

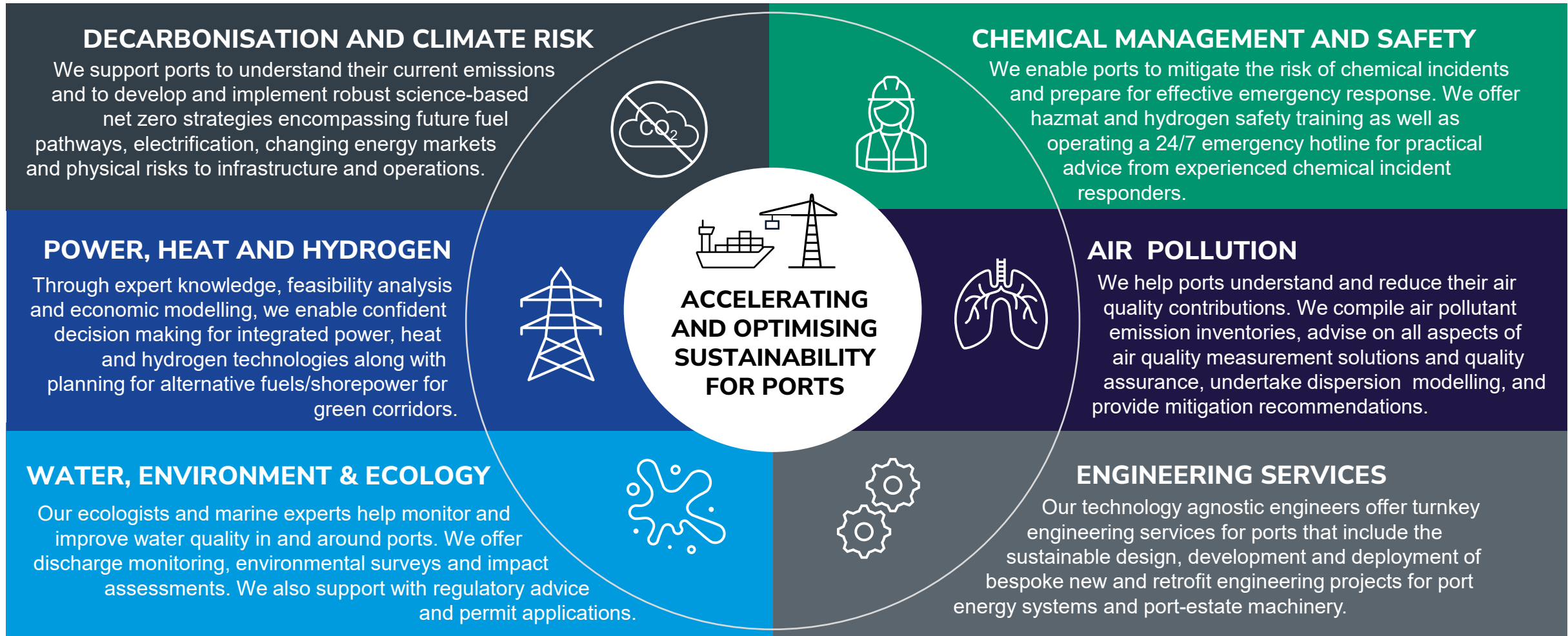


END TO END SUSTAINABILITY AND TECHNICAL SUPPORT FOR PORTS

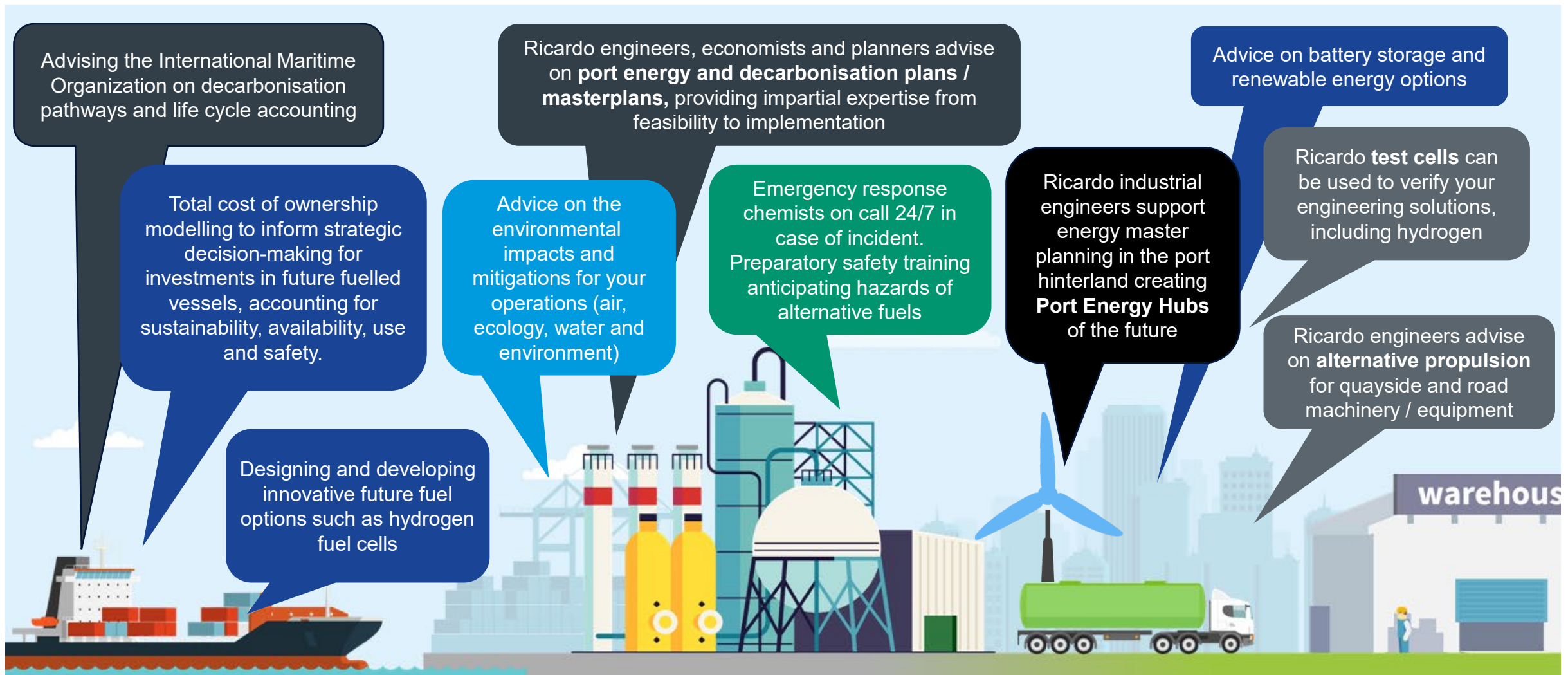
Ricardo

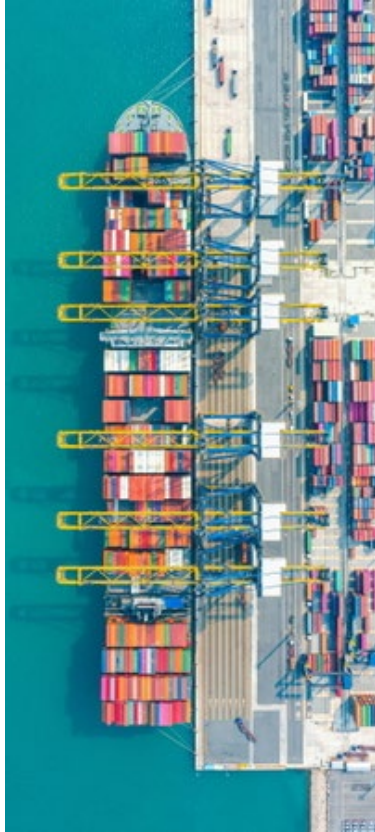
RICARDO – SUSTAINABILITY SUPPORT FROM CONCEPT TO COMPLETION

