



ALTERNATIVE FUELS

SERVICES FOR
THE DEVELOPING
ALTERNATIVE FUELS
MARKET



**BUREAU
VERITAS**

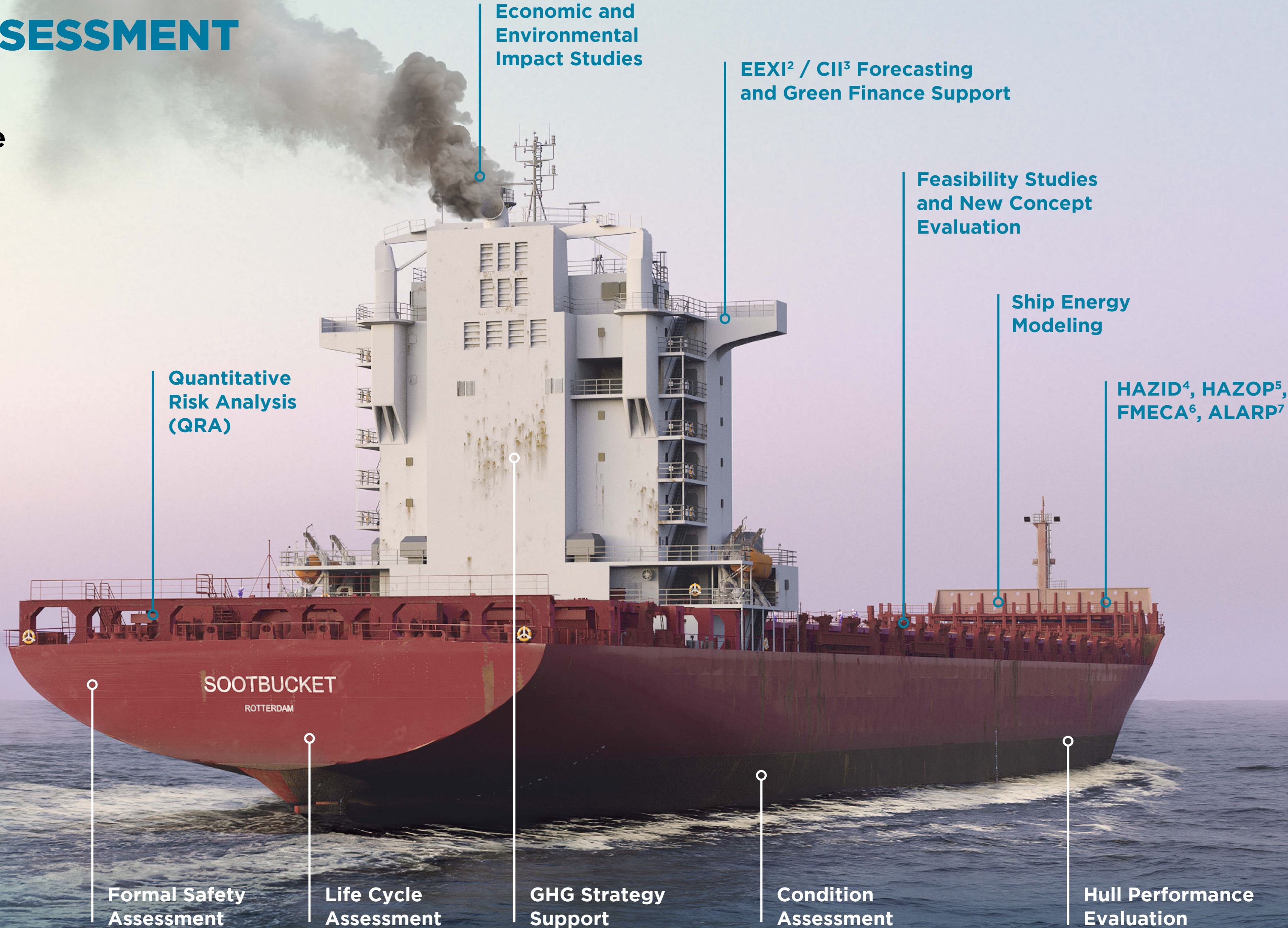
SOLUTIONS
Marine & Offshore

PRE-CONVERSION ASSESSMENT

Consultancy services to determine base case performance of traditionally fueled vessels

Ship owners face a wide range of fuel and ship design options, based on evolving international regulations, cost and environmental impact.

