

Everllence

# Biofuel in Everllence B&W two-stroke engines

IMO TECHNICAL SEMINAR ON MARINE  
BIOFUELS

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12 February 2026



# Agenda - Biofuel in Everllence B&W two-stroke engines

IMO Technical seminar on marine biofuels



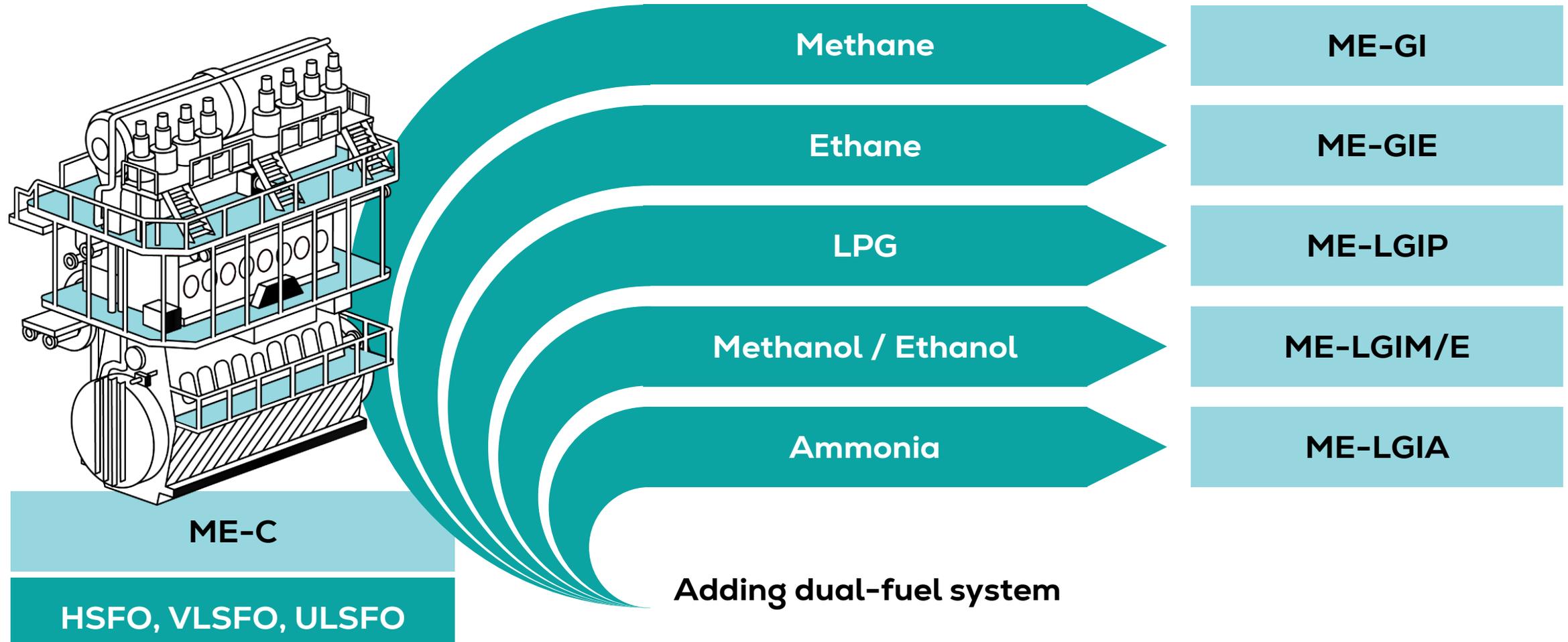
- 1. Everllence B&W engines**
- 2. Market and forecast**
- 3. What is biofuel?**
- 4. How do we approach biofuel?**
- 5. Regulatory clarity**
- 6. Sum up**

