Classification Rules for the future

ARCSOP
Perth, October 2023

Presented by:

Taylor Wamberg

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Lloyd's Register

Established more than

260 years

ago as the world's first marine classification society to improve the safety of ships.

Trusted maritime adviser

Partnering with clients to drive performance across the ocean economy

CLASSIFICATION, COMPLIANCE & ASSURANCE

ADVISORY & PERFORMANCE SERVICES

INNOVATION & DIGITAL SOLUTIONS

WE CARE – WE SHARE – WE DO THE RIGHT THING

Foundation

The Lloyd's Register Foundation – LR's social purpose

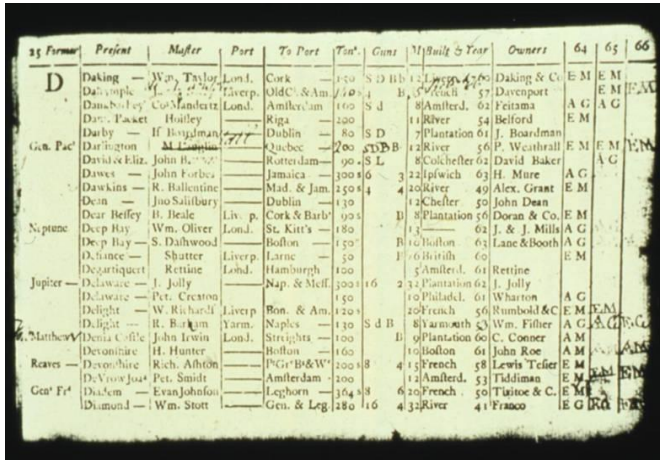
Engineering a safer world

What is classification?

The development, publication and worldwide implementation of Rules covering:

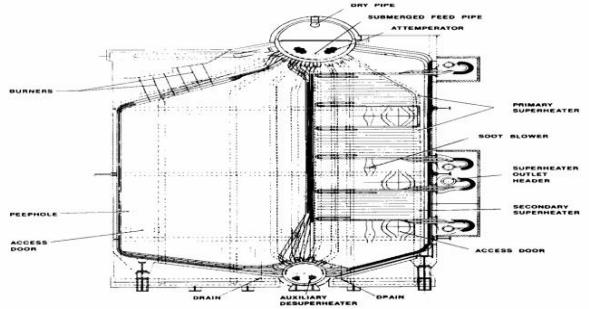
- Structural strength of the hull
- Safety and reliability of propulsion and steering systems
- Effectiveness of essential auxiliary systems

Derived from a commercial need to reduce loss

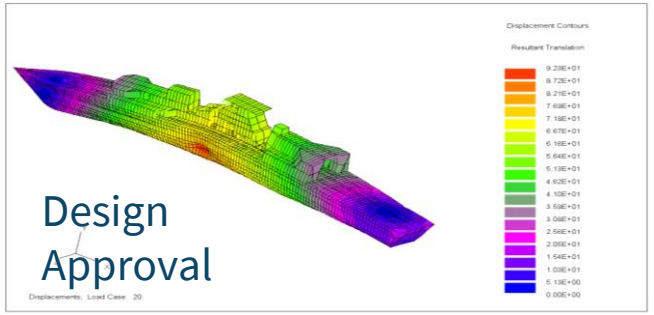


25 Former	Project	Master	Port	To Port	Tons	Guns	M/Built & Year	Owners	64	65	66
D	Daking	Wm. Taylor	Lond.	Cork	150	S D B	Lynn 1760	Daking & Co.	E M	E M	
	Dalrymple	W[illegible]	Liverp.	Old C. & Am.	160	4	B[illegible]ch 57	Davenport		E M	
	Danabelley	Co[illegible]dertz	Lond.	Amsterdam	160	S d	8 Amsterd. 62	Feitama	A G	A G	
	Dart. Packet	Hoitley	——	Riga	200		11 River 54	Belford	E M		
	Darby	H. Boardman	——	Dublin	80	S D	7 Plantation 61	J. Boardman			
Gen. Pac	Darlington	M. Dunbar	——	Quebec	300	S D B B	12 River 56	P. Weathrall	E M	E M	E M
	David & Eliz.	John B[illegible]	——	Rotterdam	90	S L	8 Colchester 62	David Baker		A G	
	Dawes	John Forbes	——	Jamaica	300	6 3	22 Ipfwich 63	H. Mure	A G		
	Dawkins	R. Ballentine	——	Mad. & Jam.	250	4 4	20 River 49	Alex. Grant	E M		
	Dean	Jno Salisbury	——	Dublin	130		12 Chester 50	John Dean			
	Dear Beffey	B. Beale	Liv. p.	Cork & Barb[illegible]	90		B 8 Plantation 56	Doran & Co.	E M		
Neptune	Deep Bay	Wm. Oliver	Lond.	St. Kitt's	180		13 —— 62	J. & J. Mills	A G		
	Deep Bay	S. Dalwood	——	Boston	150		B 10 Boston 63	Lane & Booth	A G		
	Defiance	Shutter	Liverp	Larne	150		F 6 British 60		E M		
	Degartiquett	Rettine	Lond.	Hamburgh	200		5 Amsterd. 61	Rettine			
Jupiter	Delaware	J. Jolly	——	Nap. & Meff.	300	16 2	32 Plantation 62	J. Jolly			
	Delaware	Pet. Creaton			150		10 Philadel. 61	Wharton	A G		
	Delight	W. Richards	Liverp	Bon. & Am.	120		20 French 56	Rumbold & C	E M	E M	
	Delight	R. Barham	Yarm.	Naples	130	S d B	8 Yarmouth 53	Wm. Fither	A G		
[illegible] Matthew	Denia Caftle	John Irwin	Lond.	Streights	100		B 9 Plantation 60	C. Conner	A M		
	Devonshire	H. Hunter	——	Boston	160		10 Boston 61	John Roe	A M		
Reaves	Devonshire	Rich. Affton	——	P[illegible] B & W	200	8 4	15 French 58	Lewis Teller	E M		
	De Vrow Joat	Pet. Smidt	——	Amsterdam	200		12 Amsterd. 53	Tiddiman	E M		
Gen[illegible] Fr[illegible]	Dafem	Evan Johnfon	——	Leghorn	364	8 6	20 French 50	Tixtoe & C.	E M		
	Diamond	Wm. Stott	——	Gen. & Leg	280	16 4	32 River 41	Franco	E G		