BV Solutions M&O is well-placed to advise on feasibility, energy modeling, IMO¹ measures and green finance. We also offer a variety of environmental studies and risk assessments, as well as project management consultancy.



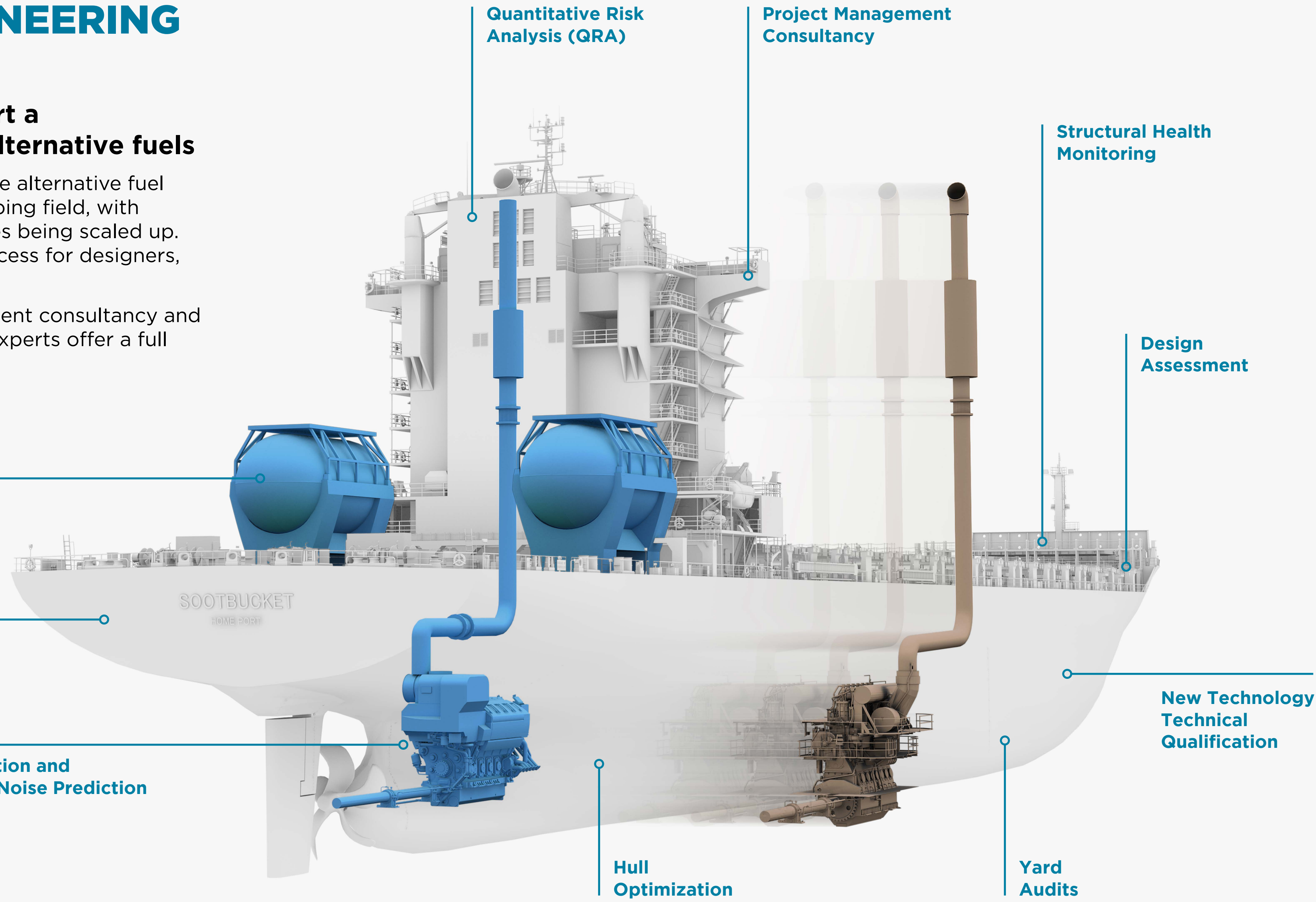
¹IMO – International Maritime Organisation
²EEXI – Energy Efficiency Existing Ship Index
³CII – Carbon Intensity Indicator
⁴HAZID – Hazard Identification
⁵HAZOP – Hazard and Operability analysis
⁶FMECA – Failure Mode, Effects and Criticality Analysis
⁷ALARP – As low as reasonably practicable

CONVERSION ENGINEERING

Engineering services to convert a traditionally fueled vessel to alternative fuels

Design approach varies depending on the alternative fuel technology chosen. This is also a developing field, with new technologies for storage and engines being scaled up. This means it will likely be a learning process for designers, suppliers and owners.