Building business resilience through sustainability



EXAMPLES OF OUR EXPERT SUPPORT TO PORTS AND THE MARITIME SECTOR





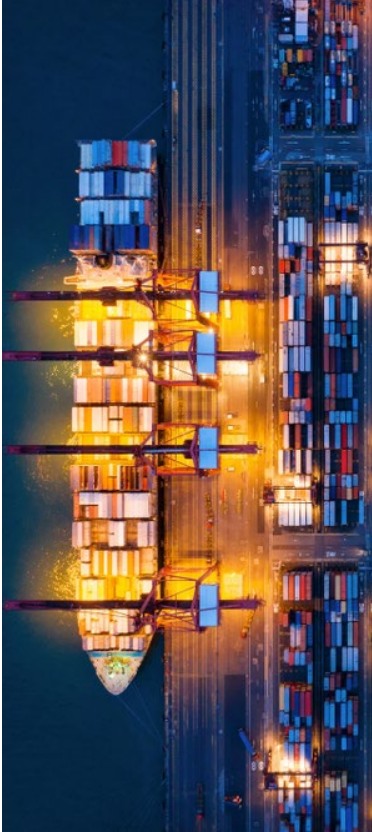
UNCHARTED WATERS

Ports are facing a unique set of challenges when it comes to ensuring a sustainable, profitable and resilient future as the maritime sector transitions to a low carbon economy. Investors, shipping companies, national and local regulators and the public are increasing pressure to see positive action on climate, environment and social issues. Alongside this, ports must invest to be ready to safely and efficiently handle the ships, fuels, energy demands and cargos of the future.

The transformation of ports must go hand in hand with that of the wider maritime sector and the requirements of their local areas. It must reduce environmental impact and be economically viable. Expert guidance is essential to develop and effectively implement robust forward-facing strategies that build resilience and reduce risk. Ricardo's maritime experts work with stakeholders across the sector from international and regional policy makers (such as the IMO and EU), local authorities, vessel operators, port owners, harbour authorities and technology providers giving them a holistic understanding of the latest thinking and future direction for the sector. Our work across other transport sectors also gives us valuable insights that can be applied to the maritime sector.

Ricardo's technical experts accelerate and optimise progress across the whole value chain, gathering evidence, conducting gap analysis and scenario analysis, developing and refining strategies, planning action, modelling feasibility and economic outcomes, appraising technology and acting as owner's engineer. Our experts are technology agnostic so can independently advise on the best solutions for your circumstances. With our support you can be confident of achieving the best possible outcomes in the most effective way.

Whether you need support to understand the changing policy landscape, recreate or refine your masterplan, gather evidence for decision making or implement your strategy, Ricardo can help.



NET ZERO AND SCOPE 3 EMISSIONS

PLANNING AND IMPLEMENTING YOUR MOST EFFECTIVE PATHWAY TO NET ZERO EMISSIONS

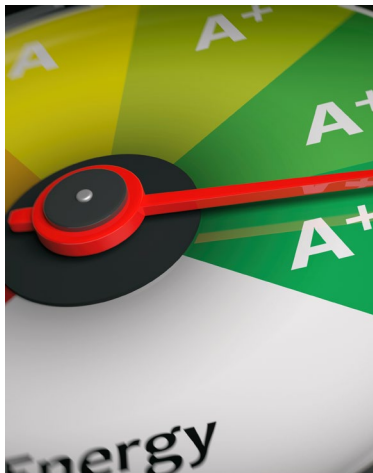
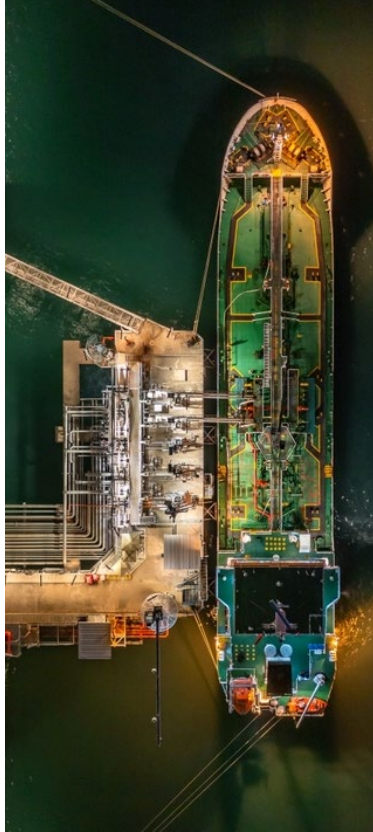
Climate change will disrupt your business systems and affect your bottom line, but forward-looking ports are already planning and implementing net zero strategies that turn threat into opportunity – reducing risks to their business operations and increasing their resilience and adaptability.