**1**

# **Everllence B&W engines**

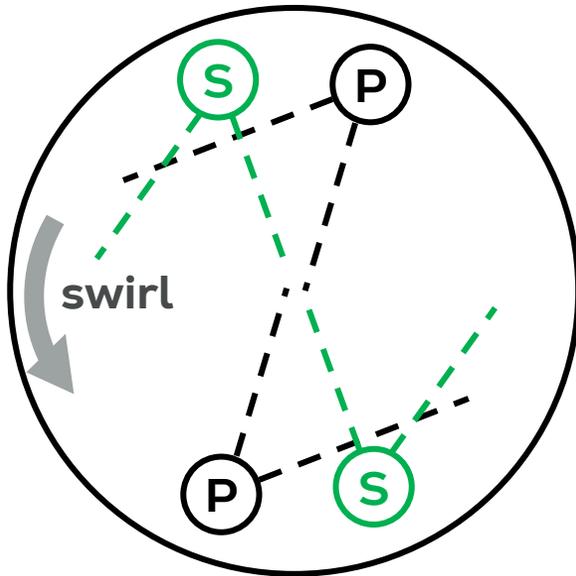
# Everllence B&W two-stroke engines

The modular approach

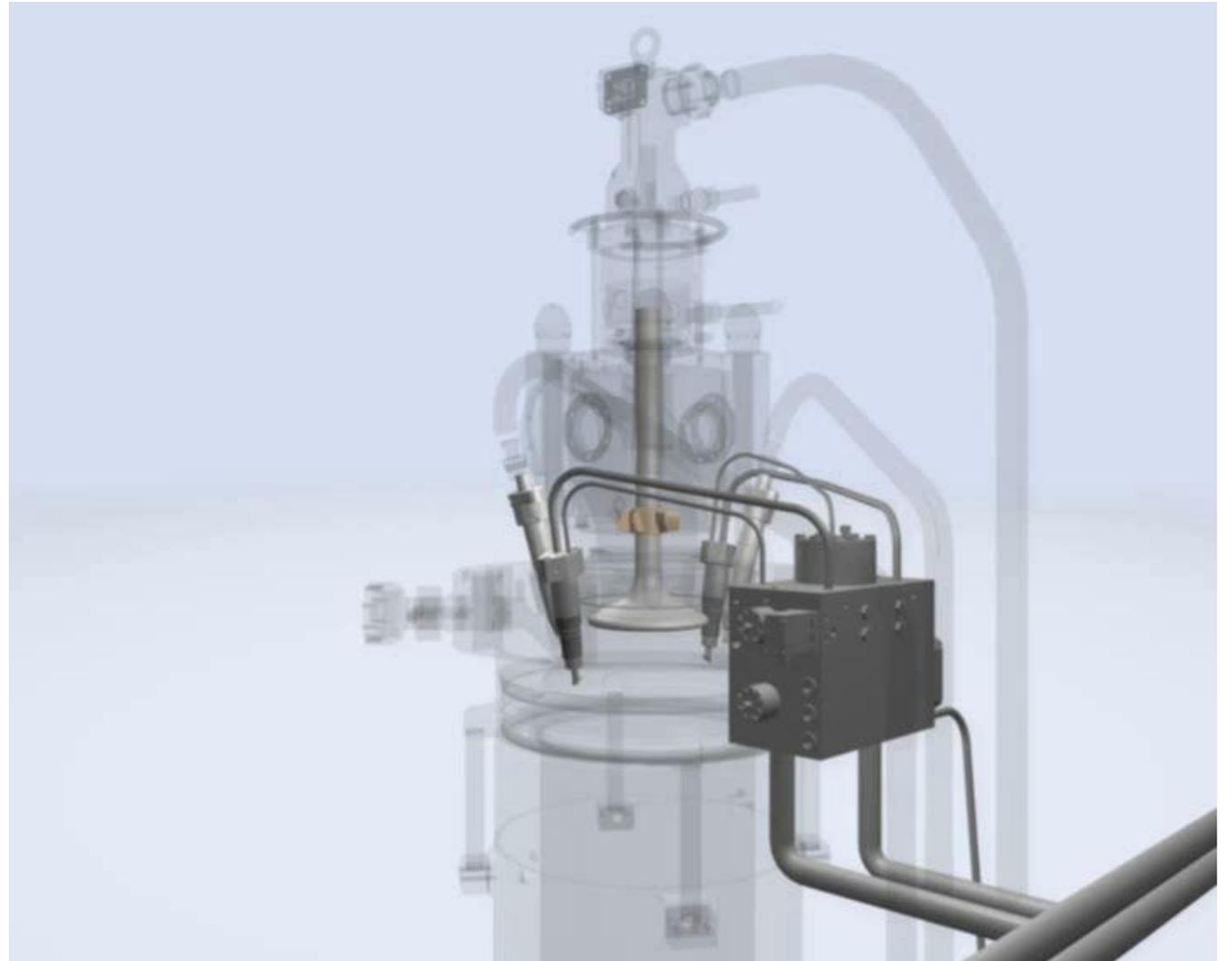