11. A coffee house scene in 1763.



The cycle of classification Rule Development

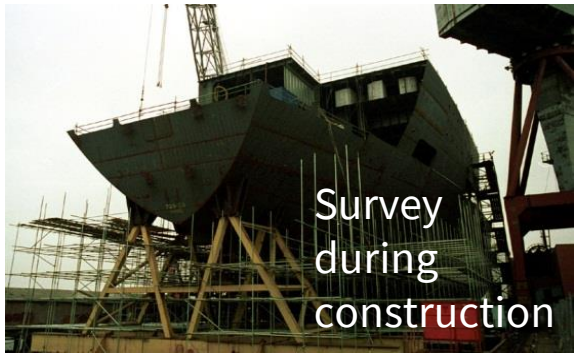


New Rules

FEEDBACK

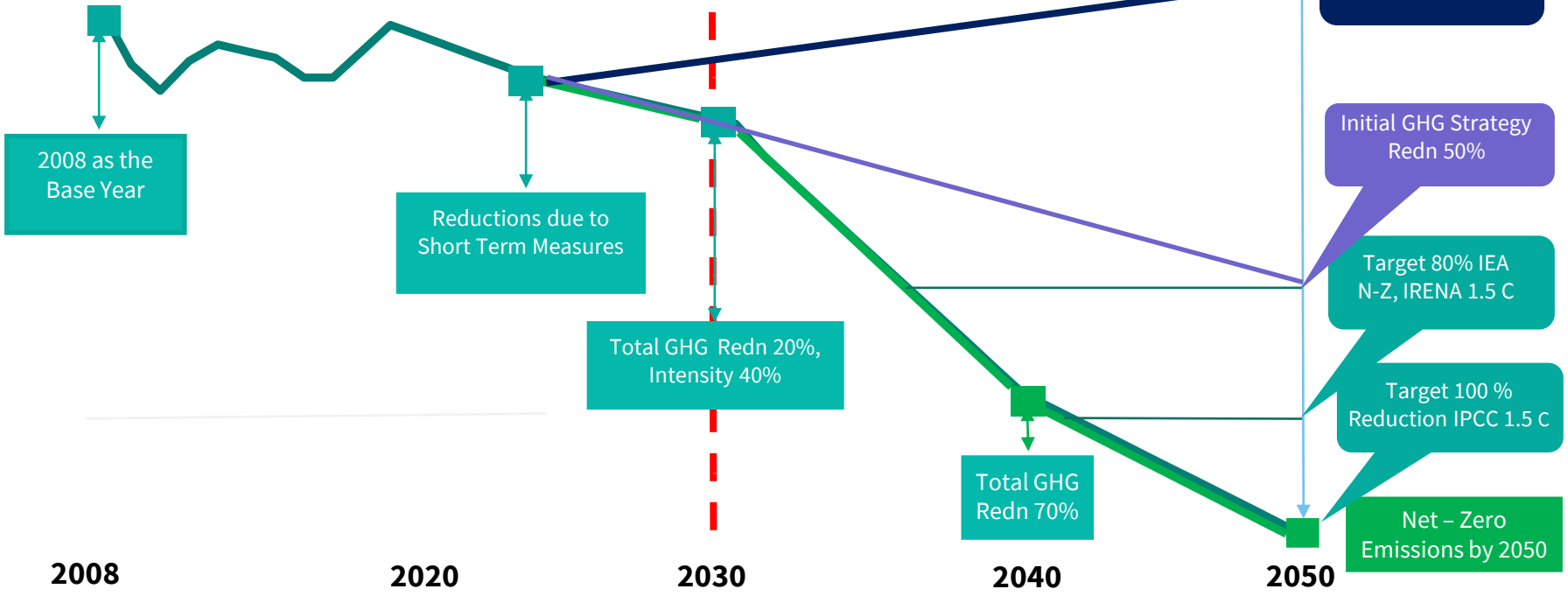
Rule Development

