



Ammonia Process Safety Management Maturity Self-Assessment Tool

Assessment Template



Disclaimer

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Opinions found in this report do not necessarily represent those of each partner.

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Fuel Safety Frameworks: Ammonia is a practitioner series from the Lloyd's Register Maritime Decarbonisation Hub and the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping.

Ammonia as Fuel Competencies and Training (2025)

- [Project Summary Report](#)
- [Competencies and Training Proposed Overall Framework](#)
- [Detailed Competency & Training Operational, Maintenance and Emergency Response Scenario Evaluations](#)

Ammonia Competency and Training Practitioners Handbooks (2026)

- [Emergency Response](#)
- [Maintenance](#)
- [Leak Detection, Management, Isolation and Repair](#)

Ammonia Process Safety Management Maturity Self-Assessment Tool (2026)

- [User Guide](#)
- [Element Maturity Tables](#)
- [Assessment Template](#)

Executive summary

Why use this tool?

The adoption of alternative fuels in shipping, for the purpose of lowering greenhouse gas (GHG) emissions, will entail significant changes in maritime safety management. Ammonia has received particular attention as a high-potential route to maritime decarbonisation that – in its deployment – also requires a careful re-evaluation of maritime safety practices. While the general need for this re-evaluation is clear, our understanding of the particular character of the required changes is less settled. Vessel owners, operators and managers contemplating use of ammonia as a fuel are confronted with important safety management questions for which there are few ready answers: ‘where do we begin?’, ‘what aspects of our operation should we focus on when implementing change?’, ‘how can we be confident that our operation is ammonia-ready?’.

This tool provides a basis for developing initial answers to these questions. It is grounded in a belief that the maritime industry can learn from other safety-critical industries that have track-records of safely handling hazardous molecules like ammonia. Specifically, it describes how the process safety management (PSM) approach to managing safety – well-established in sectors such as chemical engineering and oil and gas – can be applied in the maritime context to help orient the industry to the safety management requirements of an ammonia-powered future.

Who is this tool for?

The primary audiences for this tool are those vessel owners, operators and managers who are in the process of adopting ammonia as a marine fuel, or considering doing so. This includes both shore-based and sea-going vessel management. For these audiences, this tool provides a mechanism for evaluating present safety management arrangements against a PSM framework, and for identifying the aspects of these arrangements that may require improvement.

In addition to these primary audiences, this tool may also be of interest to stakeholders with a more general interest in assuring safe maritime operations, including seafarers, operators using fuels other than ammonia, regulators and training establishments. While the development of this tool has been motivated by the challenge of assuring the safe deployment of ammonia as a marine fuel, there may nevertheless be value in maritime stakeholders who are not (or not yet) considering adopting ammonia as a fuel evaluating their activities through the lens provided by PSM. We welcome engagement from this extended audience as part of the wider dialogue supporting continuous improvement in maritime safety outcomes.

Structure

For ease of use, the tool is separated into 3 documents that should be used together when performing self-assessments. These are:

- The [User Guide](#)
- The [Element Maturity Tables](#)
- The [Assessment Template](#) ([click here](#) to download the editable template)

Feedback

We are keen that this publication – and future work – is as relevant and useful to industry as possible. To this end, we welcome feedback on this tool using the following QR code or [click here](#).



For guidance on use of this Template, refer to the User Guide.

Assessment Template

Assessment strategy (if used): ☐ Maritime baseline ☐ PSM conversion ☐ Risk-based triage

Commit to Process Safety

Element	Element goal						Remarks (Evidence/ Next Steps/ Priority)
		Ad-hoc	Reactive	Standardised	Proactive	Generative	
Process Safety Culture	Leadership and workforce consistently prioritise process safety in decision-making and daily behaviour.	☐	☐	☐	☐	☐	
Compliance With Standards	All operations demonstrably meet or exceed relevant codes, standards and legal requirements.	☐	☐	☐	☐	☐	
Process Safety Competency	Organisational processes and resources support the maintenance and application of effective process safety knowledge and practices (technical and non-technical).	☐	☐	☐	☐	☐	
Workforce Involvement	Personnel from across the organisation actively participate in developing, improving and assuring integrated PSM.	☐	☐	☐	☐	☐	

