# HARBOURING CHANGE: THINKING FAST AND SLOW ABOUT PORT DECARBONISATION

Jacobs

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Ports are where global trade meets climate action. While they may not earn the attention of passenger-heavy modes like aviation or rail, their commercial footprint and supply chain connectivity are even more significant.

About 80 per cent of global merchandise trade is transported by sea, with shipping capacity steadily increasing. Efficient, resilient ports are therefore vital for economic growth and global trade. Their influence, however, extends far beyond commerce, and we are now seeing ports play a pivotal role in the energy transition.

But how to decarbonise them? Emissions reduction is a system-wide shift that impacts how ports operate, invest, and work with the broader supply chain.

It's complex, but not impossible. With the right questions, clear priorities, and a phased approach, progress is already happening.

## START BY ASKING THE RIGHT QUESTIONS

The first question every port operator should ask isn't what to do, but where to start. That starting point depends on each port's footprint, ownership model, infrastructure, and market demands. There is no one-size-fits-all strategy. Few ports are owned or operated by a single entity. Instead, there's usually a mix of public and private stakeholders, third-party tenants, and infrastructure arrangements that span decades.

Before anything else, be clear on scope boundaries. That may sound simple, but it's often one of the most complex parts of the process. We work with clients to set realistic boundaries. For some, this might mean focusing initially on assets under their direct control. For others, it requires building consensus across a regional or global terminal network.

Ports also need to build an emissions baseline, defining Scope 1 (direct emissions), Scope 2 (energy use), and Scope 3 (supply chain) emissions. For ports with complex ownership structures, this is no small feat, but it's the foundation for everything that follows.

It also pays to cast the net wide early by exploring multiple options and stress-testing assumptions before narrowing in on a strategy. Step back and consider a wide range of inputs—regulatory requirements, energy mix, market positioning, and stakeholder priorities. And it's not just about engineering, it's also about governance, funding, and timing.

At the Port of Cleveland, we worked with the authority on infrastructure planning tied to emerging fuel technologies and regional energy strategies. This involved assessing what was technically feasible and working through regulatory and financial implications with broader stakeholders. It's a good example of how upstream decision-making—supported by both engineering and advisory input—can shape downstream investment with fewer surprises.

The next step is to consider your organisation's planning horizons: setting short-, medium-, and long-term goals. Decarbonisation is a timeline of fast wins and slower, structural shifts, not just a single milestone.

## SHORT-TERM: FOCUS ON WHAT YOU CAN CONTROL TODAY

Targeted operational changes can improve efficiency and reduce

emissions without requiring major capital spending. For example, optimising the terminal operating system to reduce equipment moves can lower fuel consumption, which can add up to significant savings over a single year. Tackling it early is low-cost and high-return.

At the Port of Oakland, we helped deliver the Freight Intelligent Transportation System, which included smart traffic signals, dynamic message signs, and vehicle detection systems to optimise truck movements. These upgrades reduced congestion-related emissions and laid the groundwork for more predictive freight logistics, all of which helped connect operational improvements to emissions targets.

Decarbonisation is as behavioural as it is technical. At several ports, we've seen strong results when operational changes are paired with staff engagement, fresh KPIs, and performance-based incentives to help connect daily decisions to emissions outcomes.

## MEDIUM-TERM: ALIGN INFRASTRUCTURE WITH EMISSIONS GOALS

This is where more capital-intensive measures start to take shape: retrofitting equipment, electrifying fleets, upgrading lighting systems, and integrating solar or wind where viable.

In Australia, on the western Cape York Peninsula, we designed the Amrun Chith export facility, including a jetty and wharf system with energy-efficient design features. The project included early engagement with Indigenous stakeholders and environmental planners for sensitive coastal zones. Working on this project reinforced what we already knew: sustainability goals and low-carbon infrastructure can be embedded from the outset, even in heavy industrial and export-focused settings.

Within container ports, yard planning is also an important consideration. Reconfiguring stacking layouts to minimise horizontal container movement—especially for empty containers—can significantly cut equipment run times without a big capital spend.