We work with ports to tackle their direct (Scope 1) and indirect energy (Scope 2) emissions, as well as their value chain (Scope 3) emissions which can account for more than 90% of an organisation's carbon impact.

Every port is different which is why we tailor our solutions to your own situation and climate ambitions, but we always use robust evidence, tried and tested methodologies and our deep experience to help you plan and achieve your net zero ambitions. Net zero is a journey that requires buy-in from multiple stakeholders: the board, the staff, suppliers and investors – our experts can facilitate engagement and education to align all relevant parties to help you accomplish your climate goals.

We offer a range of services to help ports realise their net zero ambitions:

- Carbon footprint and baselining
- Scope 3 emissions inventories
- Emissions projections and net zero modelling
- Net zero measures and scenario modelling
- Target setting and SBTi alignment
- Development of net zero and scope 3 roadmaps
- Supply chain stakeholder engagement
- Technology feasibility and design options
- Implementation support
- Energy and carbon reporting
- Site energy auditing
- Progress review and update of strategic plans.



ENERGY SYSTEMS MODELLING

IMPLEMENTING SUSTAINABLE ENERGY SOLUTIONS

Electrified port machinery, shore power for berthed ships and demands from the wider port industrial hinterland imply high energy consumption at ports. Meanwhile decarbonisation is an imperative with regulations, net zero commitments, public and investor pressure and energy costs all driving action.

Ricardo's energy engineers and technical experts work with ports to plan strategically, make informed investment decisions and implement effective sustainable energy solutions that are bespoke to each port's circumstances.

From network innovation and developing smart grids through renewable energy (self-generation) options to use of hydrogen and alternative fuels, our technology-agnostic experts provide independent advice based on robust evidence and deep experience to provide you with future-facing energy solutions tailored to your needs. With Ricardo's support you can build resilience and adaptability to changing energy markets and demands, tightening regulation and climate change impacts.

We offer a range of services to help ports optimise their energy transition:

- Renewable energy options analysis
- Pre-feasibility and feasibility studies
- Technology implementation
- Multi-use decarbonisation infrastructure
- Grid connection and grid capacity
- Network innovation
- Demand-side management
- Private wire
- Energy investment analysis
- Utility asset optimisation
- Hydrogen – strategy, planning and feasibility, demand mapping and end use cases



CLIMATE ADAPTATION

BUILDING RESILIENCE TO ENHANCE SAFETY AND ADAPT TO A CHANGING CLIMATE

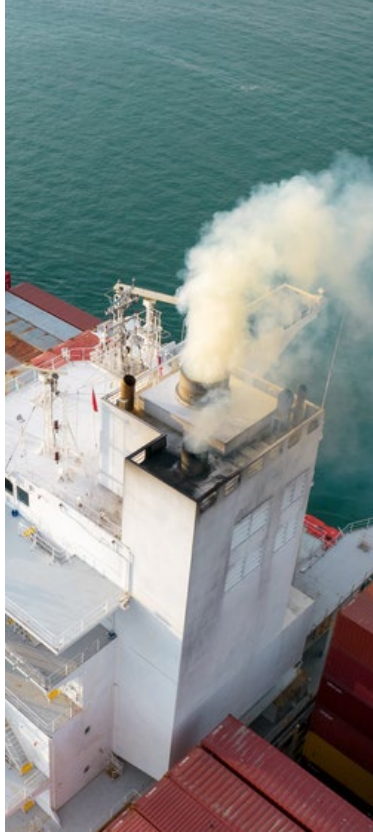
Ports are heavily exposed to climate risk, with extreme weather events increasingly creating safety concerns, disrupting operations and damaging infrastructure. As climate change increases and extreme weather events' increasing severity and frequency posing a growing threat, it is vital that ports fully understand their risks and build their resilience. A resilient port reduces the risks to personnel and minimises financial losses from damage to equipment and interruption to operations.

Our work on risk also supports ports to understand how the global transition to net zero can disrupt existing markets and supply chains and generate new ones. Understanding the transition and seizing the opportunities will be key to business growth over the coming decade.

Ricardo's climate risk and adaptation experts work with ports and other complex businesses to analyse and tackle both physical and transitional risks related to climate change and seize the opportunities net zero offers.

