasingly data platforms, coordinating flows of cargo, equipment, vehicles and information in real time. Our contributors emphasise that digital tools are not valuable in isolation, but in how they connect systems, reduce idle time and support better decision-making under pressure. The shift is subtle but important: from digitising individual processes to designing integrated, end-to-end operating models.

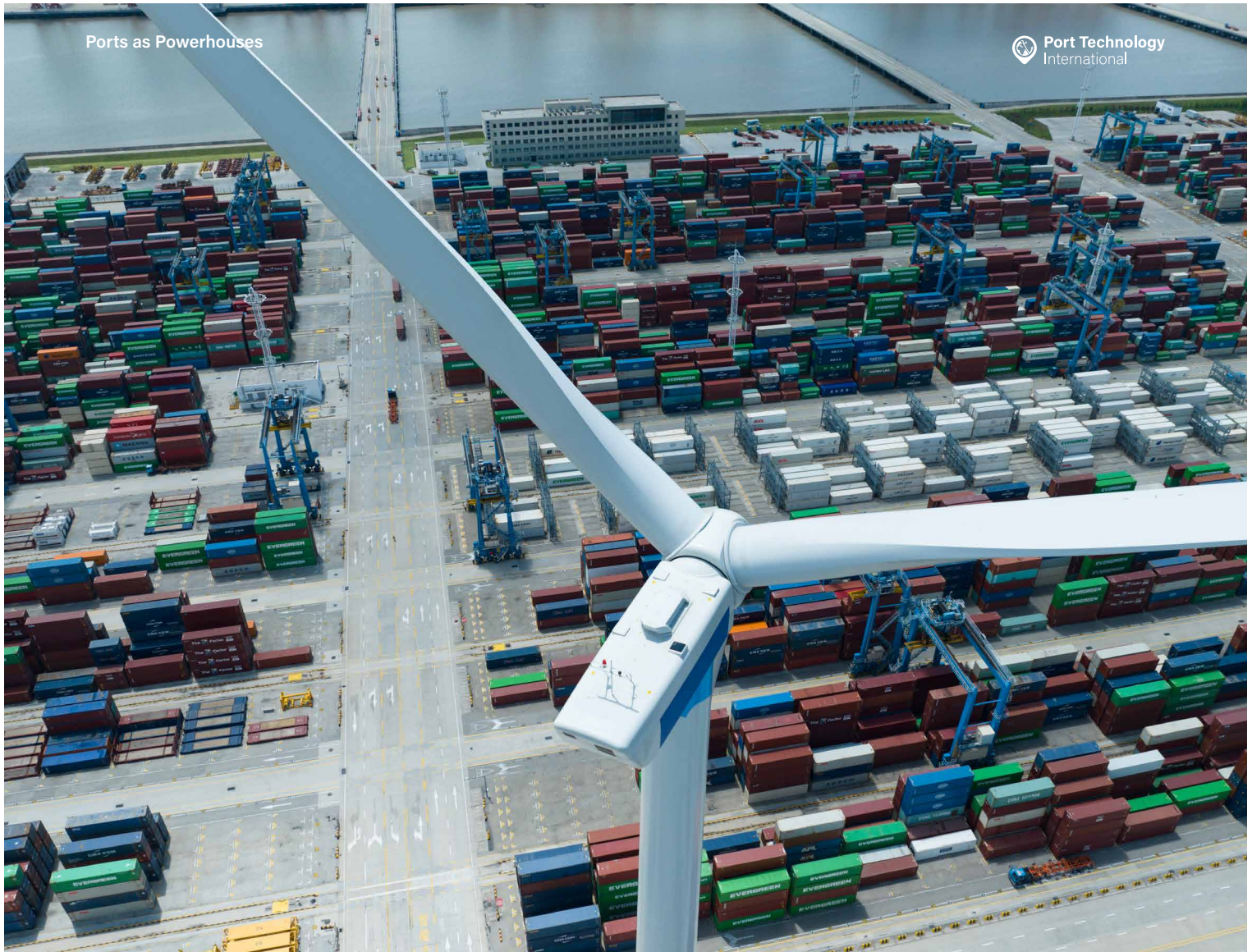
This theme is particularly evident in discussions around port community systems and data sharing. The contribution from the International Port Community Systems Association highlights how digital collaboration can unlock emissions reductions well beyond the terminal gate, supporting regulatory compliance, transparency and more sustainable cargo flows across entire corridors. As reporting requirements multiply and standards evolve, the ability to share trusted, standardised data is fast becoming a prerequisite for participation in global trade.

The human dimension of this transition is also clearly visible. Technology alone does not deliver resilience. Operators such as Peel Ports Group underline the importance of workforce adaptation, governance and careful programme coordination. Automation and digital systems introduce new risks as well as opportunities, particularly in complex, legacy environments. Successful transformation depends as much on people, skills and organisational alignment as it does on hardware or software.

Taken together, the articles in this journal point to a common conclusion: ports are moving beyond their traditional role as passive infrastructure providers. They are becoming active orchestrators of energy, data and logistics – what this edition terms “powerhouses” in the truest sense. Power, in this context, is not only electrical capacity, but influence: the ability to shape cleaner trade routes, support vessel decarbonisation, and enable more resilient supply chains at scale.

There is no suggestion that this journey is simple. The challenges are substantial, and the pace of change is uneven across regions. Yet the examples shared here demonstrate that progress is already underway, driven by long-term investment, pragmatic innovation and a growing willingness to rethink how ports are designed, powered and operated.

As a new year begins, this edition reflects a sector increasingly aware of its expanding role beyond simply moving cargo. Across these pages, ports emerge as places where energy, data and operational decision-making increasingly converge. Progress is less about dramatic leaps than about consistency, coordination and follow-through. The direction is clear; the real test will be how effectively that potential is translated into day-to-day operations.



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@ info@porttechnology.org
W www.porttechnology.org
in www.linkedin.com/porttechnology



Clean, Fast and Scalable: Rethinking Ports in the Climate Age



Rashid Abdulla, CEO and Managing
Director, DP World Europe

Europe's need to decarbonise has never been more pressing. In the wake of COP30, one message stands out: every sector must cut emissions – and quickly.

For the supply chain industry, the question is no longer whether ports should decarbonise, but how they can accelerate the transition and support the sustainable movement of goods across regions. Environmental progress, operational efficiency and competitiveness must advance in tandem.

Decarbonisation With Purpose

Our customers and stakeholders are increasingly demanding action on sustainable operations. Across Europe, our experience shows that sustainability and operational performance can reinforce one another.

At DP World's Antwerp Gateway terminal, for example, CO₂ emissions per container move have been reduced by more than 50 per cent since 2013, while terminal capacity

has increased through automation and smart yard design. To build on this, the final four of 27 automated stacking crane modules will come online in 2026, further increasing storage capacity. In 2028, the latest version of our terminal operating system, Zodiac, will be introduced to improve visibility and planning.

DP World's latest £200 million investment brings BoxBay high-bay storage technology to London Gateway, taking this transformation even further. BoxBay will cut

“The question is no longer whether ports should decarbonise, but how they can accelerate the transition.”

energy intensity while improving efficiency by stacking containers vertically in an automated, renewably powered system. It is the first full-scale operation of its kind in the world and a tangible example of how innovation can deliver both sustainability and competitiveness for UK trade.