FEEDBACK

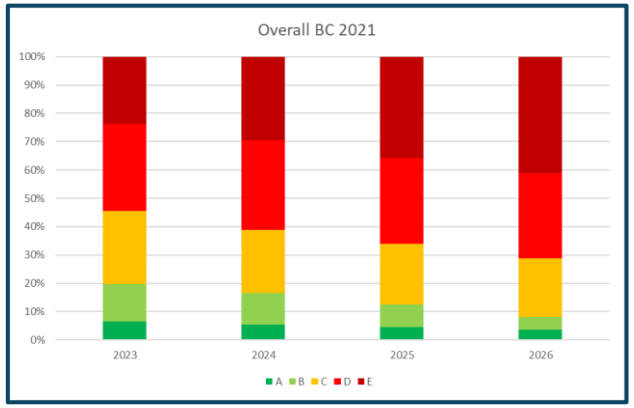


FEEDBACK

Rapid Change Ahead.



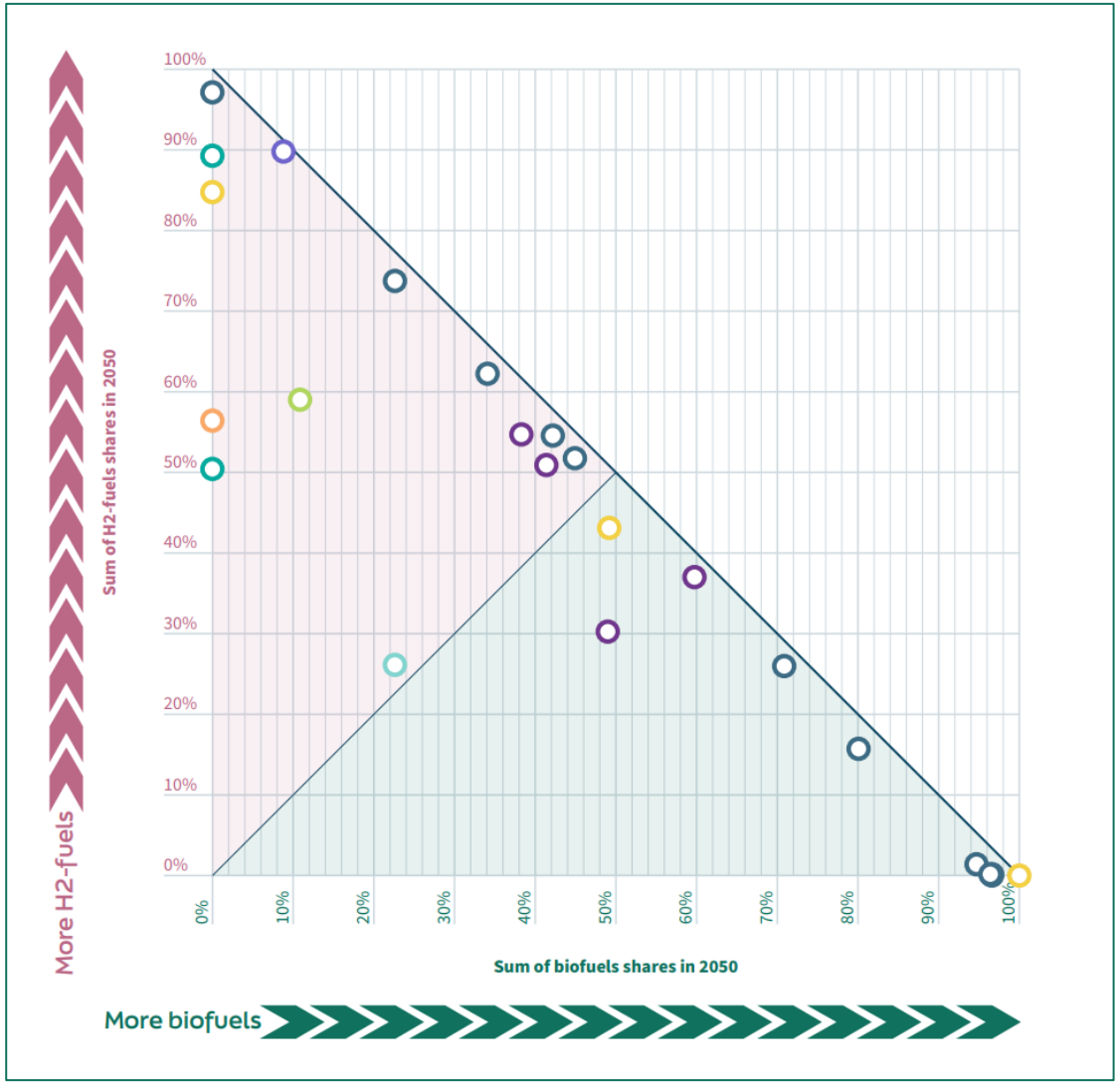
Short Term Measures put pressure on existing fleet to change.



