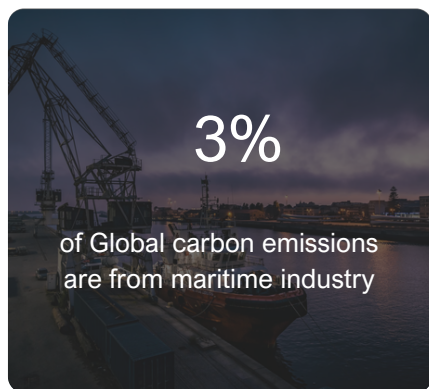
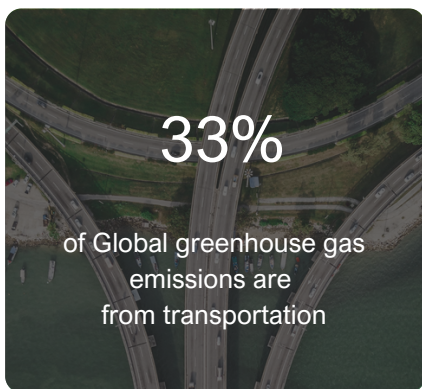


Green Ports: Paving the Way Towards Sustainable Infrastructure and Operations

195 Countries have signed the Paris Climate Agreement with the goal of limiting global warming by 2 degrees Celcius by reducing greenhouse gas emissions. The shipping industry currently accounts for 3% of global carbon emissions. Without intervention, this percentage is expected to increase by 130% of 2008 emissions by 2050, undermining the objectives of the Paris Agreement. To address climate change, the focus on sustainability will extend to all sectors including shipping and transportation.



Key Drivers

Net Zero projects will attract more clients, access more economic financing and secure licenses to operate. Ports should strike a balance in integrating the economic, environmental goals and social responsibilities into their business plans.



Regulation

- Plans and requirements to reduce emissions are expected to increase as policy matures



Investor Pressure

- Potential for disclosing sustainability efforts, goals, and progress to investors upon request.



Competitiveness

- Reduced operational costs that attracts environmentally conscious customers
- Giving you an edge in the market



Reputation

- Visible sustainability focus attracts and retains staff
- Looked upon more favorably by the public, customers, stakeholders and politicians

Modular Solutions to Support Ports' Net Zero Journey

Univers and Mott McDonald have joined forces to design modular solutions to support each step of the ports' journey to green infrastructures and operations.



Energy Demand Management & Efficiency

- Energy Strategy
- Site planning
- Demand Modelling
- Flexibility Management



On-site Renewables & Grid Solutions

- Technology selection and planning
- On-site generation
- Electricity Revenue Strategy
- EV Charging Infrastructure Vehicle to grid



Port Operation Insights

- Port Asset Management
- Power/Energy Analytics
- Energy Waste Identification



Carbon Management

- Carbon emissions monitoring
- Carbon abatement
- Carbon offset and renewable energy certificate trading



Low Carbon Design & Construction

- Planning & Design for net-zero
- Carbon modelling and optimization
- Low carbon construction and integration

Energy Security

One of the key challenges faced by ports in their journey to sustainability is the issue of energy security. Spiralling energy costs pose a significant concern, as traditional energy sources become more expensive and less sustainable. The transition towards cleaner energy sources adds further pressure to ports, as they need to invest in renewable energy infrastructure and technologies to reduce their carbon footprint. Ensuring energy security is also crucial, as ports must have reliable and uninterrupted access to power to maintain operations which is not guaranteed by intermittent energy sources. This necessitates exploring alternative energy solutions, such as onsite renewable energy generation and energy storage systems, to mitigate the risks associated with energy supply disruptions. By addressing these challenges comprehensively, ports can enhance their resilience and stay competitive.