Our memorandum of association with Last Energy, announced in September 2025, aims to bring Europe's first micro nuclear reactor into our port operations, providing secure, carbon-free energy for our business.

These transitions are less about compromise and more about rethinking how terminals are powered, operated and connected. Decarbonisation offers an opportunity to modernise, improve service reliability and unlock smarter ways of working. It must be done with intent, backed by long-term investment, and with the conviction that ports can be drivers of cleaner trade.

Smart Systems, Real Impact

Digitalisation has become a central enabler in this transition. Over the past decade, we have seen how digital tools can simultaneously improve energy performance and operational resilience. The concept of a 'smart port' is no longer theoretical; it is a daily reality in ports across Europe and beyond.

From terminal operating systems to automated equipment, real-time visibility and predictive maintenance, these tools help optimise cargo handling, berth planning and energy use. In turn, they reduce congestion, avoid idle time, improve planning and support lower emissions across every movement in and out of the port.

These tools are not only useful during disruption; they are increasingly essential in preparing for it. During recent network disruptions across Northern

Europe, Antwerp Gateway's digital truck appointment system and real-time yard planning tools helped maintain flow and avoid bottlenecks.

As supply chains face growing pressure from geopolitical uncertainty, climate volatility and rising customer expectations, ports that invest in digital infrastructure will be better placed to adapt and absorb such shocks.

The Power of a Connected, Low-Carbon Network

The benefits of these technologies become more powerful when connected across Europe's logistics network – from inland terminals to coastal gateways. When ports act in isolation, the impact is limited. When digital tools and low-emissions infrastructure are scaled regionally, the effect is exponential: cleaner transport corridors, faster



cargo movement and more predictable logistics for importers and exporters.

At DP World's expanding operations in Constanta, Romania, digital coordination tools, integrated customs scanning and multimodal infrastructure are helping to decarbonise inland trade flows. The terminal now includes a new RoRo hub and a five-hectare project cargo terminal, both linked to rail and barge corridors. This reduces reliance on roads and provides faster, lower-emission routes into Central and Eastern Europe.

These improvements demonstrate what a port can achieve with the right investment, strategy and customer focus. But to realise their full potential, such approaches must be replicated at scale – across other hubs, corridors and terminals across the continent.

A Path for Ports to Lead

For ports to genuinely support decarbonisation, they must adopt electrification, renewable energy and digital tools as core infrastructure, rather than optional enhancements. Across the supply chain industry, we have seen that these elements offer more than operational upgrades: they enable emissions reductions without compromising capacity or competitiveness. We and others are demonstrating that it can be done; what remains is a question of pace and scale.

COP30 made the direction of travel clear. What happens next depends on how policy and industry align. Europe's ports are already proving what is possible, but scale and coordination will determine whether progress remains local or becomes systemic.

About the author

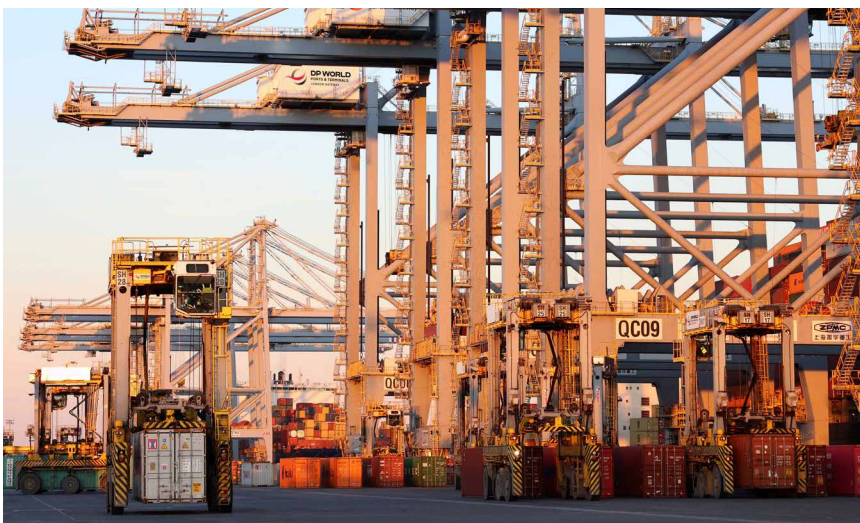
Rashid Abdulla is CEO and MD of DP World Europe, where he oversees a pan-European network spanning ports and terminals, contract logistics and freight services. He previously led the Asia Pacific region and served as SVP Global Operations at DP World's Head Office.

About the company

DP World is reshaping the future of global trade to improve lives everywhere. Operating across six continents with a team of over 125,000 employees, we combine global infrastructure and local expertise to deliver seamless supply chain solutions. From Ports and Terminals to Marine Services, Logistics and Technology, we leverage innovation to create better ways to trade, minimising disruptions from the factory floor to the customer's door.

In Europe, DP World employs more than 25,000 people in over 250 locations spanning 30 countries. They offer customers access to 10 deep-sea terminals, 14 inland terminals, 150 warehouses and 90 locations connected through a feeder and shortsea network.

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- **Drive** the future of intermodal logistics through collaboration.



From Diesel to Digital: Hutchison Ports' Sustainability Transformation




Joe Ho, Director - Safety, Security & Environment, Hutchison Ports

As a world-class global port group, at Hutchison Ports every container move represents an opportunity to drive positive change. Each lift from a berthed vessel is not merely a logistical step, but a step towards accelerating climate resilience. Hutchison Ports (the Group) is embracing a sustainability transformation. Across our 53 ports in 24 countries, we are scaling up electrification, pioneering battery swapping for terminal trucks, expanding renewable energy use, and deploying

onshore power – anchored by science-based targets and measurable outcomes.

At Hutchison Ports, our sustainability mandate is structured around three pillars: *Our Environment, Our People and Our Business. Decarbonisation sits at the heart of Our Environment.*

Steering the Transition

At Hutchison Ports, the Group Sustainability Committee (GSC) steers

the transition and integrates material sustainability topics across our operations. Co-chaired by two Divisional Managing Directors and comprising senior leaders from diverse geographies and functions, the GSC plays a central role in formulating, guiding and implementing the Group's sustainability directives, strategies and initiatives. This collaborative leadership ensures a unified direction and drives meaningful progress towards our sustainability goals.

“Electrification delivers the largest direct emissions reductions, and digitalisation amplifies their impact.”



In 2024, Hutchison Ports invested over \$150 million in sustainability initiatives, including equipment electrification – a 33.8 per cent increase compared with 2023. Examples from across the Group illustrate this progress.

Anchoring Ambition: Our Net-Zero Vision

Recognising the transformative potential of electrification and innovative technologies, Hutchison Ports has pursued equipment electrification since 2005 to enable a cleaner environment and a more efficient future. This long-standing vision underscores our commitment to innovation and positions Hutchison Ports at the forefront of sustainable port development.

In 2023, we formalised a group-wide commitment to set near-term and net-zero targets aligned with the Science Based Targets initiative (SBTi) Corporate Net-Zero Standard. Hutchison Ports became the first global port operator to receive official SBTi validation for both its near-term greenhouse gas (GHG) emissions reduction target and its 2050 net-zero goal. This milestone underscores our proactive, science-driven response to global climate challenges and reinforces our commitment to a low-carbon future, setting a tangible example for the port industry.