We offer a range of services to help organisations understand their risks and adapt to a changing climate:

- Climate risk and opportunity assessment
- Climate scenario analysis
- ISSB (was TCFD) reporting and disclosure
- Ongoing monitoring of climate risks and issues
- Transition plans
- Adaptation strategy and plan
- Stakeholder engagement and training



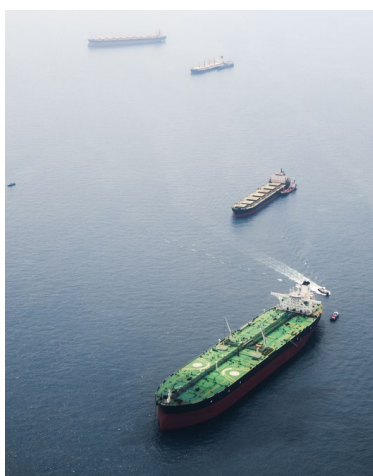
MANAGING AIR POLLUTION

UNDERSTANDING YOUR EMISSIONS THROUGH EVIDENCE-BASED MONITORING AND MODELLING

The management and control of risks from air pollution are driven by regulatory frameworks adopted by local, national and international authorities, and by the need for businesses to demonstrate environmental, corporate social responsibility. This is a complex field of work as emissions are generated from a wide range of sources at ports including vessels, port side machinery, vehicle traffic, rail, buildings and plant. The impact of these emissions also depends on meteorology, the proximity of the port to key receptors such as residential areas, and many other factors. Therefore, characterising these emissions and their impact demands a detailed understanding of the underlying sources, their activity profiles and dispersion processes. Poorly characterised pollution sources or modelling systems can lead to failed policies and action plans, wasted investment and, potentially, regulatory penalties.

Our experts can work with you to develop a robust evidence base of your air pollution impact and mitigation policy and actions through air quality monitoring, emissions inventory and modelling. We can provide you with tailored solutions to meet your needs and manage the risks to your business. We offer a range of services including:

- Design and installation of air quality monitoring networks, both reference and sensor systems
- Operation, calibration, quality control and data management of monitoring systems
- Development of port air quality strategies, to understand and mitigate your emissions
- Port emissions inventories and forecasts
- Local and regional-scale dispersion modelling to assess your impact on local air quality
- Regulatory policy advice and development, to meet your obligations under local and national regulatory frameworks
- Noise, odour, dust and oil-pollution assessment services



GREEN CORRIDOR DEVELOPMENT

ACCELERATING THE ADOPTION OF CARBON NEUTRAL SHIPPING ROUTES

Green shipping corridors are essential for maritime decarbonisation. These designated routes focus innovation and testing of green technologies, making it easier to implement and scale sustainable practices. By concentrating efforts on specific routes, the maritime industry can more efficiently develop and deploy alternative fuels and energy-efficient vessels. These corridors foster collaboration among ports, shipping companies, and governments, encouraging investment in critical infrastructure such as refuelling infrastructure and onshore power supplies. By reducing emissions along these routes, green shipping corridors improve air quality and ocean health, and they also demonstrate the viability of green shipping technologies, driving broader industry adoption.

Each corridor is unique, requiring bespoke analysis to assess the technical and economic feasibility of operating zero-emission vessels along the route. Ricardo has proven expertise in conducting the comprehensive analyses needed to establish a green shipping corridor, including vessel decarbonisation options and landside infrastructure requirements. Combined with our proficiency in environmental and economic assessments, Ricardo offers the complete skillset necessary to develop and implement effective green shipping corridors.

Our offering to potential green shipping corridors:

- Environmental assessment
- Vessel decarbonisation solutions analysis
- Hydrogen and derivatives— strategy, planning and feasibility, demand mapping and end use cases
- Port infrastructure assessment
- Economic analysis and business case development
- Shore power feasibility assessment
- Stakeholder engagement