# Dual fuel combustion

Some fuels require a pilot injection to stabilize the ignition

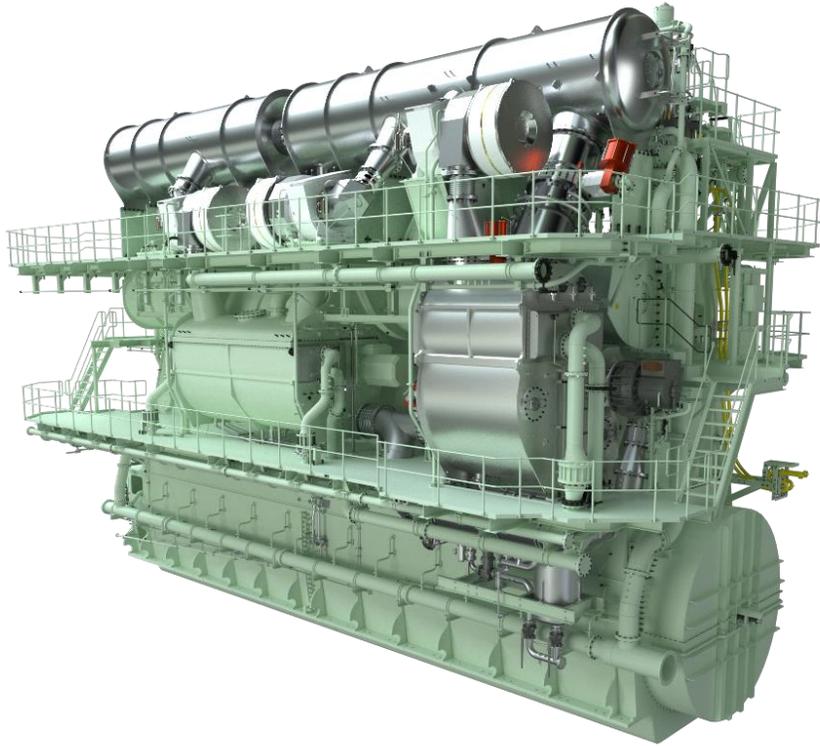


- (P)** Diesel injector for pilot injection
- (S)** Second fuel injector (Methane, Alcohol, etc.)