Across the network, business units (BUs) have begun executing decarbonisation plans, reducing group carbon intensity and expanding green power procurement. Coupled with electrification, our

sustainability reporting highlights a strong year-on-year increase in solar generation and continued expansion of green electricity purchases – both critical to achieving the Group's ambitious reduction targets.

Electrification: The Frontline of Port Decarbonisation

Electrification remains the most immediate lever for reducing terminal emissions. Hutchison Ports is replacing diesel equipment with electric alternatives and modernising power infrastructure to support this transition under a clear Group directive. From 2024 onwards, all new purchases or replacements of mobile and terminal equipment must be fully electric, ensuring consistency and accountability across the network.

In the UK, Hutchison Ports UK has set an ambitious target of net-zero Scope 1 and Scope 2 emissions by 2035. The Port of Felixstowe has replaced rubber-tyred gantry cranes with electric cranes and now operates a yard crane fleet with more than 60 per cent of electrified units. The remaining diesel cranes are scheduled for phase-out by 2035. To support electrified horizontal transport, two 11 kV substations have been commissioned to power a growing fleet

of electric terminal trucks, alongside an automated battery swapping station.

In the Netherlands, Hutchison Ports ECT Rotterdam has set the ambition to operate zero-emission terminals by 2035. Infrastructure development is underway, with diesel and hybrid equipment being replaced by fully electric alternatives, including electric automated guided vehicles (eAGVs), electric straddle carriers and all-electric mobile equipment. By 2028, around 100 eAGVs are expected to be in operation.

In Thailand, Hutchison Ports Laem Chabang Terminal D has deployed remote-controlled electric quay cranes and electric rubber-tyred gantry cranes (eRTGCs), continuously expanding its electric fleet to handle multiple mega-vessels simultaneously. The latest deployment – among the largest in the country – improves operational efficiency while significantly reducing Scope 1 emissions.

Hutchison Ports Pakistan operates the country's first deep-water container terminal to deploy electric terminal trucks and eRTGCs. A major milestone has been the transition from an on-site diesel powerhouse to a direct national grid connection, leveraging Pakistan's increasingly clean energy mix. This shift improves reliability, reduces emissions and local air pollution, and lowers energy costs.



Through the transition from diesel-powered machinery to electric alternatives – including terminal tractors, reach-stackers, empty container handlers and heavy forklifts – Hutchison Ports is significantly reducing Scope 1 emissions while advancing long-term environmental objectives.

Innovating for Efficiency: Battery Swapping in Action

Charging downtime has long been a barrier to electrifying heavy port trucks. Hutchison Ports is addressing this challenge by introducing battery swapping stations (BSS), which replace depleted battery packs with fully charged unit in minutes, enabling continuous operations.

Hutchison Ports Abu Qir in Egypt is among the first business units to deploy a BSS. The fully automated system requires no human intervention and completes the process in just six minutes, compared with over 70 minutes using conventional charging.

At the Port of Felixstowe, the introduction of autonomous trucks (ATs) – Europe's first deployment of ATs in mixed traffic at a port – alongside a BSS and upgraded charging infrastructure, supports the port's programme to acquire 150 electric tractor units over two years and transition away from diesel-powered equipment.

In Shenzhen, Hutchison Ports YANTIAN launched the world's first on-dock chassis BSS for terminal trucks in 2025. The system reduces charging time to approximately five minutes, supports more than 100 electric trucks per day, and is expected to cut carbon emissions by over 5,000 tonnes annually. Energy costs are also reduced by around 20 per cent,

supported by a cloud-based platform for fleet and energy management.

Renewable Energy: Powering Our Electric Future

As electrification shifts emissions from Scope 1 (diesel) to Scope 2 (electricity), the carbon intensity of electricity becomes increasingly critical. Hutchison Ports procures certified green power and invests in on-site generation to ensure electrification delivers genuine emissions reductions.

Terminals in Oman, Poland, Spain, Thailand, the Netherlands and the UK now procure electricity from renewable sources, with renewable electricity accounting for approximately 45 per cent of total electricity consumption as of October 2025.

At the Port of Felixstowe, all electricity is certified from solar, wind, or other renewable sources, effectively eliminating Scope 2

emissions from purchased electricity and supporting the rapid electrification of cranes and vehicle fleets. Rooftop solar also forms part of the energy mix, with approximately 2,000 panels installed.

In Spain, Hutchison Ports BEST in Barcelona sources 100 per cent renewable electricity – primarily solar and wind – from a certified provider, reinforcing the emissions reductions achieved through electrification.

Across Australia, Mexico, Myanmar, Pakistan, Panama, Spain, the Netherlands and the UAE, solar installations support terminal lighting and administrative facilities. Group-wide solar generation increased by 136 per cent year-on-year in 2024, while green electricity contracts continue to expand – central to achieving the Group's 54.6 per cent Scope 1 and Scope 2 emissions reduction target by 2033, compared with a 2021 baseline.





Onshore Power Supply: Reducing Vessel Emissions

Hutchison Ports recognises that maritime decarbonisation is a shared challenge. In addition to reducing our own emissions, we support shipping partners through solutions such as onshore power supply (OPS) or cold ironing, which allows vessels to switch off auxiliary engines while berthed.

In Barcelona, Hutchison Ports BEST became the first container terminal in the Mediterranean to operate a full OPS system in 2024, supplying vessels with up to 8 MW of 100 per cent renewable electricity. The pilot phase targets annual CO₂ reductions of around 2,500 tonnes, with further expansion planned under the Port of Barcelona's Nexigen electrification programme.

In the Netherlands, Hutchison Ports ECT Rotterdam, together with Rotterdam Shore

Power, aims to provide OPS to more than 90 per cent of visiting vessels by 2028. As one of the largest projects of its kind in Europe, over five kilometres of quay will be equipped with shore power facilities. When fully operational, the project will supply over 5,000 vessels annually, reducing CO₂ emissions by approximately 35,000 tonnes. A power capacity of 60MVA will be installed for the purpose, with 100 per cent of the energy supplied from certified green sources, both at ECT Delta and ECT Euromax.

