DESIGNING NET ZERO PORTS

Applying infrastructure decarbonisation best practice to maritime

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Why focus on ports?

The maritime sector plays a major role in the global economy, transporting a high volume of freight around the world. As such, maritime, and ports in particular, are a visible part of transport decarbonization discussions. However, the sector is responsible for only 2.9 percent of global greenhouse gas emissions[1] and moves freight with some of the lowest carbon emissions per tonne.kilometre (t.km)[2] of any transport sector.

Maritime emissions are expected to increase as global trade grows and other sectors decarbonise. Therefore, the sector will need to decarbonise. To drive this change, the International Maritime Organisation (IMO) has set a carbon intensity reduction target (emission per t.km of freight) of 40 percent, based on a 2008 baseline, by 2030.

Although freight handling in ports only accounts for a small proportion of the emissions from the freight movement chain, port's shore-based assets are attracting attention in light of the IMO target. This, combined with local policies and legislation, means there is added stakeholder pressure on ports to reduce their emissions from operation and construction.

Decarbonising Construction

Ports have already been decarbonising their operations. Containerisation and today's state-of-the-art automated systems have minimised the number of times freight is moved within the port, resulting in improved margins and thereby supporting emissions reduction. The same motive has also driven more energy-efficient handling equipment, and, more recently, the electrification of equipment. These trends are expected to continue and combine with other trends—including the roll-out of renewable energy and broader state-level electricity grid decarbonisation—to deliver zero-carbon port operations.

For this reason, the proportion of emissions generated from port construction is an increasingly larger component of the whole-life-carbon impact of a port. With construction already estimated to be up to 40 percent of the whole-life-carbon footprint of some ports, construction emissions are clearly material to the sector. Heightened attention to port construction emissions derives from an increased focus on construction emissions more generally, and in particular during project consenting, which has become more challenging on climate grounds in

[1] *Fourth Greenhouse Gas Study 2020*, International Maritime Organization (IMO)

[2] A tonne.kilometre (t.km), is a unit of measure of freight transport which represents the transport of one tonne of goods (including packaging and tare weights of intermodal transport units) being transported a distance of one kilometre.

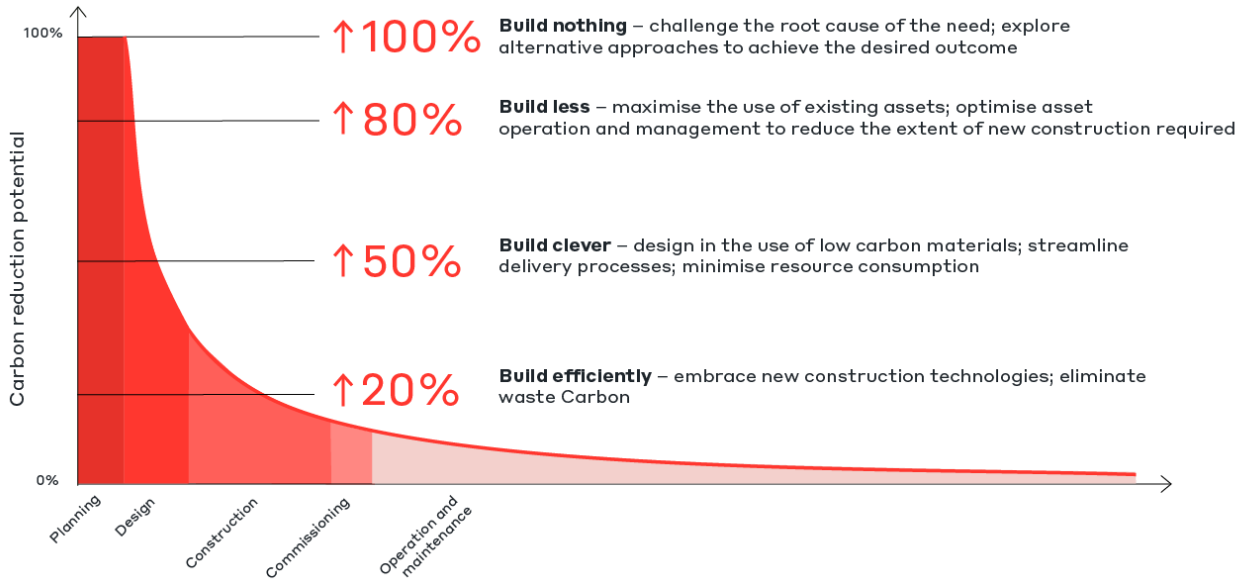
some jurisdictions. Therefore, it is essential to consider construction decarbonisation during port design and construction.

Following a Clear Path

Fortunately, there is a global standard for reducing emissions during the design and construction of infrastructure–PAS 2080. This standard provides a breakdown of responsibilities and activities that all members of the value chain need to assume so they can jointly deliver the decarbonisation of infrastructure. It is relatively straightforward to apply the PAS 2080 framework to the port context. The key elements of this process are as follows:

- Leadership to drive the decarbonisation of the project
- Decarbonisation targets agreed by stakeholders
- Identification and implementation of carbon reduction interventions across the construction value chain
- Monitoring and reporting of emissions against the decarbonisation targets
- Governance to implement the process

One of the most important concepts employed by PAS 2080 is the carbon-reduction hierarchy. This is a useful framework within which to consider how to reduce emissions from ports (see below).



Source: As seen in *Infrastructure Carbon Review*, HM Treasury, citing Green Construction Board

Putting Process Into Practice

Each port is different; however, there are a number of common approaches to carbon reduction that are relevant to the design of any port. (see next page):

Carbon reduction heading	Potential opportunity
Build nothing	Is it possible to provide the same port capacity in another way so that new port infrastructure is not required?
Build Less	Is it possible to reuse existing port infrastructure (such as a quay wall)? or is it possible to site a port near a deep-water channel to minimise dredging?
Build Clever	Ports often require large quantities of concrete and steel. Is it possible to minimise these materials through modern stacking systems? Is it possible to use alternatives such as timber in appropriate settings (such as warehousing)? Can lower-carbon versions of the steel and concrete be used (such as cements with large quantities of recycled and secondary content)?
Build efficient	Can offsite and modular construction techniques be used? Can electric plants be used? For plants harder to decarbonise, such as dredgers, will it be possible to use biofuels, or, in the future, hydrogen?

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While there is increased scrutiny on the climate action of the maritime sector, and port construction in particular, there is also a clear path for reducing emissions generated from the construction of infrastructure projects. By utilising the PAS 2080 process in the port context—to identify where emissions from port construction come from and what pragmatic solutions can be applied—ports can reduce emissions, delivering an enhanced licence to operate within an evolving context.

About the Author

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James Peet is a Masters qualified Chartered Environmentalist (IEMA) with 13 years of experience. He is an Associate specialising in carbon management, in particular, net zero strategies and the roadmaps that underpin them. His knowledge encompasses carbon management frameworks (e.g. GHG Protocol, Defra, PAS 2080) and detailed practical applications across multiple sectors (e.g. transport, power waste, water). James leads the Net Zero product line and the Environmental Impact Assessment (EIA)-Greenhouse Gas (GHG) Assessment product line for WSP in the UK. He has appeared as an Expert Witness on climate change and was a co-author of the updated guidance on GHG assessment in EIAs from the Institute of Environmental Management and Assessment.

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