- The IMO agreed to establish new emissions reduction targets at the MEPC-80 meeting held in July 2023.
- Revisions are significantly stricter than previously agreed – the new agreement will target net-zero in 2050, compared with the previous target of a 50% reduction in emissions by 2050.
- New interim targets for total emissions and intensity for 2030 and 2040 have been set.
- Similarly, the IMO has set a target of 5% for renewable fuel in use by 2030.

Many Alternative Maritime Fuel Options

- **Liquefied Natural Gas (LNG)**
- **Methanol**
- **Ammonia**
- **Hydrogen**
- **LPG, Biofuels, Electricity, Nuclear**



Mapping most recent fuel mix scenarios: Hydrogen (H2) – fuels scenarios versus Biofuel Scenarios. Source: The Future of Maritime Fuels | LR

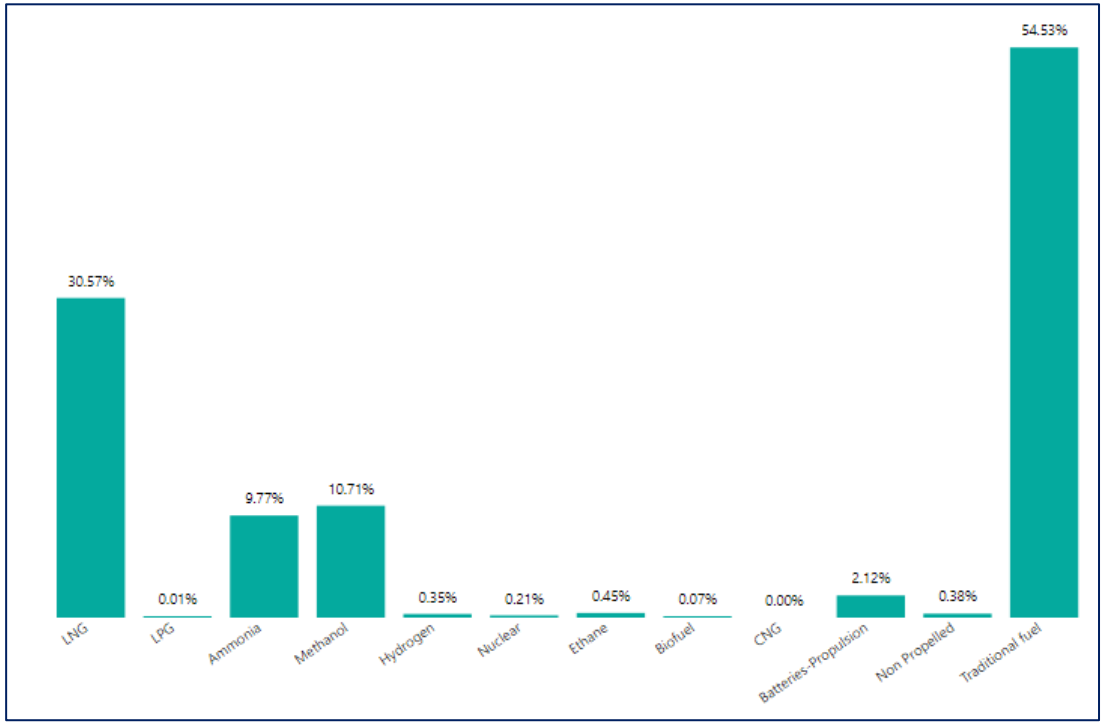
Rule Development for Future Marine Fuels

Currently the primary focus of alternative fuels include but not limited to:

- **Methanol**
- **Ammonia**
- **Hydrogen**
- Marine Bio-fuels
- Fuel Cells
- Swappable Energy
- Nuclear
- OCCS (On board Carbon Capture Systems)

- First 3 Rule sets are based on IGF Code and Nuclear is being updated as written in 1980s.
- NB Rules are still based on Marine fuel is the primary fuel except for Nuclear

Fuel capable/Ready fleet –Orderbook (ex-LNG vessels)