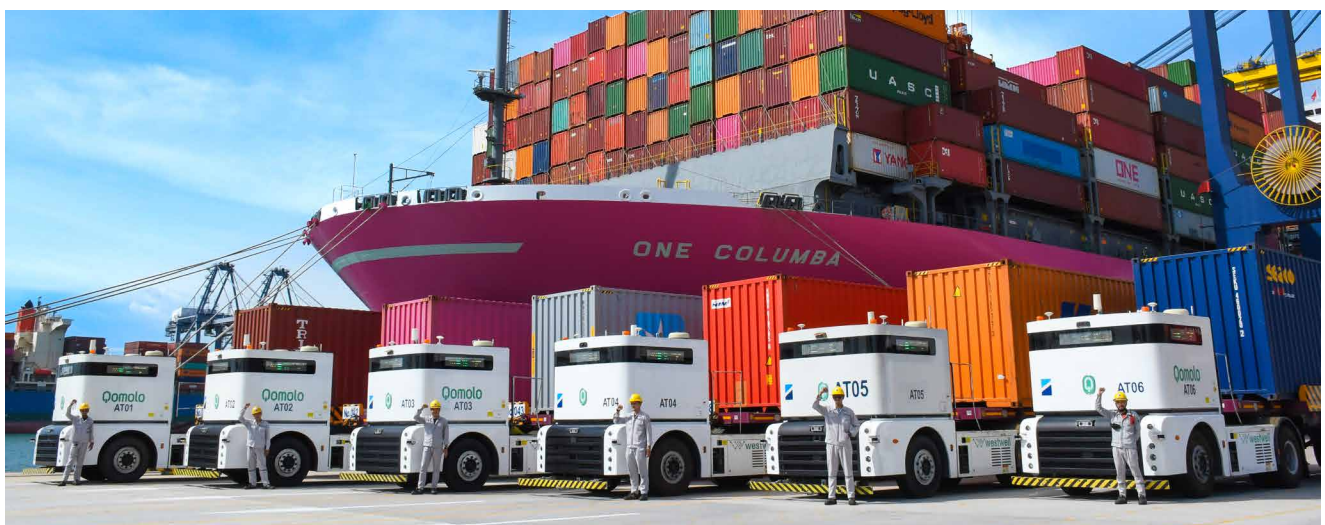
In China, Hutchison Ports YANTIAN continues to lead in OPS deployment. In 2024, the terminal recorded an 83 per cent increase in vessels connected to OPS and a 101 per cent increase in electricity supplied, avoiding approximately 19,322 tonnes of CO₂ – equivalent to planting over one million trees. YANTIAN's monthly OPS usage continues to set new records,

supported by its six sets of smart OPS systems that cover 95 per cent of its berths.

Automation and Intelligence: Optimising Port Operations

While electrification delivers the largest direct emissions reductions, digitalisation amplifies their impact. From remote-controlled cranes and autonomous trucks to AI-enabled yard surveillance systems, Hutchison Ports is digitising operations to enhance safety, efficiency and fleet utilisation.

Hutchison Ports Thailand exemplifies this approach, becoming the first terminal in the network to fully deploy autonomous trucks operating in mixed traffic alongside manual vehicles. Supported by advanced 5G connectivity, these systems integrate seamlessly with terminal operating



systems, enabling real-time coordination and dynamic route optimisation.

Tracking Progress: Measuring Decarbonisation Impact

A Group-wide sustainability dashboard tracks performance across operations, providing visibility against decarbonisation targets while maintaining operational continuity.

By the end of 2024, group-wide emissions were approximately 17 per cent below the 2021 baseline, with continued reductions in CO₂ intensity and diesel consumption per TEU as electrification and renewable energy use expand.

What's Next: Scaling, Standardising and Sharing

The next phase of Hutchison Ports' sustainability journey focuses on scale and standardisation. Electrification of cranes, tractors and yard equipment will continue, supported by substation upgrades, smart charging and battery swapping. Automation, digitisation and safety protocols are being standardised, with a strong emphasis on people's health and safety.

Renewable energy procurement and on-site solar generation will continue to grow, ensuring electrification delivers net reductions in carbon intensity. Collaboration with suppliers and partners will also play a key role in reducing Scope 3 emissions.

From Directives to Implementation

The GSC is supported by the Group Safety, Security & Environment (SSE) team, which drives implementation, monitors progress and supports BUs in delivering the climate transition plan. At the site level, each BU Head acts as a sustainability leader, supported by an Environmental Focal Point responsible for compliance, permitting and local reporting.

Workshops covering safety risk assessment, electric equipment maintenance and charging safety ensure sustainability strategies translate into effective on-the-ground action.

Together, We Can Make It Happen

Decarbonising ports is complex, but Hutchison Ports has demonstrated that progress is both achievable and already underway. Through ambitious targets, technological innovation and strong partnerships, we are turning net-zero ambitions into reality.

By electrifying assets, swapping batteries in minutes, procuring renewable electricity, supplying shore power and digitising operations, Hutchison Ports is delivering tangible emissions reductions while supporting the communities we serve. Collaboration remains central to this journey – driving sustainable change across the industry and beyond.

About the author

Joe Ho is the Director - Safety, Security & Environment of Hutchison Ports. Joe joined Hutchison Ports in 1995 and has held various head of engineering roles in ports in Hong Kong, Shenzhen, and Shanghai. In 2019, he was appointed to the current position, leading the global sustainability strategy and initiatives. He is a UK Chartered Engineer, a Hong Kong Registered Professional Engineer, and a Competent Person under the Gas Safety Ordinance in Hong Kong.

About the company

Hutchison Ports is the ports and related services division of CK Hutchison Holdings Limited. Hutchison Ports is the world's leading port investor, developer and operator with a network of port operations in 53 ports spanning 24 countries throughout Asia, the Middle East, Africa, Europe, the Americas and Australasia. Over the years, Hutchison Ports has expanded into other logistics and transportation-related businesses, including cruise ship terminals, distribution centres, rail services and ship repair facilities. In 2024, Hutchison Ports handled a combined throughput of 87.5 million TEUs.

[Find out more](#)



Charting a Net-Zero Future for Global Port Operations: PSA Leading Sustainable Port Transformation



PSA International

As global trade continues to surge, ports stand at the crossroads of economic growth and environmental stewardship. Attention is turning to how leading port operators can champion carbon neutrality without compromising

commercial competitiveness – the same challenge that PSA International (PSA) faces. The journey to sustainable operations hinges not only on technology deployment but also on forging strategic partnerships to enable them.

Electrification: The Bedrock of Sustainable Terminals

PSA's global terminals are embracing equipment electrification, with a target of achieving 90 per cent electrification

“By aligning net-zero initiatives with operational excellence, PSA demonstrates that ports can be both supply chain partners and environmental leaders.”



or hybridisation of all cranes by 2030. In addition to cranes, prime movers, which contribute 30 per cent of PSA's Scope 1 emissions, are also being progressively electrified.

PSA has adopted a two-pronged approach to decarbonising its rubber-tired gantry (RTG) cranes. One approach is battery hybridisation, which uses battery technology to partially power crane operations. By drawing from stored electric energy, hybrid RTGs significantly reduce diesel consumption, enabling a lower-emission operating profile without compromising performance. The other approach is full electrification through busbar connections or cable reel systems, which draw stable and continuous grid power and eliminate diesel consumption during crane operations.

Electric prime movers, while efficient, require charging time that can lead to unproductive hours. To address this and maintain competitiveness, PSA has evaluated various charging strategies and scheduling systems to support productivity.

Electrification also brings infrastructure challenges. Civil and electrical infrastructure must be catered for, and converting yard blocks for electric cranes or installing charging stations can result in temporary operational downtime.

PSA also seeks to maximise opportunities for recovering regenerative energy. One such example is the recovery

of regenerative energy generated during the lowering of the quay crane spreaders – traditionally dissipated as heat – can now be recovered via regenerative energy converters that enable bi-directional energy flow. Although the recovered energy may be modest, such initiatives help reduce emissions and improve operational efficiency with minimal disruption and cost. These efforts reflect PSA's commitment to sustainable innovation and continuous improvement in terminal electrification.