Short-term Steps to Achieve Energy Security

Microgrid Design & Management



- Connections between local and main grids
- Selection of the right generated site sources
- End-to-end supply chain integration including procurement processes
- Outsourced grid management from creation to implementation

Energy Monitoring & Orchestration



- Data collection across all assets to create the blueprint of the energy transition
- Orchestration of distributed energy resources leveraging machine learning forecasts
- Implementation of first principles-based optimization modules to lower energy usage

Energy Storage



- Technology Options - Sizing, Selection and Consenting (Procurement Support)
- Energy consumption optimization
- Energy peak-shaving and backup power

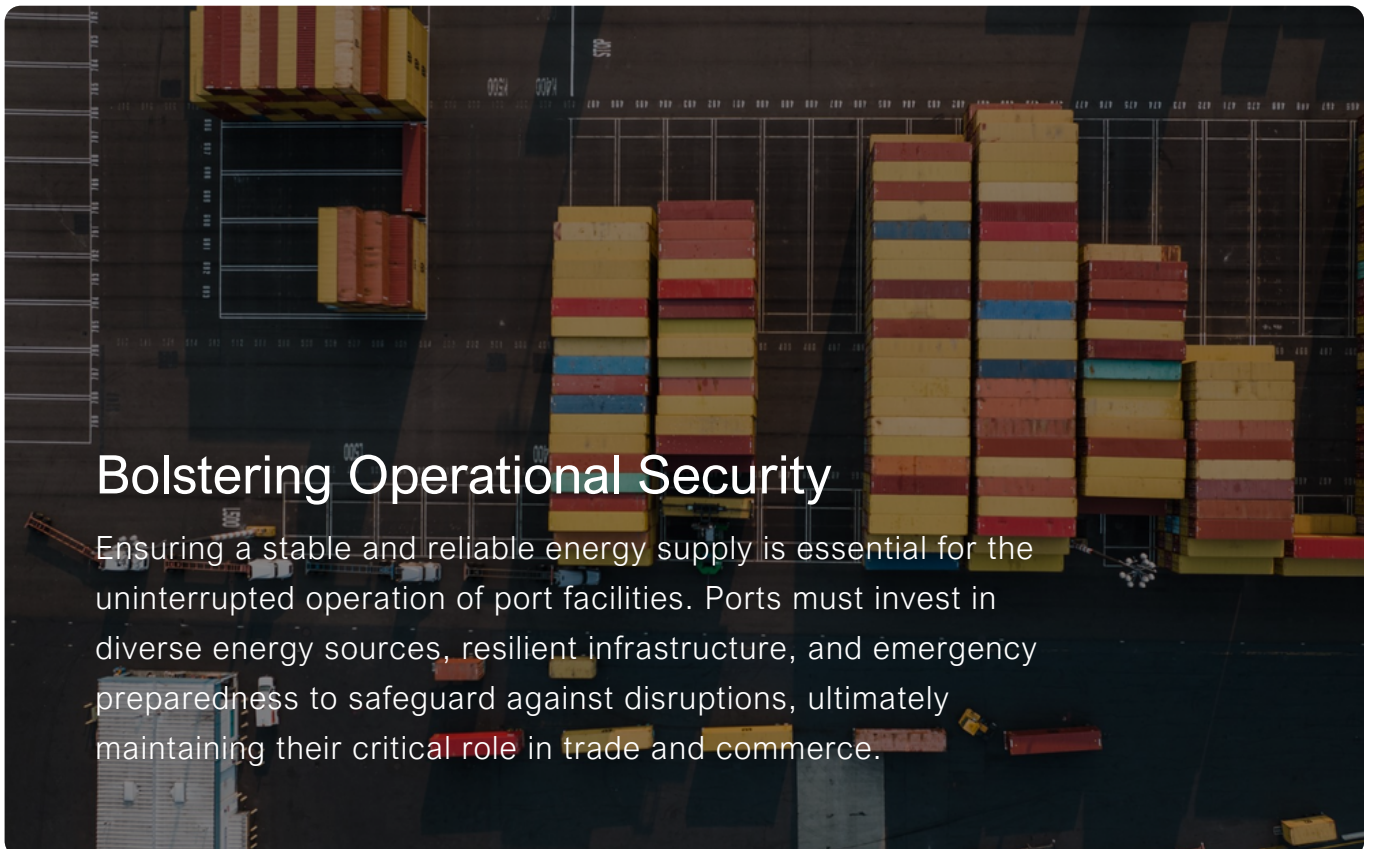
Full Site Digital Twin Creation



- to connect digital and physical assets

Bolstering Operational Security

Ensuring a stable and reliable energy supply is essential for the uninterrupted operation of port facilities. Ports must invest in diverse energy sources, resilient infrastructure, and emergency preparedness to safeguard against disruptions, ultimately maintaining their critical role in trade and commerce.