Source: IHS data, Clarksons – Renewable Intelligence Network

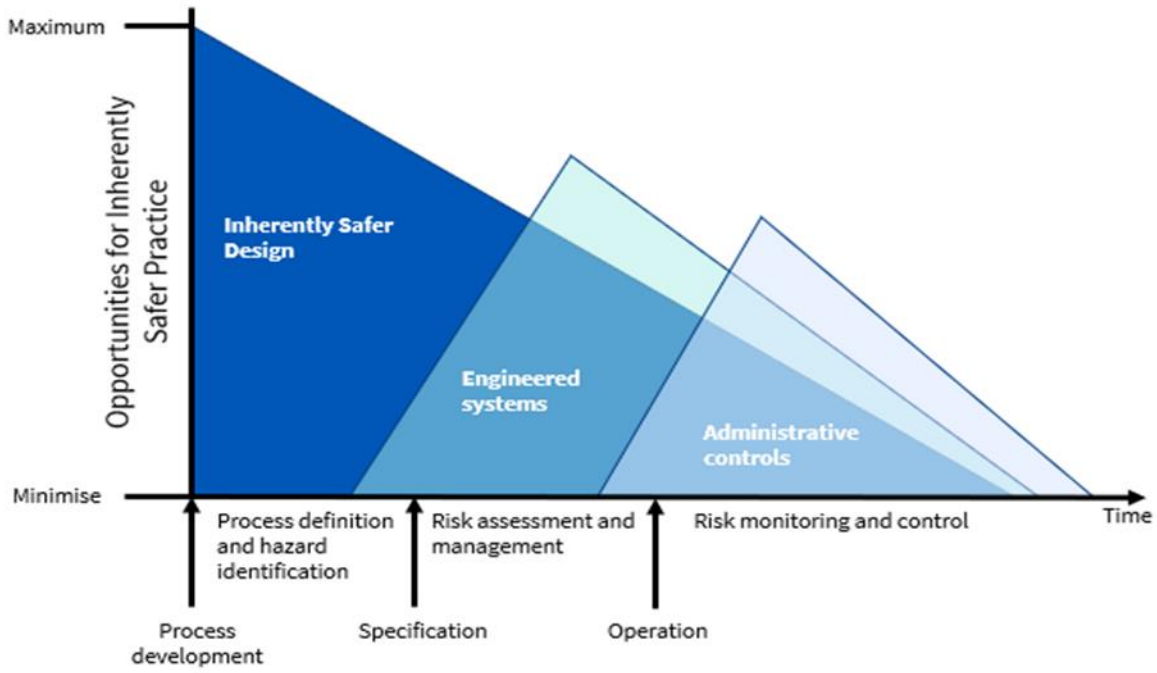
Designed and maintained by LR Insight Team

Inherently Safer Design and meaningful protection

Inherently safer design strategies…

Trevor Kletz “what you do not have, cannot leak” where the essence of the inherently safer approach to system design is the avoidance of hazards rather than their control by added-on protective equipment.

- *Reduce consequence*: the quantity of fuel that is stored and present within equipment and pipework should be minimised;
- *Reduce likelihood*: the number of equipment items, instruments and connections should be minimised to limit the number of potential leak sources; and,
- *Protect life*: persons onboard (particularly passengers) should be separated as far as possible from ammonia sources.



Meaningful protection…

That is, given an accident it can be shown that all obvious, simple, practical and cost-effective protections were adopted in addition to those expected by regulation and identified by risk assessment

LR Risk Based Certification

Process

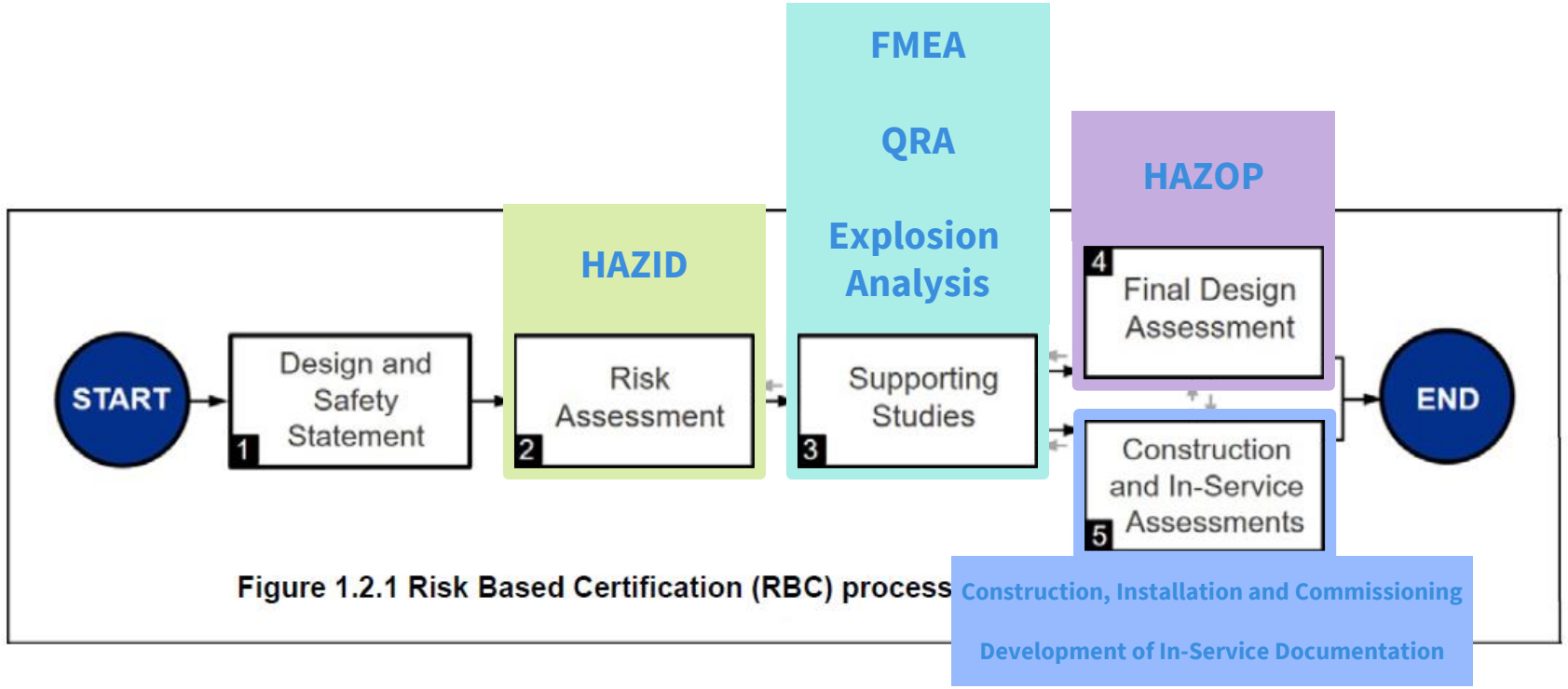


Figure 1.2.1 Risk Based Certification (RBC) process

ShipRight
Design and Construction

Risk Management

Risk Based Certification (RBC)