Integrating Renewables: Clean Energy for Competitive Advantage

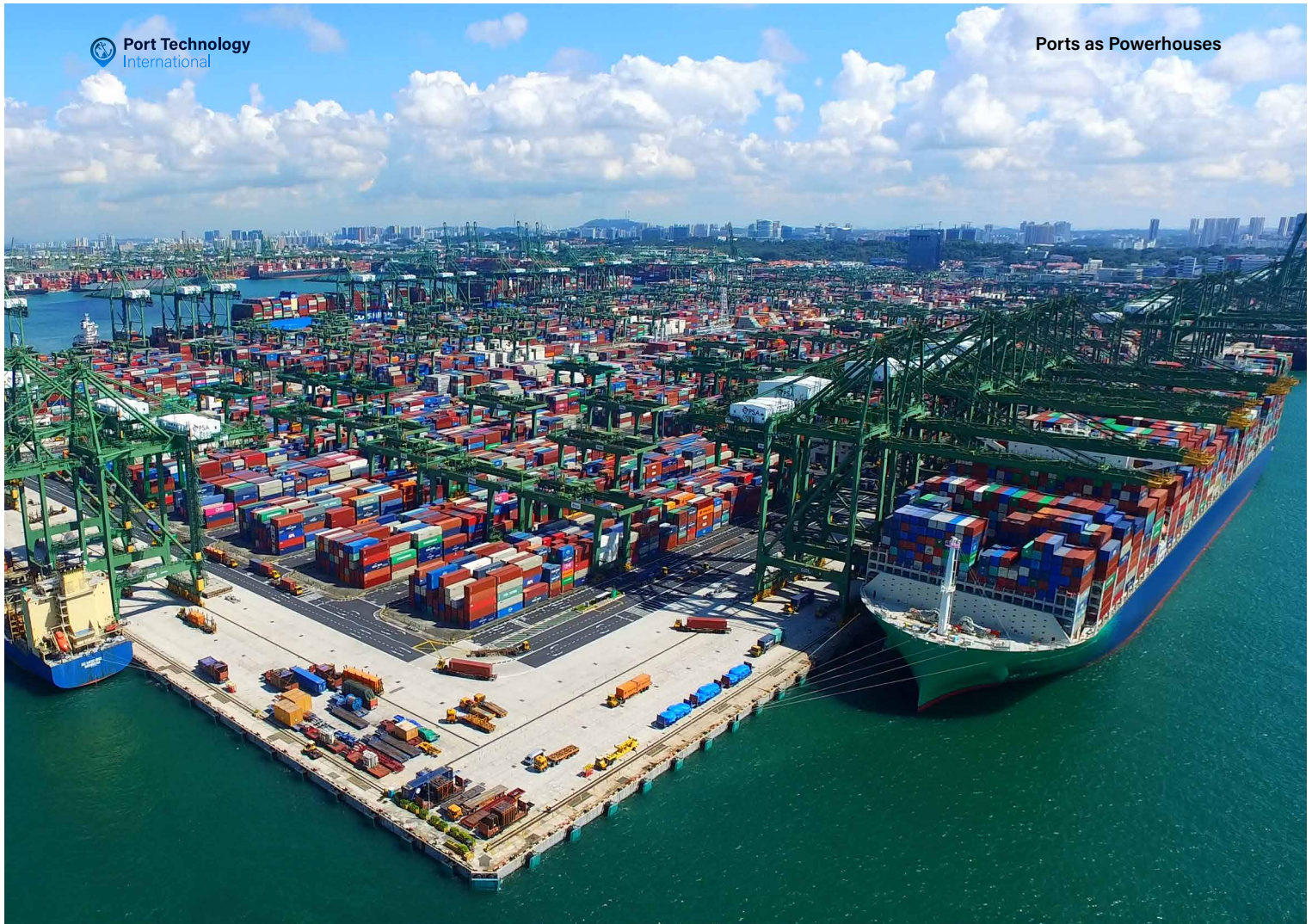
While electrification lays the foundation for reducing port emissions, integrating renewable energy is pivotal for achieving net-zero operations. Wherever possible, PSA explores self-generation options such as solar panels and wind turbines on available land, buildings, and quay crane machinery housings. This is supplemented through partnerships with suppliers via power purchase agreements and unbundled energy attribute certificates. One example is the partnership between PSA Mumbai and O2 Power, which established a long-term power purchase agreement for a 10-megawatt external solar farm supplying renewable electricity for PSA Mumbai's needs.

Energy Resilience and Reliability: Building the Powerhouse Port

Transitioning to net-zero operations is not just about going green – it is also about ensuring energy resilience and reliability. PSA Ventures, the external innovation and corporate venture capital arm of PSA International, has invested in VFlowTech, a Singapore-headquartered energy storage solutions company specialising in vanadium redox flow battery (VRFB) technology designed for safe, scalable, long-duration storage.

Unlike conventional lithium batteries, VRFB systems use liquid vanadium electrolytes to store and release energy through a reversible electrochemical process. With electrolytes stored externally in tanks, the system is highly scalable – from megawatt-hour to gigawatt-hour capacity – making it suitable for large-scale applications such as utilities, industrial facilities, and ports.

PSA will embark on operational trials with VFlowTech, with a view to potentially scaling the technology across its global ports and supply chain network. This would reduce reliance on carbon-heavy backup systems and support PSA's broader net-zero and energy optimisation objectives. Such technology helps ports balance supply and demand, store excess renewable energy, and maintain operations during grid disruptions.



Maintaining Commercial Competitiveness

PSA believes that sustainability and profitability can go hand in hand. Electrified equipment lowers fuel costs, renewable energy helps hedge against price volatility, and improved resilience reduces downtime. PSA's forward-looking investments attract global shipping partners seeking reliable and green logistics solutions.

By aligning net-zero initiatives with operational excellence, PSA demonstrates that ports can be both supply chain partners and environmental leaders. As the industry navigates new challenges, PSA's commitment to sustainability ensures that port ecosystems remain competitive engines of growth, driving both economic prosperity and environmental progress.

About the company

PSA International (PSA) is a leading global port operator and trusted partner to cargo stakeholders. Currently, PSA's portfolio comprises over 70 deepsea, rail and inland terminals across more than 180 locations in 45 countries – including two flagship port operations in Singapore and Belgium. Drawing on the deep expertise and experience from a diverse global team, PSA collaborates with its customers and partners to develop world-class port ecosystems and deliver innovative supply chain solutions to accelerate the shift towards sustainable trade.

[Find out more](#)



The Drive for Sustainability: How and Why Port Community Systems Will Play Their Part



Inga Morton, General Manager,
International Port Community
Systems Association

The shock is still reverberating through the maritime industry following the IMO's decision in October to postpone Net Zero Framework discussions by a year. The failure to adopt the framework – which would have provided clarity and a much-needed level playing field – exposed deep divisions between member states at the Marine Environment Protection Committee (MEPC).