Carbon Management

Accurately accounting for carbon emissions is another critical aspect of becoming a green port. Developing Net Zero roadmaps and baselining Scope 1, 2 and 3 emissions, is now at the front of mind for operators. To effectively reduce their carbon footprint, ports need to audit their energy consumption and identify areas for improvement. However, this process can be challenging and time-consuming with efforts and latency in data capture. Collecting and analyzing data on energy usage across various port operations and facilities require sophisticated monitoring systems and data management processes. Ports must invest in robust carbon accounting tools and establish streamlined processes for data collection enabling them to track their progress, set emission reduction targets, and implement effective carbon reduction strategies.

Short-term Steps to Achieve Lower Carbon Emissions

Carbon Audit Design



- Data capture identification
- Accurate modelling
- Benchmarking of data findings against capital data sets

Near Time Energy Consumption Data



- Comprehensive monitoring of energy portfolio
- View load curve and 7-day consumption split to highlight inefficient events and assets
- Automatically switch off unused assets and receive alerts of above average consumption

Carbon Emissions Monitoring and Management



- Carbon tracing and abatement tracking
- Monitor total emissions year to date and view a 10-year forecast
- View reductions and emissions by type as well as top emitters per location

Strategy Design and Implementation



- Capital operators' solutions for carbon predictions (PAS 2080 and similar)

Sustainability at The Forefront

Any new buildings and port infrastructure should also be sustainable, and there are specialist tools to account for embedded carbon in any construction materials. Operational insights generated from data can also help inform the planning, design, and delivery of new capital programs, and ensure they deliver improved efficiency in operation.

Energy as a Revenue Stream

Ports are increasingly recognizing the potential of energy as a revenue stream in their sustainability efforts. Balancing capital investments becomes critical as ports explore opportunities to generate revenue from energy-related initiatives. By deploying green infrastructure, such as solar panels and wind turbines, ports can generate renewable energy and sell excess power back to the grid, creating additional revenue streams. Additionally, ports can explore the concept of private wire systems, where they establish partnerships with nearby businesses, hotels, industrial parks, electric vehicle charging hubs, and green hydrogen facilities to supply them with clean energy on-site or near-site. This not only provides a reliable customer base but also strengthens the port's sustainability credentials and contributes to the local green economy.

Short-term Steps to Achieve Lower Carbon Emissions

Monitor renewable energy infrastructure



- Accurate output vs. demand predictions
- Data-driven portfolio optimization to address forecast discrepancies
- Enhanced productivity through defect and design flaw identification

Design and Manage Sustainable Infrastructure Systems



- Shore power systems (cold ironing) reduce air pollution and greenhouse gas emissions from ships
- EV charging stations which uses vehicle-to-grid solutions, boosting air quality
- Enhancing building efficiency with systems and efficient equipment.
- Networks manage energy consumption.

Energy Trading



- Leverage renewable energy generation capacity, energy storage systems, or access to grid connections
- Participation in electricity spot markets or in bilateral contracts with buyers or suppliers

Group Connections for Electricity Production



- Secure engineering support for producing electricity export and renewable electricity from hydrogen, and other alternative fuels, and storage