# NOx reduction equipment

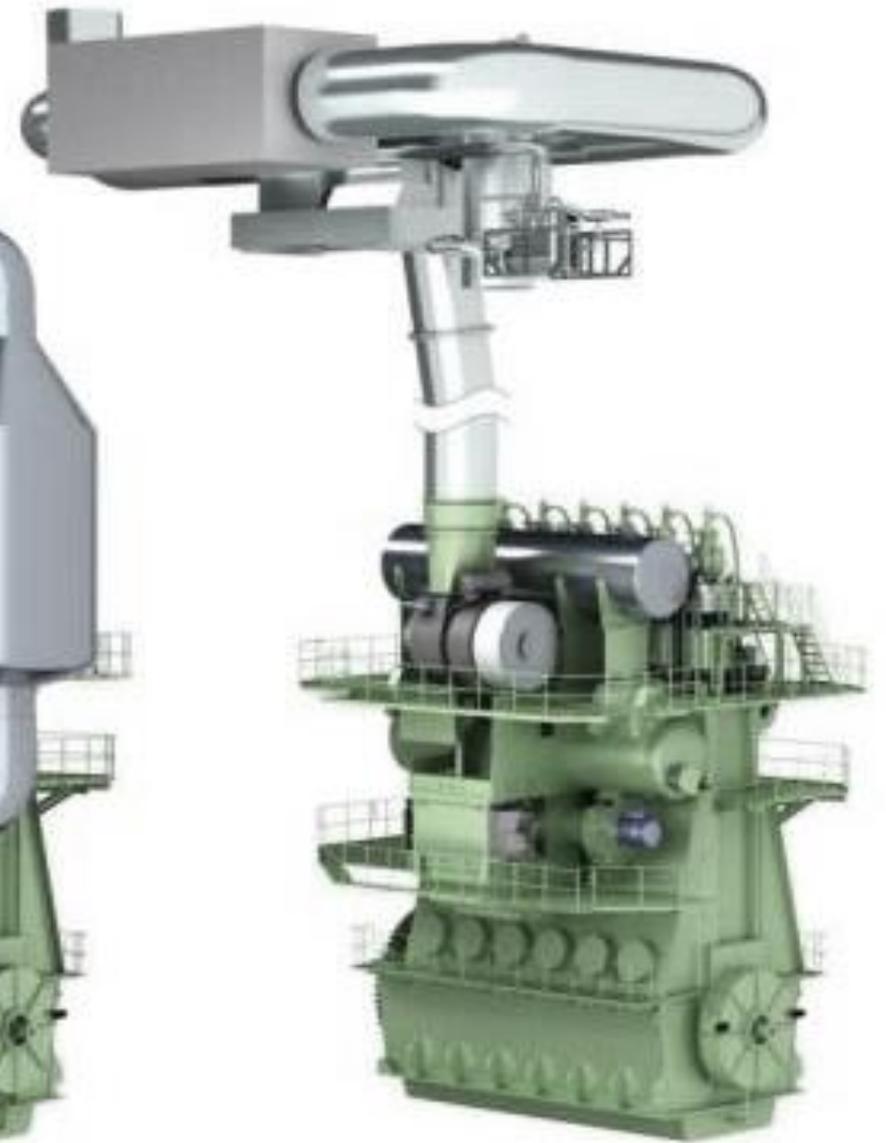
Tier III technology



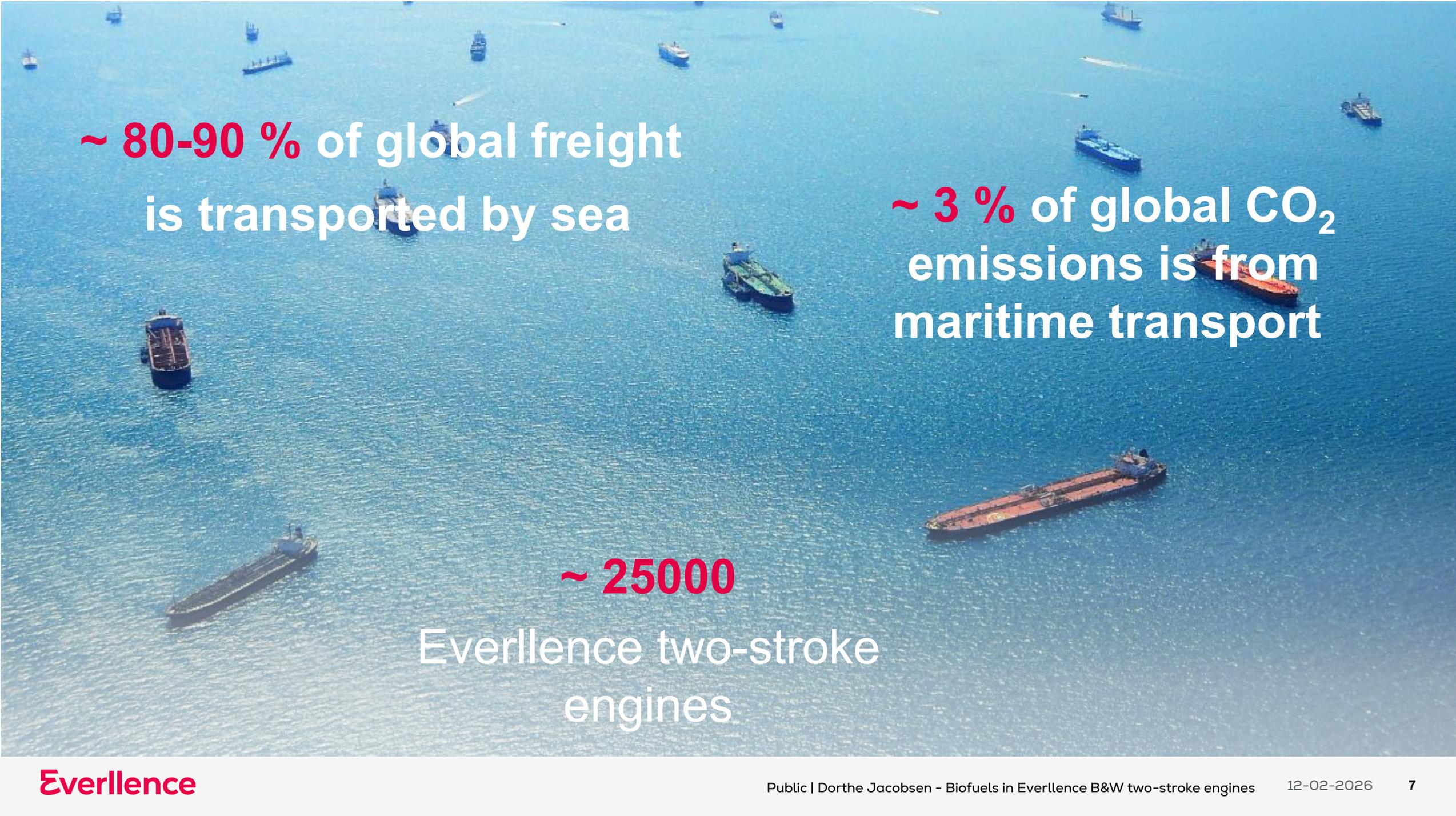
**EGR** – Exhaust Gas Recirculation



**HP-SCR** – High