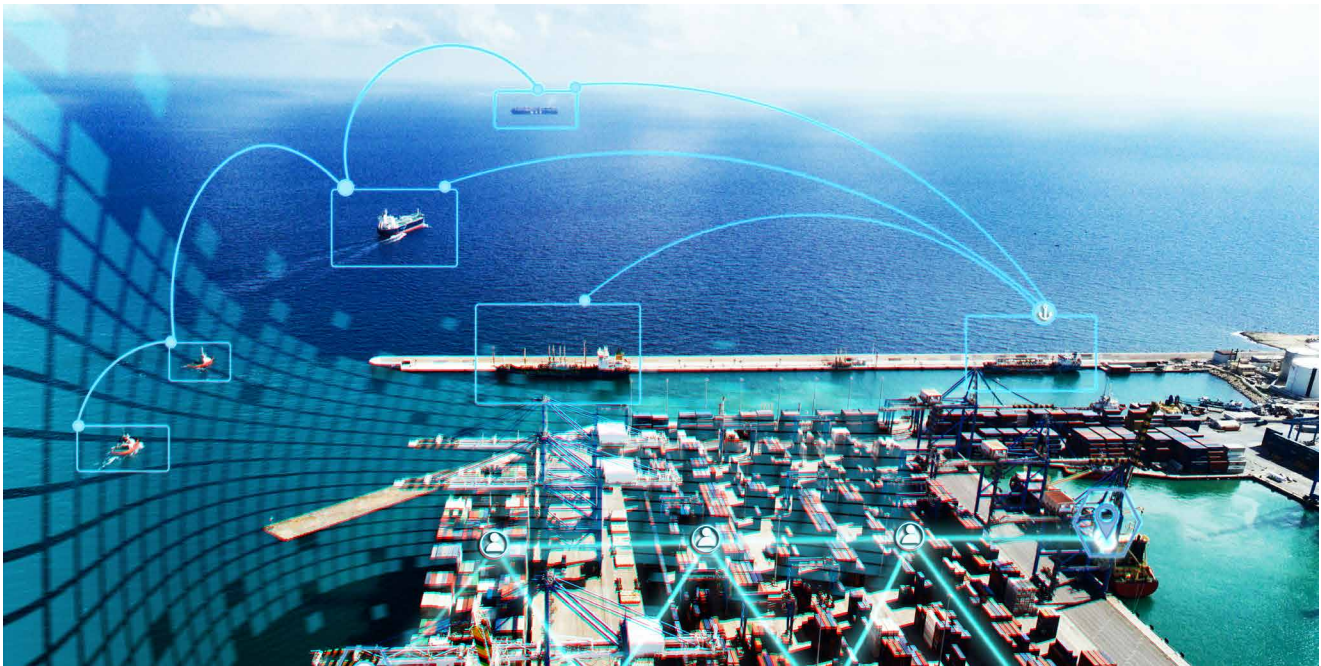
Yet this does not mean sustainability efforts stop here. The global maritime industry remains firmly on its path towards adopting future fuels for decarbonisation.

Of course, the impact is not limited to shipowners alone. The handling, storage and supply of ammonia, methanol, hydrogen and other alternative fuels depend on collaboration, cooperation and investment

across ports and the wider maritime sector. And there is still much more to be done.

Against this backdrop, the International Port Community Systems Association (IPCSA) has embarked on an ambitious project to identify, assess, analyse and share the role that Port Community Systems (PCS) and Single Windows can – and should – play in sustainability. The

“The services Port Community Systems provide can be maximised to support the shipping and logistics industry in improving sustainability performance.”



focus is twofold: first, considering in-house initiatives to reduce their own footprint and environmental impact; and second, looking outward at how the services they provide can be maximised to support the shipping and logistics industry in improving sustainability performance.

Port Community Systems already play a vital role in ensuring smooth and efficient information and cargo flows through ports – reducing delays, cutting paperwork and, in turn, lowering costs and carbon emissions. IPCSA is now asking: how much more can be done, and how can Port Community Systems learn from one another?

Stephanie van den Berg, IPCSA's Sustainability Lead and Strategy & Innovation Portfolio Manager at the Netherlands' Portbase, says that presenting Portbase's sustainability strategy to IPCSA members two years ago was an important starting point. "I shared the initial emission-reduction calculations we had completed at Portbase; that prompted a call to all other Port Community Systems in the meeting and led to the decision to set up an IPCSA Sustainability Working Group. We see port authorities working intensively on sustainability, including emission-free port strategies, shore power and the energy transition. But Port Community Systems were not yet doing so with the same focus."

The Working Group is therefore examining what PCSs are doing today, how they can contribute more effectively, how

they can facilitate more sustainable cargo flows, and what data should be shared to achieve further emissions reductions.

"There are four goals," she adds. "First, monitoring and sharing knowledge of sustainability trends, rules and regulations. Second, identifying which data needs to be shared within the IPCSA community to support emissions reduction. Third, promoting and aligning on data standards that enable comparable and credible sustainability insights. And finally, sharing best practices so members can learn from initiatives that genuinely deliver impact."

Stephanie highlights that IPCSA's central focus has always been the sharing of knowledge, experience and best practice to enable the most effective electronic exchange of information and keep ships and cargo moving. That culture of trust and collaboration is equally strong within the Working Group, whose purpose is to share insights from successful sustainability strategies as members work towards more resilient, lower-emission port logistics.

Also from Portbase, Martijn Maatman, Consultant Strategy and Innovation, is guiding the Working Group's focus on new and upcoming sustainability regulations. As he notes, the past few years have seen a deluge of new rules, including the EU's Emissions Trading System (ETS) and FuelEU Maritime Regulation; the Alternative Fuel Infrastructure Regulation (AFIR), which includes requirements for

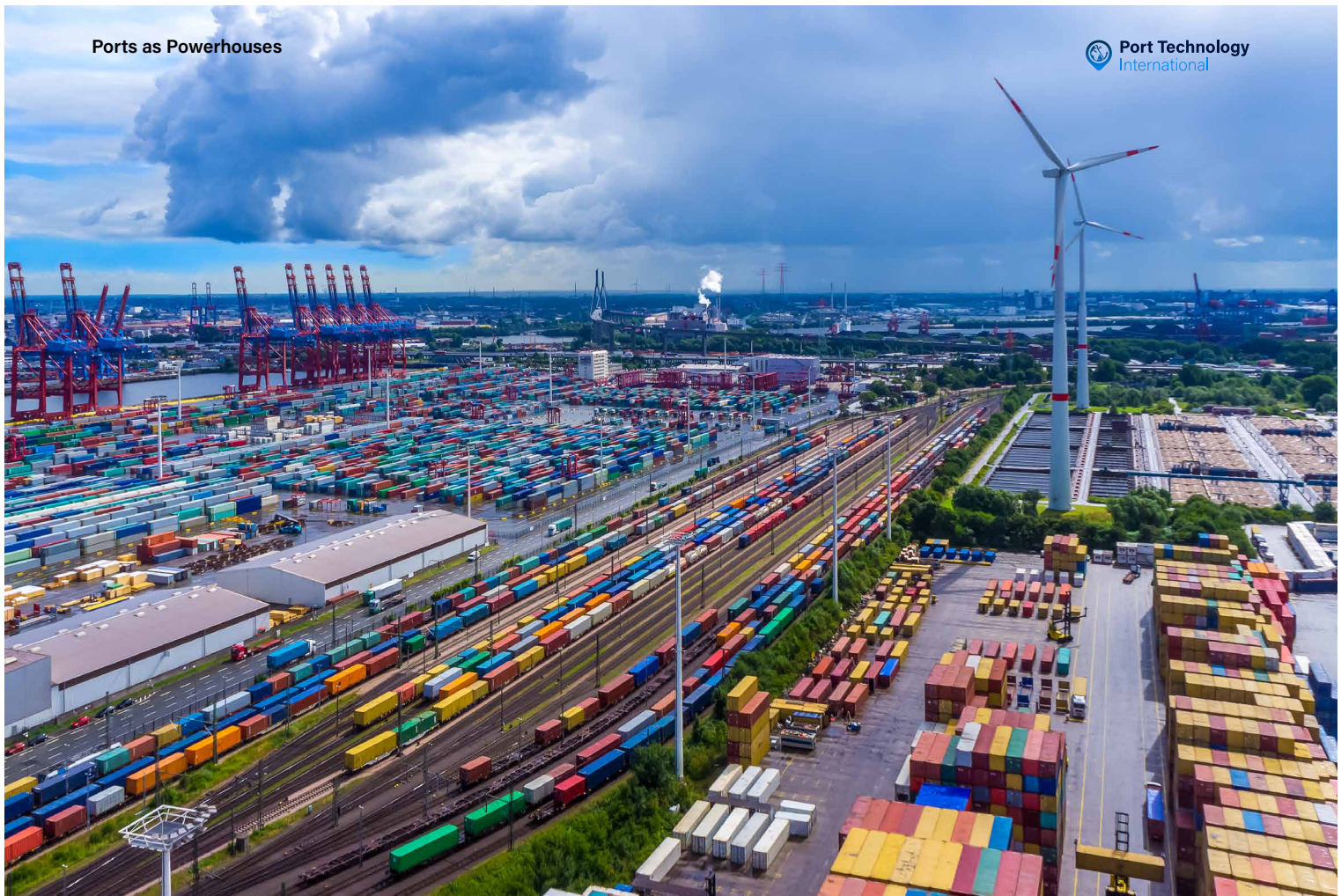
vessels to use shore power; the Corporate Sustainability Reporting Directive (CSRD); the EU Deforestation Regulation (EUDR); the Digital Product Passport (DPP); the Carbon Border Adjustment Mechanism (CBAM); and the Corporate Sustainability Due Diligence Directive (CSDDD).