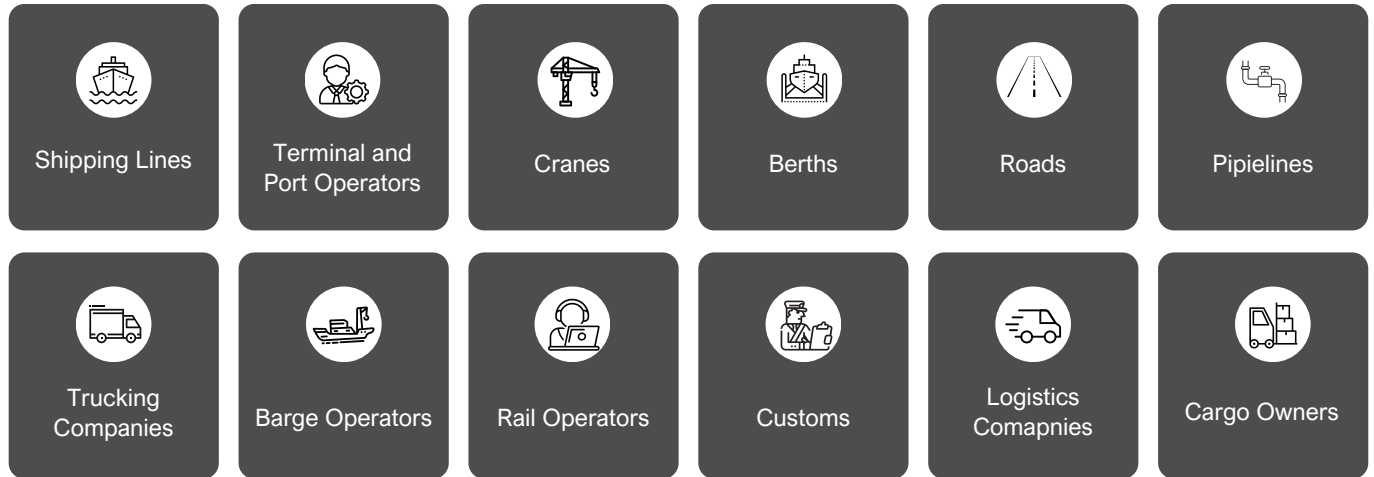
Energy as a Strategic Asset

Energy serves as a valuable revenue stream in the ports industry. Ports can optimize their financial performance by developing comprehensive energy strategies, including demand modelling, on-site electricity generation, and future fuel infrastructure. Efficient energy management not only reduces costs but also enhances revenue through sustainable practices, making it a key focus for port operations.

Leading the Way in Green Shipping and Operations

The journey to become a green port offers numerous benefits, including reduced costs, optimized energy usage, uptake of green energy, improved data integrity, reduced carbon emissions, lower carbon taxes, and improved access to green finance. By investing in renewable energy infrastructure, ports can decrease reliance on traditional sources and mitigate rising energy costs. Implementing strategies like peak energy shaving optimizes consumption while increasing the green energy mix aligns with environmental goals

Green Port Stakeholders



Green Ports

Green ports are committed to environmental sustainability. These ports adopt green technologies and low/zero carbon fuels for power-intensive terminal equipment, in-port vessel operations and ship refueling.

Some common features include



Renewable energy usage



Energy management system



Data analytics and connectivity



Eco-friendly terminal design



Electric equipment and vehicles

Benefits of Green Ports



Environment

- Reduced Air Pollution
- Lowered Greenhouse Gas Emissions
- Improved Water Quality
- Conservation of marine ecosystems



Port

- Improved efficiency
- Improved decision-making
- Reduced congestion
- Maintenance cost savings
- Reduced amount of accidents
- Reduced risk from inaccurate planning and forecasting
- Mitigate risks associated with fluctuations in shipping volumes

About



Univers provides the world's most comprehensive decarbonization system. We help companies and countries optimize energy systems and reduce carbon emissions with accurate, reliable, and actionable decarbonization data. Our EnOS (Energy and Environment Operating System) platform connects on-the-ground operational technology and in-the-cloud intelligence to deliver real-time energy data and data-driven carbon monitoring, reporting, and abatement. With 220 million devices connected, over 560GW of renewable energy under management, and a community of over 500 customers including Microsoft, Starbucks, and HSBC, we're helping leading businesses get the world to net zero—and what comes after it.



Our purpose is to improve society by considering social outcomes in everything we do, relentlessly focusing on excellence and digital innovation, transforming our clients' businesses, our communities and employee opportunities. Partnering with our clients, we are solving the world's most intricate challenges. We search out the connections others fail to make, to unlock creativity and deliver better outcomes for the lives we touch every day.

More

To learn more about modular solutions for green infrastructure and operations, visit <https://go.univers.com/Green-Ports-Campaign-Webinar-Home.html>

