



Ricardo
Energy & Environment

Expert environmental and sustainability advice for maritime operations

With over 50,000 merchant ships operating around the world, emissions from international shipping contributes 2% to annual global greenhouse gas (GHG) emissions. The next decade is set to see shipping activity rise significantly, leading to increases in emissions – and the associated health impacts – of GHGs and toxic air pollutants at ports and coastal locations.

The Paris Agreement's focus on limiting the worsening impacts of climate change, together with the increasingly high profile of the burdens posed by urban air pollution, will result in the global maritime industries coming under increased scrutiny from regulators and governments worldwide, with ever greater pressure to reduce their environmental impact.

Ricardo's experts, engineers and scientists have extensive experience, knowledge and track record of:

- Providing environmental and sustainability advice to maritime operations.

- Helping regulators, governments and industries to understand and address environmental challenges – from analysing sustainable marine engine technologies and fuels through to measuring the impacts of shipping on local and regional environmental quality.

Our knowledge spans the full range of environmental issues including:

- GHG emissions.
- Air quality and pollution control.
- Water quality.
- Fuel efficiency and energy management.
- Policy development.

Our services

Our services have been developed to help our clients understand the current and potential future environmental impacts of maritime operations and how to manage them.

Air emissions quantification, mitigation and policy development

- Compiling air emission inventories to quantify pollution from vessels and ports.
- Conducting emissions measurements to improve understanding of real-world emissions.
- Assessing ambient air pollution impacts, and occupational and public exposure risks arising from maritime pollutant emissions.
- Designing, installing, operating and managing air quality monitoring stations to support compliance reporting.
- Conducting detailed air dispersion modelling of pollutant emissions at ports to enable air quality forecasting and develop improvement strategies.
- Assessing technical options to reduce emissions from vessels and ports, using cost-effectiveness analysis and marginal abatement cost curves.
- Developing policy options for reducing emissions to deliver improved air quality in ports and port cities, including cost-benefit analysis and decarbonisation pathways.
- Projecting shipping activity and future trends, including sustainable and economically viable future alternative marine fuels and their infrastructure.
- Carrying out fuel sulphur reporting obligations under Directive 2016/802/EU on sulphur content of certain liquid fuels (formerly Directive 1999/32/EC).

Water quality, regulatory compliance support and incident/risk management

- Monitoring and assessing water discharges to support the achievement of regulatory compliance.
- Providing environmental permit application and regulatory support, including liaison with key regulatory authorities.
- Delivering in-house planning and environmental impact assessment (EIA) expertise to support port development and expansion.
- Conducting ballast water management and strategic environmental assessments (SEA).
- Performing marine environmental baseline surveys for macroinvertebrates, macroalgae and habitats to support ecological protection and port planning and development.

- Providing support during environmental incidents through Ricardo's National Chemical Emergency Centre (NCEC), so minimising the impact of marine incidents on people, the environment, assets and reputation.
- Carrying out weathering and dispersant testing to minimise risks, so providing confidence that oil spill incidents can be resolved quickly and efficiently.

Our experience

Our experience includes:

- Detailed modelling of vessel and in-port emission sources to underpin local environmental modelling for a UK port city.
- Behaviour and fate modelling (including vapour clouds), and incident response advice for a spill of a hazardous chemical at sea from an international marine operator in close proximity to a highly populated port city. We helped to resolve the incident without there being any impact on human health, the environment or the organisation's reputation.
- Research and life cycle analysis of the financial and environmental impacts of using natural gas as a marine fuel to reduce emissions.
- Environmental permit support to a highly industrialised UK port, including predictive air quality modelling and assessment of the impacts of marine operations on health. Our work supported the port in cost-effectively achieving a permit renewal.
- Air quality monitoring at a port to review nitrogen dioxide and particulate matter concentrations against EU limit values.
- Analysing the performance and behaviour of a heavy-fuel-oil alternative made from post-consumer waste plastic (that was previously unrecyclable) to assess if it was suitable to be used commercially by marine operators. The project also involved conducting an environmental life cycle assessment, which demonstrated the process would have a significant positive environmental impact.



For more information on our environmental and sustainability advice for maritime operations, please contact one of our experts at enquiry-ee@ricardo.com or +44 (0) 1235 753000