Pressure  
Selective Catalytic Reduction



**LP-SCR** – Low Pressure  
Selective Catalytic Reduction



~ **80-90 %** of global freight  
is transported by sea

~ **3 %** of global CO<sub>2</sub>  
emissions is from  
maritime transport

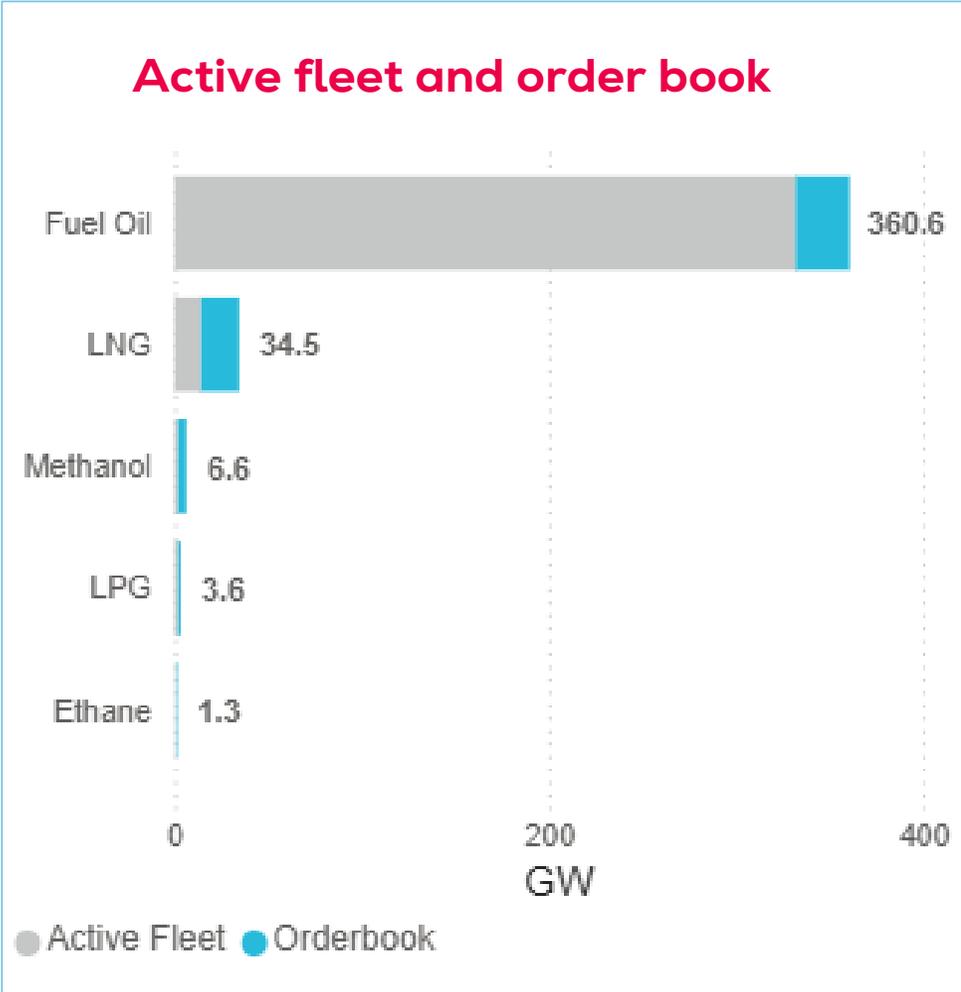
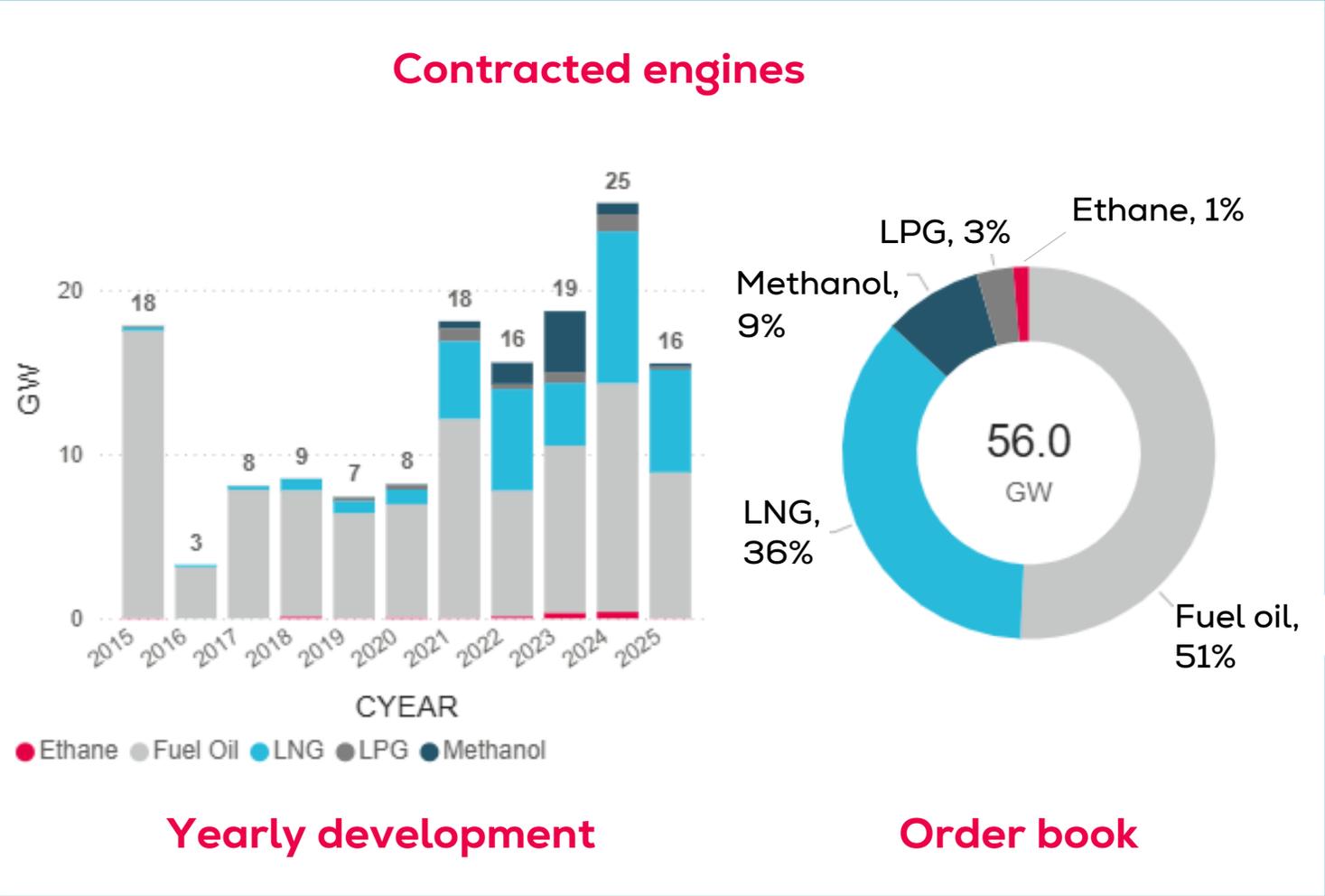
~ **25000**  
Everllence two-stroke  
engines