PORT SAFETY

PUTTING SAFETY FIRST TO PROTECT PEOPLE, THE ENVIRONMENT, YOUR ASSETS AND REPUTATION

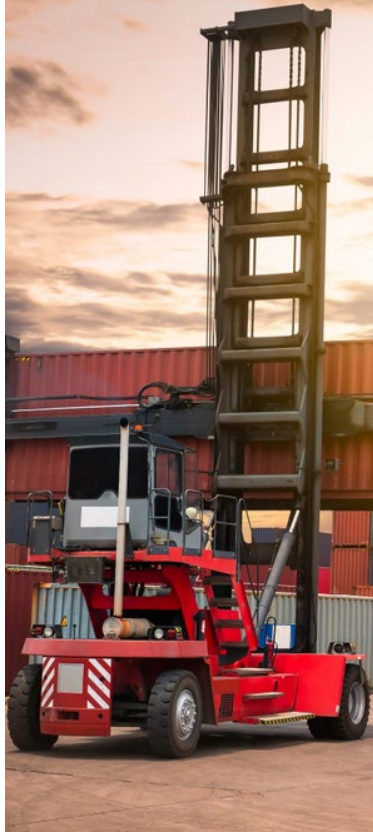
Ensuring a safe and clean working environment is imperative for ports. With potentially dangerous chemicals being stored or passed through your care alongside the effects of climate change increasing the risk of exposure to hazards such as excessive heat, ultraviolet radiation, extreme weather events and air pollution, safety needs to be considered from many angles.

Our chemical experts can help mitigate the risk of safety incidents and provide advice to minimise negative impacts should a chemical related incident occur. We offer a range of training courses to build knowledge and practical ability in your workforce enabling them to safely prevent or manage dangerous situations.

Our trained emergency response chemists are relied on by the UK and other international emergency services as well as hundreds of leading chemical and logistics organisations. The multilingual service is available globally, 24/7/365 and provides tailored practical advice to those on the scene to resolve chemical emergencies with the least possible impact on people first and foremost, then taking steps to protect the environment, your assets and your reputation. Ricardo's air quality and climate adaptation experts can work with you to identify and minimise risks posed by the environment.

We offer a range of services to help ports create a safe and sustainable environment:

- 24/7/365 chemical emergency response hotline
- Hazmat and response safety training
- Alternative fuel safety training
- Dangerous goods advisor
- Chemdata – an interactive chemical hazard database
- Climate adaptation plans
- Air quality improvement



DECARBONISING YOUR FLEET AND MACHINERY

SUSTAINABLE MOBILITY SOLUTIONS

Ports are dependent on the safe, efficient and reliable operation of their vehicle fleets and the transition to sustainable mobility solutions must be achieved without compromising these operations. We can de-risk the energy transition and bring sustainable mobility solutions to your vehicle fleet. We leverage our deep technical expertise to develop and implement new mobility solutions, with improved efficiency and performance, and bring them to market quicker and more cheaply without compromising safety or quality.

We can determine the best clean, sustainable propulsion solution for your business, through understanding your operational requirements and the available portfolio of technologies, whether battery electric, fuel cell, or internal combustion engines, using hydrogen or de-fossilised fuels.

For electrified vehicles, we provide solutions across power electronics, software and control, eMachines, eDrives and batteries to accelerate the adoption of EVs and the energy transition of your fleet.

Ricardo can support you to navigate changing legislations, identify and implement sustainable fuel solutions including hydrogen, biofuels, and synthetic fuels to reduce emissions across a wide range of machine and vehicle types.

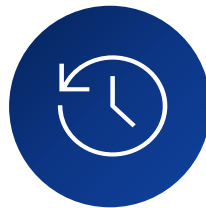
- Fleet electrification
- Sustainable fuel appraisal
- Hydrogen fuel cells
- Clean and efficient combustion engine technologies
- Transmissions and driveline
- Conversion, retrofit, and demonstrator vehicles



ABOUT RICARDO

WE ARE A GLOBAL STRATEGIC, ENVIRONMENTAL AND ENGINEERING CONSULTING COMPANY

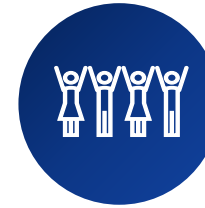
Our teams of consultants, environmental specialists, engineers and scientists support customers in solving the most complex and dynamic challenges to help achieve a safe and sustainable world. We have been working with the marine sector for more than a century and advise international policy makers national and local governments, trade associations and companies. We provide tailored support from concept to completion across the value chain, gathering robust evidence to inform effective strategies which we help to implement and report on.



Deep heritage of
109
years of
innovation



Located in
23
countries
worldwide



More than
3000
colleagues
worldwide



We have over
2500
live
projects

START A CONVERSATION ABOUT
ACCELERATING AND OPTIMISING
YOUR SUSTAINABILITY JOURNEY



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