With risk assessments, project management consultancy and structural analysis, BV Solutions M&O's experts offer a full range of services for this critical stage.

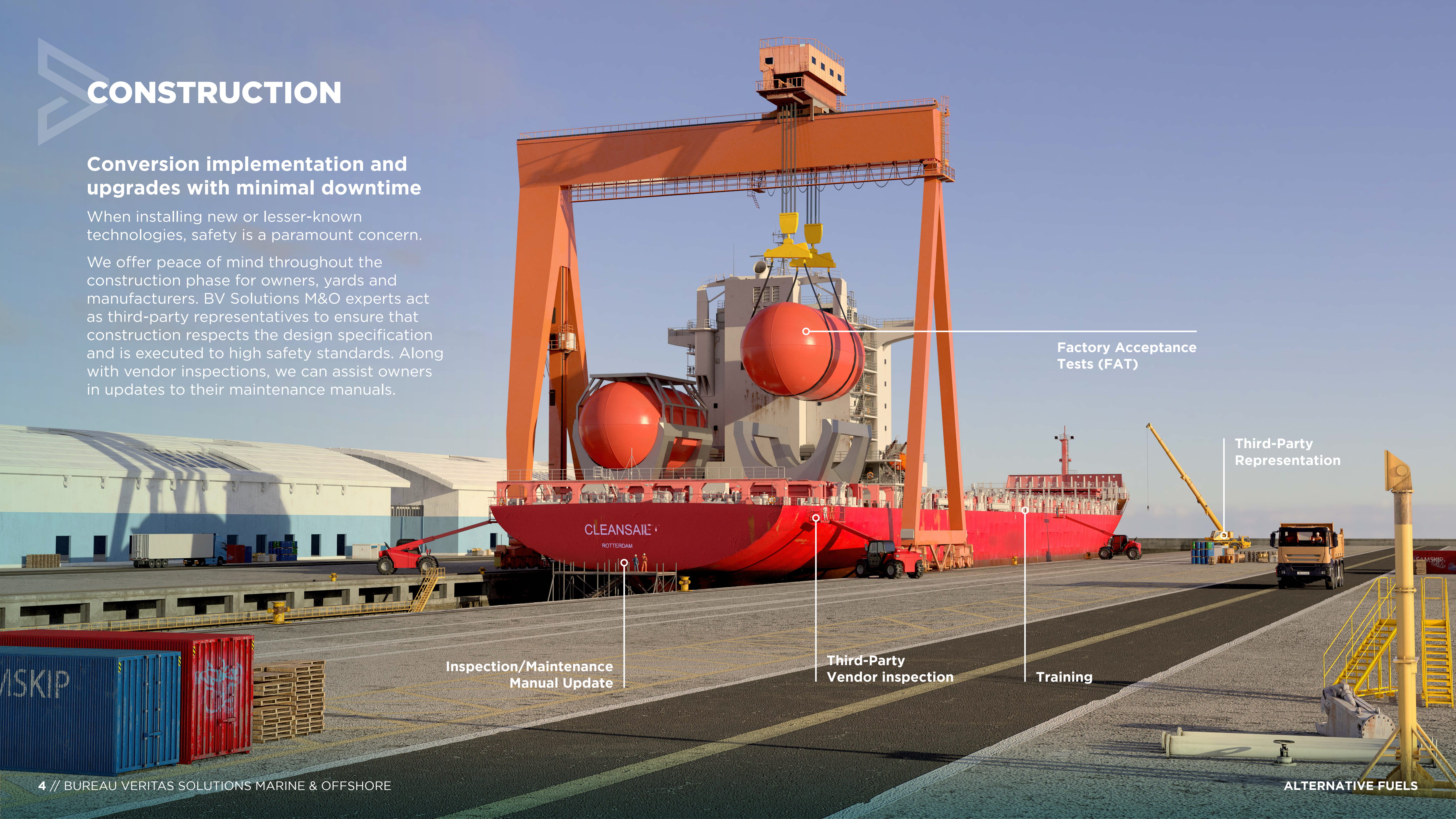


CONSTRUCTION

Conversion implementation and upgrades with minimal downtime

When installing new or lesser-known technologies, safety is a paramount concern.