"Last year we looked closely at EU regulations relating to sustainability and identified around 20 – some partially implemented, others already in effect, and most still being written," he says. "However, we need to ensure that governments and businesses have sufficient time to implement them all. If regulations continue to arrive at this pace, it will be too much to absorb, and delays will inevitably follow."

For each regulation, Martijn argues, the key question should be: "Do we, as Port Community Systems, need to be involved, or does this sit directly between government and company?"

As an example where the answer is 'yes', he points to AFIR. "Vessels will need to prove that they have used shore power, and where. They will have to submit a shore power request, which would be a logical addition to the vessel visit notification. We are developing a module for this at Portbase."

IPCSA is encouraging its members to be proactive: asking customers what support they need, considering where data is required for reporting and compliance, and assessing how shared data can help with



everything from origin of shipment to the type of fuel used for haulage, and even the weight of goods or entire containers.

Data sharing is key for both compliance and efficiency, Martijn emphasises. Standardisation of data would be the ultimate prize – something IPCSA continues to actively promote.

Jérôme Besancenot, Head of Digital Transition at HAROPA Port (Le Havre, Rouen and Paris), says that while HAROPA and its Port Community System, developed by SOGET, are working together to support carriers and logistics operators in reducing carbon emissions and improving sustainability, not all stakeholders are aligned with concepts such as just-in-time operations, and some remain reluctant to share data. "We are facing the same difficulties we encountered 40 years ago, when we first started working on the Port Community System," he says. "Back then, the challenge was bringing stakeholders together to collaborate and define process optimisation in a concept that was entirely new. Today, it feels like we are starting something new again."

Port Community Systems must change the way stakeholders coordinate and

collaborate, now incorporating the energy transition into that equation. "In the past, Port Community Systems focused on speed – the flow of vessels and cargo. Today, speed is probably no longer the top priority. We must also consider energy savings and the control of greenhouse gas emissions."

HAROPA's mission is to become one of Europe's leading green economies, while promoting reindustrialisation along the Seine Axis. This requires a shift to cleaner energy, reduced carbon emissions and adaptation to climate challenges. Its overarching strategy is built around three core objectives: driving the energy transition, creating a 'green corridor' for transport between Seine Axis ports, and building resilience to climate change.

The HAROPA Port Community System has a role to play across all three. "For example, we can encourage ships to assess their pollution levels using the Environmental Ship Index (ESI), which we can monitor through the Port Community System. Climate resilience is also an important area – how do we collect data on natural phenomena, and how can we support adaptation? How do we collaborate with regional actors on risk-

prevention planning?"

HAROPA is developing solutions around e-maritime, e-navigation, traffic regulation and multimodal logistics, all of which depend on reliable data, as well as clear standards and definitions. The green corridor concept combines sustainability with digital innovation, maximising the use of 5G, IoT, digital twins and blockchain technology. "For anything that matters, we want to be sure the data we share is accurate," he says.

Looking inward, Port Community Systems are also taking steps to reduce the carbon footprint of their own operations. IPCSA member dbh Logistics IT AG, based in Bremen, engaged external expertise to assess its emissions, establish a baseline footprint and analyse reduction potential.

"This formed the basis for developing a sustainability strategy focused on our own organisation," says Marlene Harbold, Sustainability Manager at dbh. "An external perspective is invaluable – it helps you see your company differently and identify solutions you might not find in day-to-day operations."

Early measures include the planned installation of photovoltaic panels through an agreement with the landlord,



alongside discussions around more sustainable heating options, such as switching to biofuels. Specific reduction goals have been set for Scope 1 and 2 emissions, supported by a step-by-step implementation strategy. Legacy lighting has been replaced with LED, the number of electric vehicles in the company fleet has increased, and the business has switched to renewable energy. dbh's sustainability management system has also been assessed by EcoVadis, which recognised the company's commitment with an award.

"It's vital to establish common ground, bring people with you and share the objective of reducing emissions," says Marlene. Her advice is clear: "Start by understanding your emissions and identifying the most effective measures. Seeing tangible change is important for motivation. Communicate frequently – every step counts."

While sustainability can sometimes appear to conflict with financial objectives,

she stresses that it is also a matter of risk management. "Don't focus solely on short-term costs; consider future risks and opportunities as well. Sustainability can help you stand out from the competition, reduce dependence on energy supplies, inspire employees and build loyalty. Get your people involved and engaged. Sustainability is the challenge of our generation and those to come. Companies that play their part can have a significant influence and impact."

The IPCSA Sustainability Working Group has been developing and refining a set of Sustainability Guidelines, now available on the IPCSA website and shared across the membership. We are confident these guidelines will help members understand how they can contribute to sustainability, develop their own strategies, anticipate upcoming trends, rules and regulations, and adopt proven best practices. Ultimately, it is up to all of us to make a difference.

About the author

Inga Morton is General Manager of the International Port Community Systems Association and a Member of the ICC Legal Reform Advisory Board. A specialist in European Union and international law, she provides administrative support and expertise relating to policymakers. Inga Morton has extensive knowledge and experience across legislative, finance, data protection, competition law and strategic planning issues, having worked at a high level in both governmental and commercial sectors.

About the company

IPCSA is an international association of Sea and Airport Community System operators, sea and airport authorities and Single Window operators that is recognised across the globe for providing advice and guidance on the electronic exchange of information across borders and throughout the whole supply chain.

IPCSA focuses on supporting and facilitating systems and innovations for Port Community System members and users and promoting the use of international data standards in sea and airports, at border crossings and via Single Window systems around the world. IPCSA is a recognised NGO with consultative status at UNECOSOC and IMO.