September 2021

Methanol as Fuel
PAR, Preliminary Appraisal of Rules

Jul-22

Name of project	
Ship type	
Stakeholders *State name and organisation. Additionally, if part of RBC attach or reference qualifications/experience, and role and responsibility (e.g. RBC-1 DSS Report).*	
Design Description *A brief description of the design and/or arrangement. Additionally, if part of RBC attach or reference design objectives/operation (e.g. RBC-1 DSS Report).*	
Applicable Rules, Regs. & Codes *List, attach or reference applicable rules, regs., and codes, and note deviations from classification and statutory requirements.*	
Form completed by and date completed *State name(s), position, organisation, contact email and date.*	

Note to preparer: any text in italics is there to guide / inform the completion of this form and can be deleted

Outline

PAR is a screening of a design against applicable rules, instruments and goals. Its purpose is to:

Demand and uptake of Retrofit as of Sept 2023

Approx. 13,000

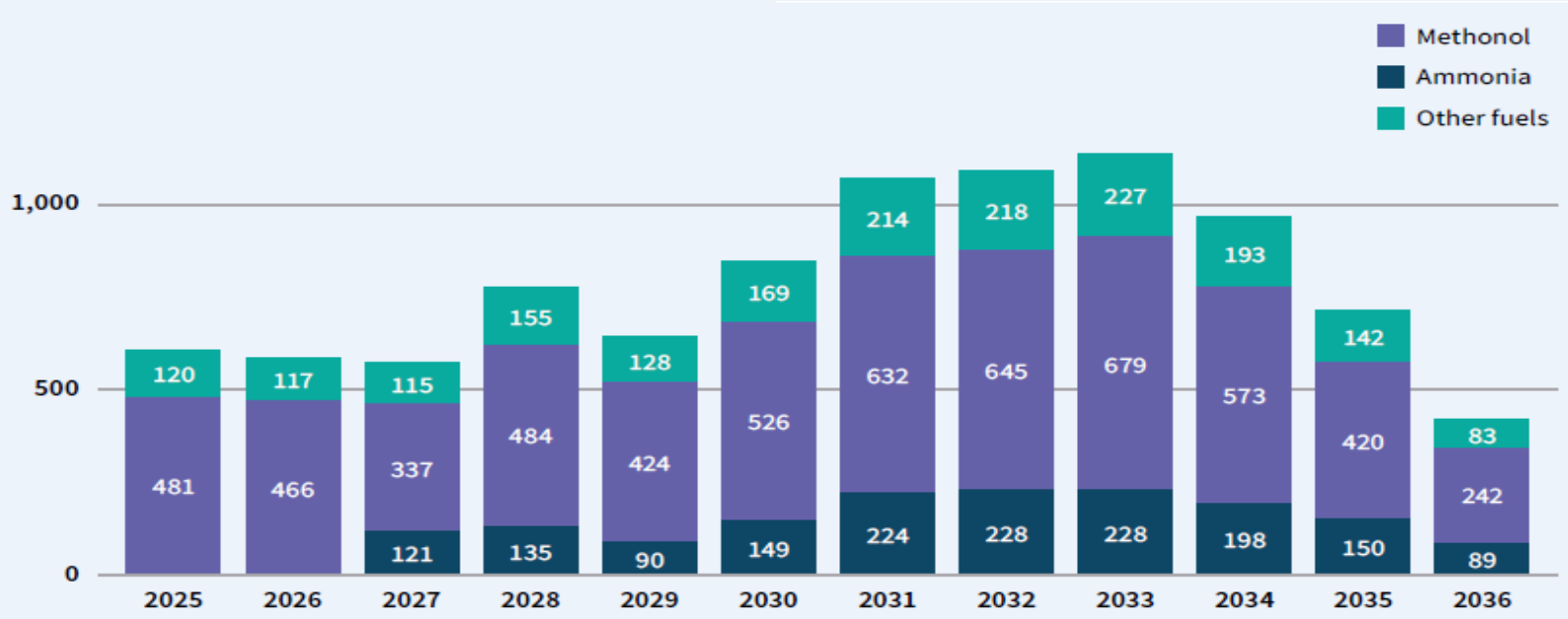
Vessels (across ship segments) are potential candidates for alternative fuel retrofits by 2036

Customer sustainability

goals are driving retrofit demand – two containership conversions already this year