We offer peace of mind throughout the construction phase for owners, yards and manufacturers. BV Solutions M&O experts act as third-party representatives to ensure that construction respects the design specification and is executed to high safety standards. Along with vendor inspections, we can assist owners in updates to their maintenance manuals.



Factory Acceptance Tests (FAT)

Third-Party Representation

Inspection/Maintenance Manual Update

Third-Party Vendor inspection

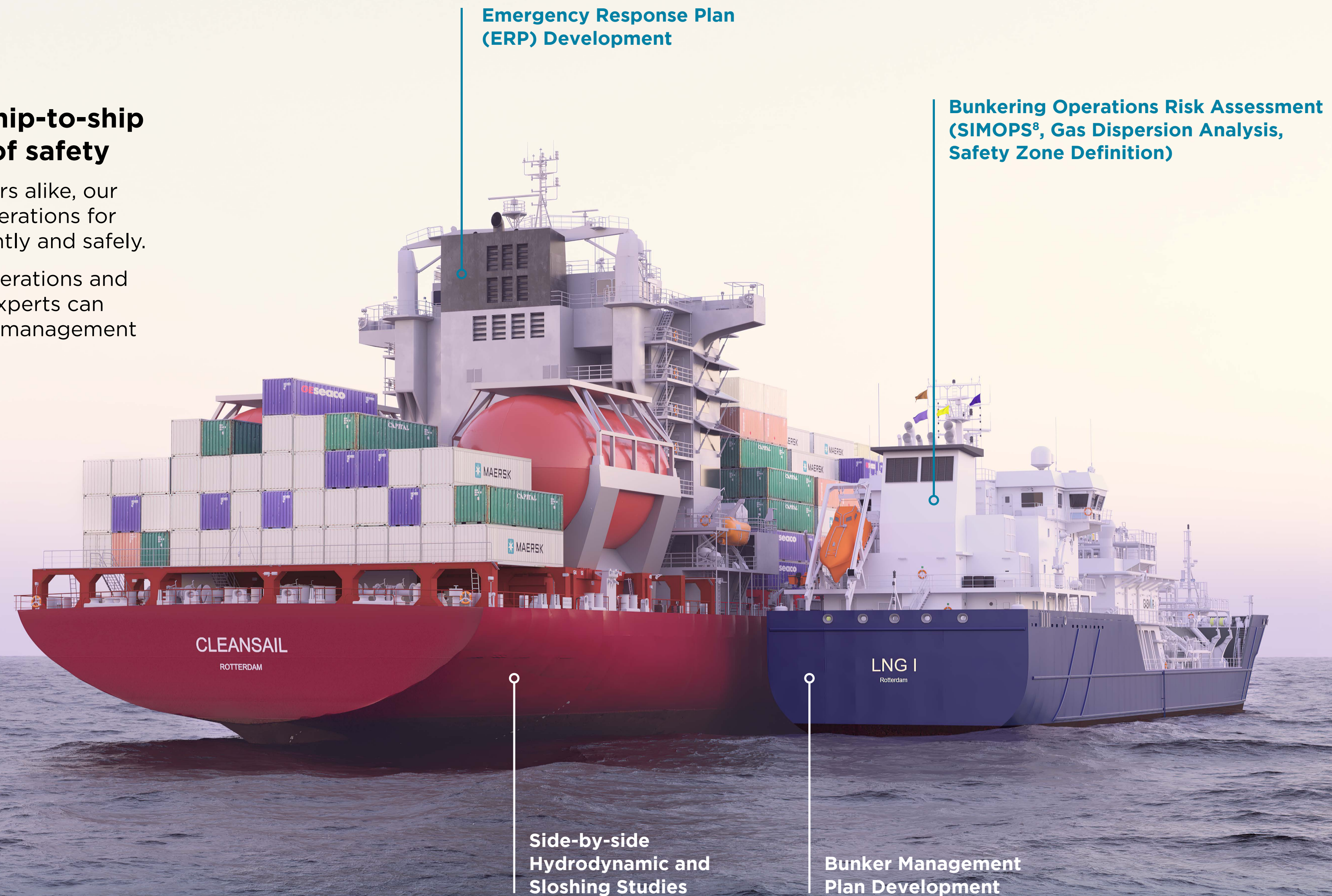
Training

BUNKERING

Supporting ship-to-shore and ship-to-ship transfers to ensure high-levels of safety

Reassuring port authorities and ship owners alike, our experts help ensure that the bunkering operations for alternative fuels can be carried out efficiently and safely.