[Find out more](#)



SUSTAINABILITY GUIDELINES

“Our main purpose is to share the knowledge and insights from successful sustainability strategies and processes, focusing on Port Community Systems and working together towards more emission-free, resilient port logistics.”

*Stephanie van den Berg,
IPCSA Sustainability lead*

Discover more about the IPCSA
Sustainability Guidelines with the QR code





Why Digital, Energy and Resilience Will Define the Next Decade of UK Ports



Gavin Laybourne,
Chief Technology and Information
Officer, Peel Ports Group

It is the very nature of ports that we operate constantly in the face of major shifts and ever-changing, often overlapping dynamics. Freeport activity, digitalisation, decarbonisation, automation and geopolitical uncertainty are no longer future considerations; they are shaping investment decisions, operating models and competitiveness today.

At the same time, global supply chains are more unsettled than ever, influenced by geopolitics, market volatility and wider

macroeconomic factors. Ports must be resilient enough to withstand these pressures in order to continue fulfilling their critical role in serving the nation.

From my perspective, leading technology and transformation across the ports sector, we are at a clear inflection point. How ports respond over the next three to five years will determine whether they strengthen their position at the heart of UK trade and the energy transition, or fall behind faster-moving international competitors.

Today, I believe we are standing at a crossroads, with four critical priorities to consider.

1. Closing the Digital Visibility and Integration Gap Across UK Ports

UK ports continue to lag behind their European counterparts in digital visibility and systems integration. Many European ports now offer real-time cargo visibility, predictive ETAs and mature port community systems. Bridging this gap

“Ports are shifting from simply moving cargo to moving electrons.”

is no longer optional; it is fundamental to competitiveness and customer confidence.

2. Decarbonisation as a Licence to Compete, not a Differentiator

Decarbonisation has moved from aspiration to commercial necessity. Shore power, alternative fuels, terminal electrification and supporting infrastructure are no longer 'nice to have'. They are fast becoming prerequisites for attracting customers, supporting vessel decarbonisation and meeting regulatory expectations.

3. Careful Coordination of Large-Scale OT, IT and Operational Programmes

Ports are running major operational, OT and IT transformation programmes simultaneously. These initiatives are essential, but without careful coordination they introduce operational risk and delivery fatigue at a time when reliability is paramount.

4. Workforce Adaptation as a Critical Success Factor

Workforce adaptation remains a key risk. Automation and digital tools will only deliver value if people are supported to change how they work, develop new skills

and focus on higher-value activity.

The challenges created by these transitions are as substantial as the opportunities they present.

Substantial Challenges Ahead

Large-scale transitions to new systems and technologies – particularly across complex environments such as ports, warehouse networks and vendor systems – inevitably bring significant challenges.

Further pressures are also emerging, including a widening digital gap between UK ports and their European counterparts, many of whom have invested heavily in digitalisation over recent years. These operators already enjoy a competitive advantage through real-time cargo visibility, predictive ETAs and integrated community systems. In 2026, UK ports must work in earnest to close this gap or risk losing ground.

Meanwhile, decarbonisation timelines continue to advance. Integrating renewables such as shore power, clean fuel infrastructure and the electrification of terminals, equipment and supporting assets – once treated as optional extras – is now essential for reducing emissions, supporting vessel decarbonisation and ensuring commercial competitiveness.

All of this must be managed while major ports continue to run large-scale operational, OT and IT programmes in parallel.

Short-Term Outlook

The energy, green and digital transitions will undoubtedly shape the ports industry over the coming years and beyond. Emerging technologies, particularly AI, are becoming increasingly prominent after years of steady development and are set to have a transformative impact on planning, asset management and decision-making.

These are not theoretical questions. They are operational decisions that will define reliability, cost and safety over the next decade. How do we ensure reliability while integrating new technologies? Which tasks should be automated? Where do humans add the most value?

A risk-based, 'designed-in' approach will be essential to balance innovation, reliability and cost.

Untapped Opportunities

Ports are shifting from simply 'moving cargo' to 'moving electrons'. The transition underway is fundamentally about energy and data, and the handling of energy-intensive cargoes such as aggregates and biomass demands robust facilities. Building energy resilience and system reliability is critical, particularly as renewable integration becomes more complex.

Closer collaboration with customers offers the opportunity to share the burden





of transition and support mutual progress towards shared goals.

Ports are also sitting on a wealth of untapped data, much of it underused because traditional ways of working have not been data-led. Unlocking this data and applying the insights gained can improve asset utilisation, operational efficiency and customer value, while delivering the transparency and traceability customers increasingly expect, particularly around carbon reporting.

Automation should free people to focus on higher-value tasks. The human brain remains the most effective problem-solving tool and should be valued accordingly. From personal experience, the most successful automation programmes are those that elevate, rather than sideline, human expertise – provided they are implemented with care.

The modernisation of legacy IT and OT infrastructure is unavoidable in mitigating operational risk. The digital and operational transformation required must be underpinned by the highest security and environmental standards, recognising that the ability to respond to and recover from incidents is as important as prevention.

Threat-led governance aligned with Department for Transport guidance will foster a proactive culture of safety, security and environmental protection.

Customers are increasingly demanding visibility and traceability, particularly around carbon reporting. While meeting these expectations requires adjustment in the short term, operators who harness available data effectively will secure a long-term competitive advantage.

Ultimately, a focus on standards – rather than rigid standardisation – will enable alignment without stifling innovation. As with all operational challenges, stronger collaboration across the sector can only improve customer experience and supply chain performance.

UK ports carry significant legacy infrastructure that must be upgraded to support the next era of port technology. Government support for port infrastructure, and for the renewable energy developments ports will host in the coming decades, will be essential to ensure competitiveness and resilience.

Despite the scale of the challenge, there is a significant opportunity for ports to reposition themselves within the supply chain as technology, energy and data hubs. By harnessing data, implementing robust yet adaptable governance, and keeping people at the heart of operations, ports can redefine their role as integral partners in the energy and digital transitions.

About the author

Gavin Laybourne is Peel Ports Group's Chief Technology and Information Officer (CTIO), the first person to hold the role at the UK's second-largest port operator. He sits on the Group's Executive team and leads all its technology and information-related activities, including IT, cyber security, data analytics, green technologies, and the ongoing automation and digital transformation of the Group's operations.

He has more than 25 years of experience in technology leadership within global organisations: most recently, he was Vice President and Global Chief Information Officer at Maersk APM Terminals, the world's second-largest terminal operator.

Prior to this, he was Chief Information Officer at Marks and Spencer, following a long tenure at Shell Retail and Shell Downstream, including as Global Technology Director.

About the company

Peel Ports Group is the UK's second-largest port operator, owning and operating six of the UK's most important ports (Liverpool, Heysham, Manchester Ship Canal, Medway (Sheerness/Chatham), Clydeport and East Anglia). It also operates a container terminal in Dublin and owns BG Freight Line, which provides short sea container services between the UK, Ireland and mainland Europe and Peel Ports Logistics, one of the UK's leading shipping and freight forwarders.

Peel Ports handles approximately 70 million tonnes of cargo every year. 14 per cent of the total UK major ports traffic flows through ports operated by the Group. Headquartered in Liverpool, it employs around 2,000 staff.

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