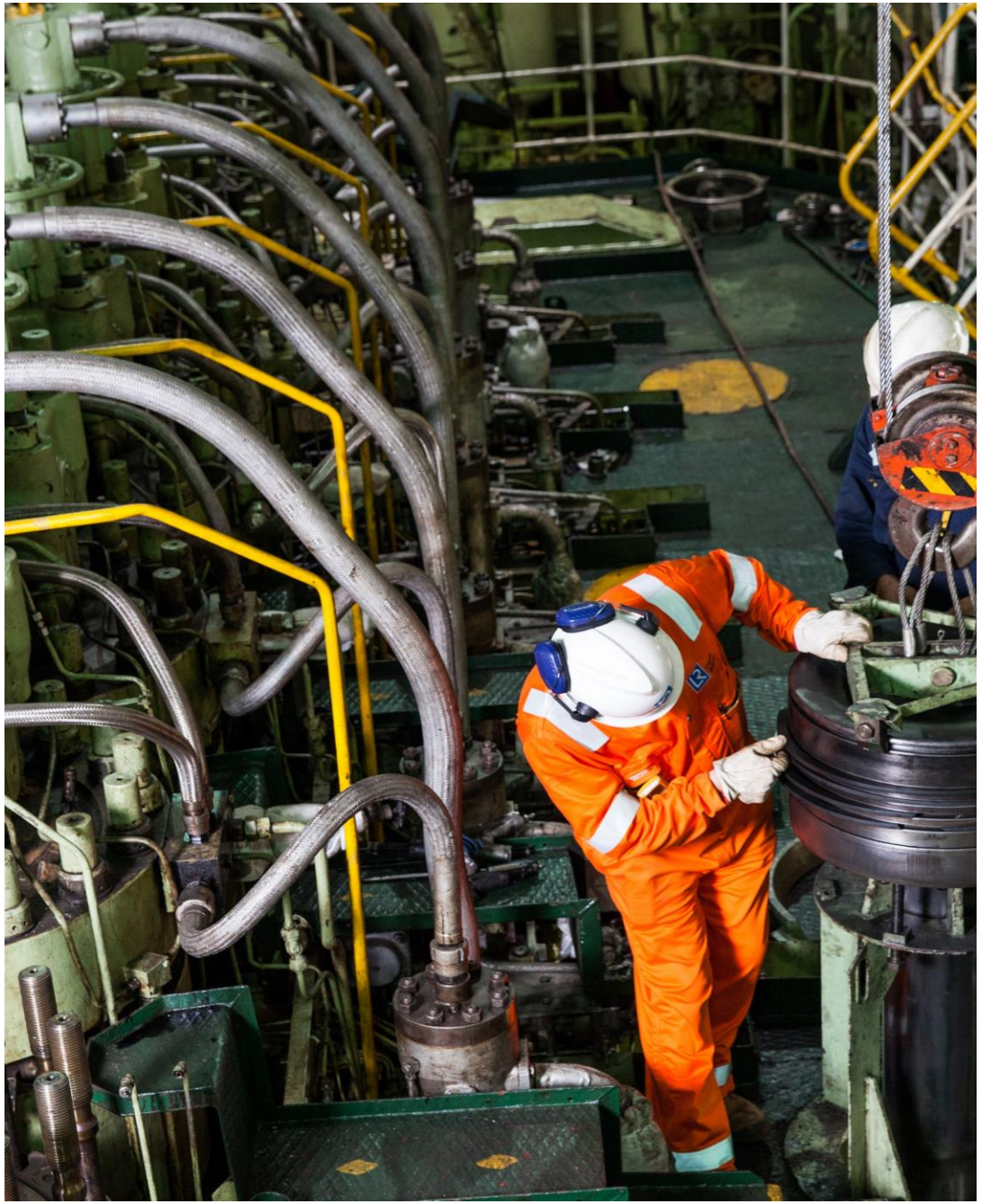
(Clarksons)

Potential retrofit demand, all vessel segments*



The retrofitting period based on conversion age limits, if the transition to zero-emission only construction begins in 2027.

* Scenario: zero-emissions newbuilds only from 2032, maximum retrofit age of 10 years, early extension of retrofit to small vessels'



Zero Ready Framework.

Gives assurance that ships built for conversion to a zero-carbon fuel are built to a credible standard to enable an efficient retrofit. Thus supporting investment decision making by providing clarity to the industry on the readiness of newbuild and retrofit vessels to operate using zero carbon fuels.

1. Dual fuel newbuild	• Build fully zero-carbon capable, dual fuel vessels from now on
2. Newbuild for future conversion	• Build vessels with confidence they will be converted to zero carbon fuels • Carry out the zero-carbon fuel conversion at a future date
3. Existing vessel retrofit	• Retrofit the current fleet for zero carbon fuels once fuels available