Understand Hazards & Risks

Element	Element goal	Ad-hoc	Reactive	Standardised	Proactive	Generative	Remarks (Evidence/ Next Steps/ Priority)
Process Knowledge Management	Accurate, accessible and current process safety information is maintained and used to enable effective risk-based decision-making.	☐	☐	☐	☐	☐	
Hazard Identification and Risk Analysis	Hazards and associated risks are systematically identified and assessed to enable control of risks within tolerable limits.	☐	☐	☐	☐	☐	

Manage Risk

Element	Element goal	Ad-hoc	Reactive	Standardised	Proactive	Generative	Remarks (Evidence/ Next Steps/ Priority)
Operating Procedures	Procedures are clear, current, appropriately formulated and dependably followed by trained personnel.	☐	☐	☐	☐	☐	
Safe Work Practices	Safety practices for hazardous work are developed and consistently implemented to assure the safety of those affected by the work, as well as the integrity of the assets involved.	☐	☐	☐	☐	☐	

Manage Risk *continued*

Element	Element goal	Ad-hoc Reactive Standardised Proactive Generative					Remarks (Evidence/ Next Steps/ Priority)
Asset Integrity and Reliability	Technical system assets are designed, installed and maintained to operate safely throughout their lifecycle.	☐	☐	☐	☐	☐	
Training and Performance Assurance	Adequate training is provided to all persons serving on ammonia-fuelled vessels and shore-side staff managing such vessels. Safe human performance is verified.	☐	☐	☐	☐	☐	
Management of Change	Effective change management ensures that neither the quantity, frequency nor the nature of changes (to assets, processes or organisation) adversely affects system safety.	☐	☐	☐	☐	☐	
Conduct of Operations	Operations are conducted in a disciplined, controlled and consistent manner that delivers required outputs while maintaining the integrity of systems.	☐	☐	☐	☐	☐	
Emergency Management	Emergency situations – including those involving ammonia hazards – are anticipated and adequately prepared for, with resources and practiced plans available to support effective response to emergencies.	☐	☐	☐	☐	☐	

Learn from Experience

Element	Element goal	Ad-hocReactiveStandardisedProactiveGenerative					Remarks (Evidence/ Next Steps/ Priority)
Measurement and Metrics	Performance indicators track leading and lagging safety indicators and are used to guide risk management decisions and continuous improvement.						
Auditing	Regular audits confirm PSM systems are functioning as intended and identify areas for improvement.						
Management Review and Continuous Improvement	Leadership/ management reviews ensure that organisation-level policies, strategies and plans remain appropriate and effective over time.						



Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

Fonden Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping is real climate action. We are a not-for-profit, independent research and development center established to accelerate the transition towards a net-zero future for the maritime industry. Together with our partners, we enable and inform the development and implementation of new technologies, build confidence in new concepts, and mature viable pathways to support the systemic and regulatory changes required to decarbonize global shipping.

As an independent and neutral platform for cross-sector collaboration, the Center brings together industry leaders, researchers, policymakers and public institutions to address some of the most complex challenges facing maritime decarbonization. Our work is grounded in scientific integrity, transparency and responsible governance, and is designed to facilitate trusted collaboration while respecting the independent decision-making of all participants.

The Center does not direct, coordinate or endorse commercial behaviour, market strategies or competitive outcomes. Instead, we provide fact-based research, analysis and insights that stakeholders may independently assess and apply within their own organisations and decision-making processes. We are committed to presenting our findings neutrally and transparently, including through clear methodologies and defined scopes of work, in order to support informed dialogue, innovation and evidence-based policymaking across the maritime ecosystem.

Through applied research, partnerships and industry-wide engagement, we aim to accelerate scalable solutions that support a safe, sustainable and commercially viable transition for the global maritime industry.

www.zerocarbonshipping.com



The Lloyd's Register Maritime Decarbonisation Hub (commonly known as the Decarb Hub) is an independent, non-profit initiative established through a partnership between Lloyd's Register Foundation – a global charity with a mission to engineer a safer world – and Lloyd's Register Group, a global provider of maritime professional services with over 260 years of heritage.

This partnership brings together the Foundation's public benefit mandate and focus on societal resilience, with the Group's deep technical expertise and trusted relationships across the maritime industry. Positioned at the intersection of these two organisations, the Hub is uniquely equipped to accelerate the safe, sustainable, and human-centric decarbonisation of global shipping – combining neutrality with influence, and research with real-world application.

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