We offer risk assessment for bunkering operations and hydrodynamic and sloshing studies. Our experts can also help with the development of bunker management and emergency response plans.



⁸ SIMOPS – Simultaneous Operations

LOGISTICS

Engineering consultancy services for the creation of worldwide logistics networks for new fuels

The availability and quality assurance of alternative fuels is an area of concern for ship owners and operators. From port stops and bunkering availability to questions of price, much is set to evolve and change in the coming decades.

BV Solutions M&O plays its role in reassuring our clients, with our knowledge of upstream production and supply, and practical services such as vendor qualification and audits.

Vendor Qualification and Audits



IN SERVICE

Monitoring environmental performance, storage of alternative fuels, inspections and more

Once in service, a newly converted vessel must conform to the evolving regulatory standards of IMO short-term measure CII.

Our experts are by our clients' side in navigating the regulatory ecosystem with their converted vessels, from CII to URN measurements and more.



⁹ URN – Underwater Radiated Noise

Comprehensive support for all your needs

We combine expert technical expertise with a deep respect of the maritime environment.

Our diversity of skills and depth of knowledge enable us to tailor our solutions to our clients’ specific challenges.

With years of hands-on experience, we offer solutions to improve safety, sustainability, strategy and operations – all while lowering overall costs.

**PRE-CONVERSION
ASSESSMENT**

- HAZID, HAZOP, FMECA, ALARP
- Formal Safety Assessment
- Quantitative Risk Analysis (QRA)
- Ship Energy Modeling
- Feasibility Studies and New Concept Evaluation
- EEXI / CII Forecasting and Green Finance Support
- Economic and Environmental Impact Studies
- Life Cycle Assessment
- Hull Performance Evaluation
- Condition Assessment
- GHG Strategy Support

**CONVERSION
ENGINEERING**

- HAZID, HAZOP, FMECA, ALARP
- Formal Safety Assessment
- Quantitative Risk Analysis (QRA)
- Project Management Consultancy
- Design Assessment
- Noise, Vibration and Underwater Noise Prediction
- New Technology Technical Qualification
- Structural Health Monitoring
- Hull Optimization
- Yard Audits

CONSTRUCTION

- Third-party Representation
- Factory Acceptance Tests (FAT)
- Third-party Vendor Inspection
- Training
- Inspection/Maintenance Manual Update

BUNKERING

- Bunkering Operations Risk Assessment (SIMOPS, Gas Dispersion Analysis, Safety Zone Definition)
- Emergency Response Plan (ERP) Development
- Bunker Management Plan Development
- Side-by-side Hydrodynamic and Sloshing Studies

LOGISTICS

- Vendor Qualification and Audits

**IN
SERVICE**

- Root Cause Analysis
- URN Measurement
- Damage and Failure studies
- Live CII tracking
- Training
- Noise & Vibration Measurements
- Structural Health Monitoring
- Onboard Measurements



HIGH-PERFORMANCE SOLUTIONS FOR FAST-CHANGING MARINE & OFFSHORE ENERGY MARKETS

Bureau Veritas Solutions Marine & Offshore is an entrepreneurial, collaborative solutions provider, building on 190 years of experience.

We provide technical advisory, asset management and assurance solutions for the Marine and Offshore energy markets. Our top-tier, added-value solutions enable clients to resolve new and complex issues, de-risk projects and optimize costs.

By listening to our clients and gaining an in-depth understanding of their challenges, our experts can deliver tangible improvements to asset and business performance, safely and responsibly. In an increasingly digital world, we partner with clients to go beyond compliance, enabling their assets to perform reliably, efficiently and with a significantly reduced level of risk and cost.

Together we build on what we know today to
change how things are done tomorrow... for good.

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