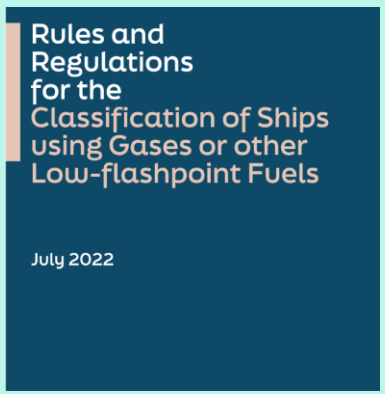
Regulatory Framework - Methanol

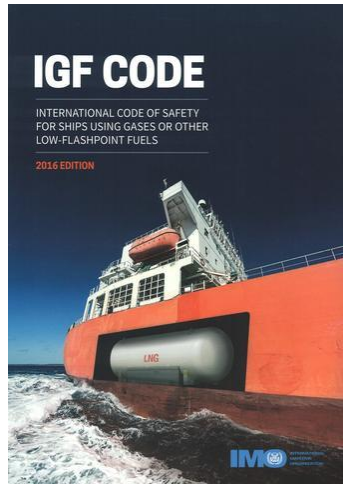
As Cargo

- MARPOL Annex II
- IBC Code
- IMDG Code – Class 3, Cat B, UN No. 1230

As Fuel

- IGF Code: Safety philosophy, goal based approach
- IMO - MSC.1/Circ. 1621 Interim Guidelines for the safety of ships using methyl/ethyl alcohol as fuel
- Rules and Regulations for the Classification of Ships using Gases or other Low-flashpoint Fuels
  - Appendix LR1 – Requirements for Ships Using Methyl Alcohol (Methanol) or Ethyl Alcohol
  - **Class notation LFPF(GF,ML)**





Quality Standards

- IMPCA Methanol Reference Specifications
- ASTM D-1152/97 Standard Specification for Methanol (Methyl Alcohol)
- ISO/AWI 6583 Specification of methanol as a fuel for marine applications (under development)

Future Fuel Regulatory Framework - Ammonia

As Cargo

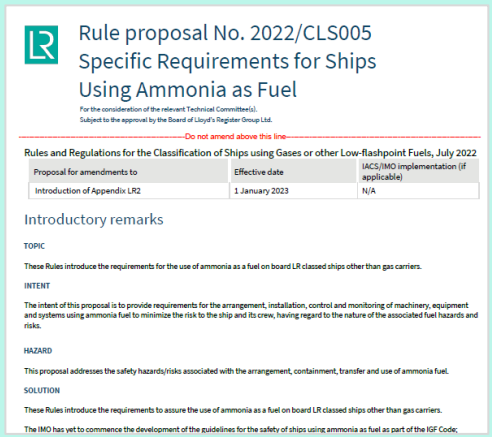
- IGC Code
- Lloyd's Register Rules for Gas Ships

As Refrigerant

- Rules and Regulations for the Classification of Ships Part 6, Chapter 3 Refrigerated Cargo Installations

As Fuel

- IGF Code: Safety philosophy, goal based approach
- Lloyd's Register Guidance notes, Technical Reference
- Rules and Regulations for the Classification of Ships using Gases or other Low-flashpoint Fuels
  - Appendix LR2 – Requirements for Ships Using Ammonia as Fuel
- Rule Development for Ammonia Fueled Engines


Rule proposal No. 2022/CLS005
Specific Requirements for Ships Using Ammonia as Fuel

For the consideration of the relevant Technical Committee(s).
Subject to the approval by the Board of Lloyd's Register Group Ltd.

Do not amend above this line

Rules and Regulations for the Classification of Ships using Gases or other Low-flashpoint Fuels, July 2022

Proposal for amendments to	Effective date	IACS/IMO implementation (if applicable)
Introduction of Appendix LR2	1 January 2023	N/A

Introductory remarks

TOPIC

These Rules introduce the requirements for the use of ammonia as a fuel on board LR classed ships other than gas carriers.

INTENT

The intent of this proposal is to provide requirements for the arrangement, installation, control and monitoring of machinery, equipment and systems using ammonia fuel to minimize the risk to the ship and its crew, having regard to the nature of the associated fuel hazards and risks.

HAZARD

This proposal addresses the safety hazards/risks associated with the arrangement, containment, transfer and use of ammonia fuel.

SOLUTION

These Rules introduce the requirements to assure the use of ammonia as a fuel on board LR classed ships other than gas carriers.

The IMO has yet to commence the development of the guidelines for the safety of ships using ammonia as fuel as part of the IGF Code;

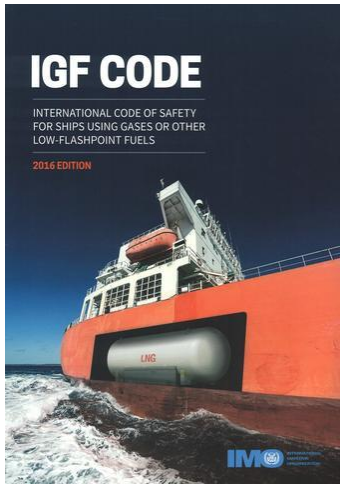

Design & Safety Aspects of using Ammonia (NH3) as a Marine Fuel

Report for: JDP for Ammonia Fuelled ship (Restricted Circulation)

Revision no.: 5

18 August 2021

Lloyd's Register



Status at IMO

- Considered as part of amendments to IGF Code
- Development of guidelines underway
- Could go to MSC 109 (likely Oct/Nov 24) or 110 (likely May/June 25) for approval/adoption

Thank you

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Thank You