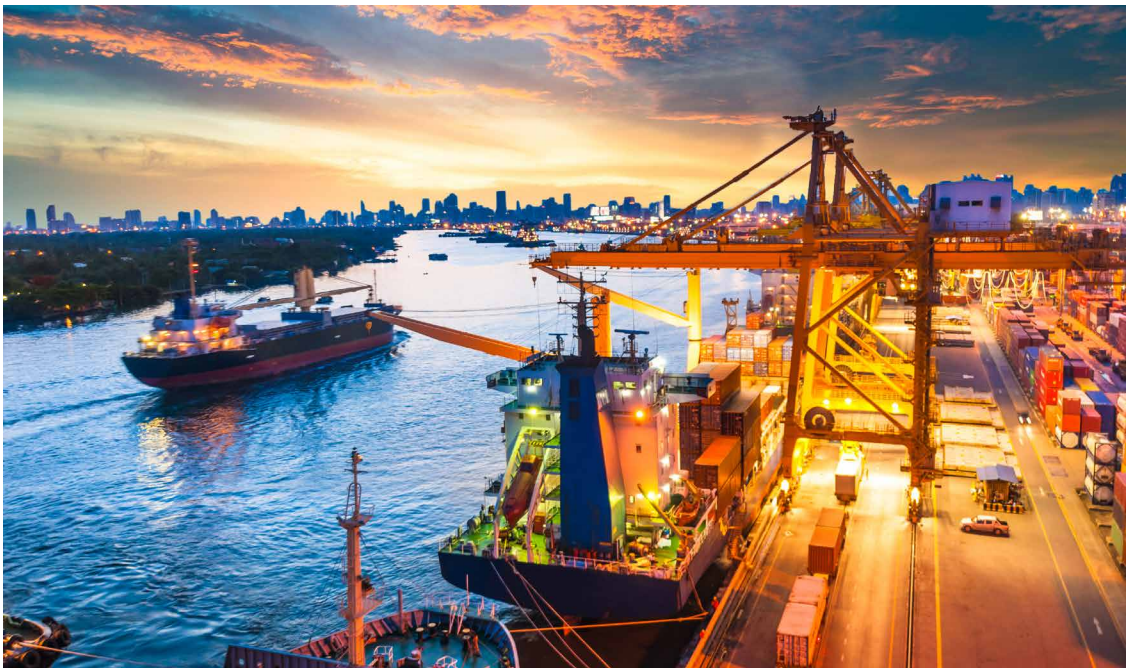
In locations with limited grid capacity, we've also worked with clients to explore renewable energy procurement strategies, including long-term agreements and power purchase options. These types of decisions often sit at the intersection of commercial strategy and technical design, requiring early cross-disciplinary coordination.

Harnessing no-idling solutions offers significant savings. Equipment idling can account for up to 20 per cent of a port's energy consumption. According to research by the U.S. Department of Energy, a heavy-duty truck consumes roughly 0.8 gallons (3 litres) of fuel per hour while idling. Idling wastes fuel, increases wear, and degrades air quality. Solutions include automatic engine turn-off software or incentivising operators to manually shut down engines. Auxiliary batteries supported by renewables—like flexible solar panels—provide air conditioning and heating without relying on the vehicle's main engine.

## LONG-TERM: PREPARE FOR WHAT'S COMING NEXT

For long-term planning, focus switches to digital systems, shore power, fuel switching, and aligning business models with carbon goals. The most forward-looking ports are already investing in analytics and modelling to improve forecasting and track emissions in real time.

Some ports are also going further by creating Digital Twins to simulate real-world port operations. These models can test different equipment configurations, forecast



emissions impacts, and help prioritise infrastructure upgrades using real-time data.

As new fuels and technologies become more readily available, ports must evolve to better reflect the energy intensity and carbon cost of their services. At the Port of Alaska, Jacobs is modernising a critical energy and goods hub with full lifecycle services. This includes planning for the adoption of lower-carbon fuels like hydrogen and ammonia, and upgrading ageing infrastructure that supports military, energy, and logistics operations across the state. The work addresses both immediate structural needs and long-term decarbonisation pathways.

## CONNECTING ACROSS SECTORS

Ports are not isolated assets. They are and always have been integral to broader energy and infrastructure systems. This is particularly evident in California, where we're working with port operators to manage climate-related risks alongside energy system constraints. Resilience strategies in these cases must consider water conveyance, storage, and energy reliability together—an area where our end-to-end capability in environmental infrastructure has proved essential.

In San Francisco, for example, Jacobs is supporting the multi-phase Waterfront Resilience Program, focused on adapting 7.5 miles of shoreline infrastructure to seismic and sea-level rise risks. The programme's integrated approach considers transport, energy, climate adaptation, and public space—all crucial as ports plan long-term resilience. Decarbonisation, adaptation, and community infrastructure planning must be approached as a single challenge.

Ports are vital transport and storage hubs with the potential to provide green energy generation and transmission. However, this all comes with an asterisk. Success relies heavily on global collaboration, avoiding short-term thinking, and backing the right technologies. This involves early commercial insight—especially when defining emissions baselines or shaping capital plans. It also requires a portfolio-wide view, not just single terminals, and using data to tie short-term improvements to long-term gains.

There's no single template for port decarbonisation, but there is a formula that works: ask the right questions early, define emissions boundaries clearly, phase the work, and link operational changes to bigger infrastructure and policy shifts.

Done right, decarbonisation makes ports greener, smarter, and more resilient. That work is already underway—terminal by terminal.

## ABOUT THE AUTHOR

Laurence Banyard is a Chartered Civil Engineer and Jacobs' Global Principal for Maritime Energy. He leads the company's worldwide efforts to promote decarbonisation, resilience and new energy technologies. His expertise includes port facilities for shipping lower-carbon fuels, energy efficiency and resilience for ports, and designing maritime infrastructure for offshore renewable energy generation.

## ABOUT THE COMPANY

With approximately $12 billion in annual revenue and a team of almost 45,000, Jacobs provides end-to-end services in advanced manufacturing, cities and places, energy, environmental, life sciences, transportation and water. From advisory and consulting, feasibility, planning, design, programme and lifecycle management, the company is focused on creating a more connected and sustainable world.