# 2

# Market and forecast

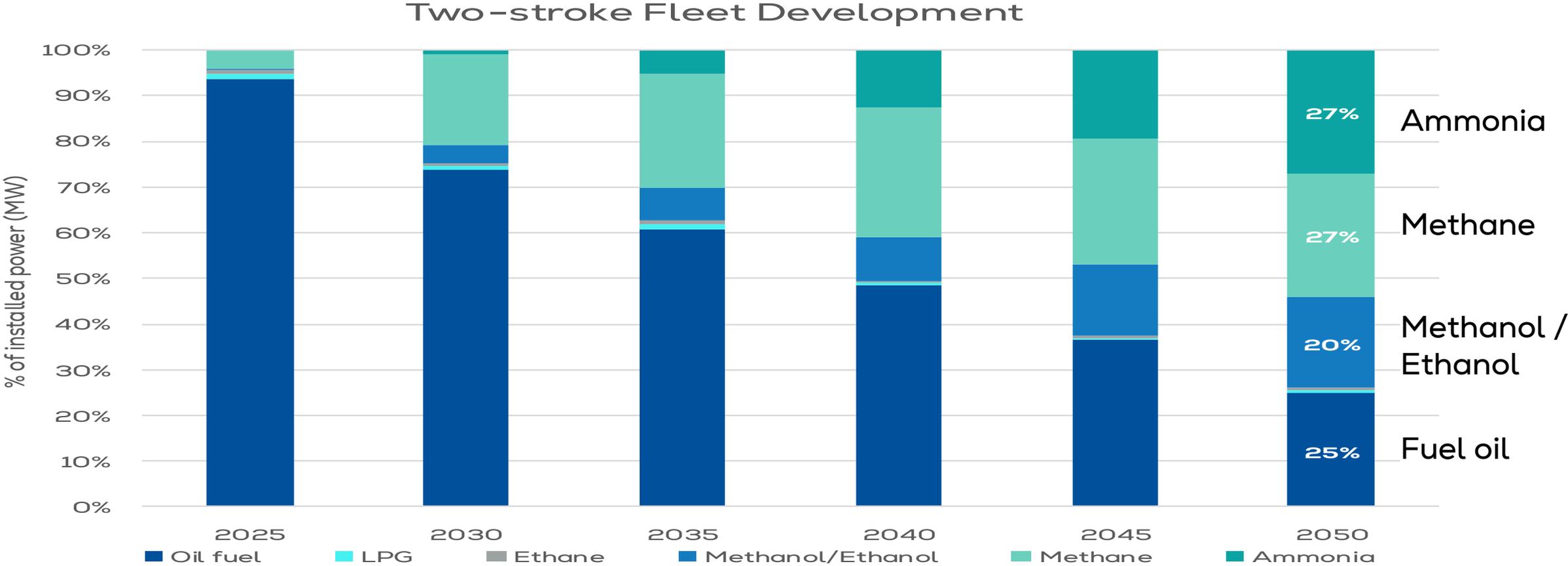
# Everllence B&W two-stroke engines

GW by fuel type



# Forecast: Fuel mix for two-stroke powered ships

A diversified fuel mix is expected for the coming decades



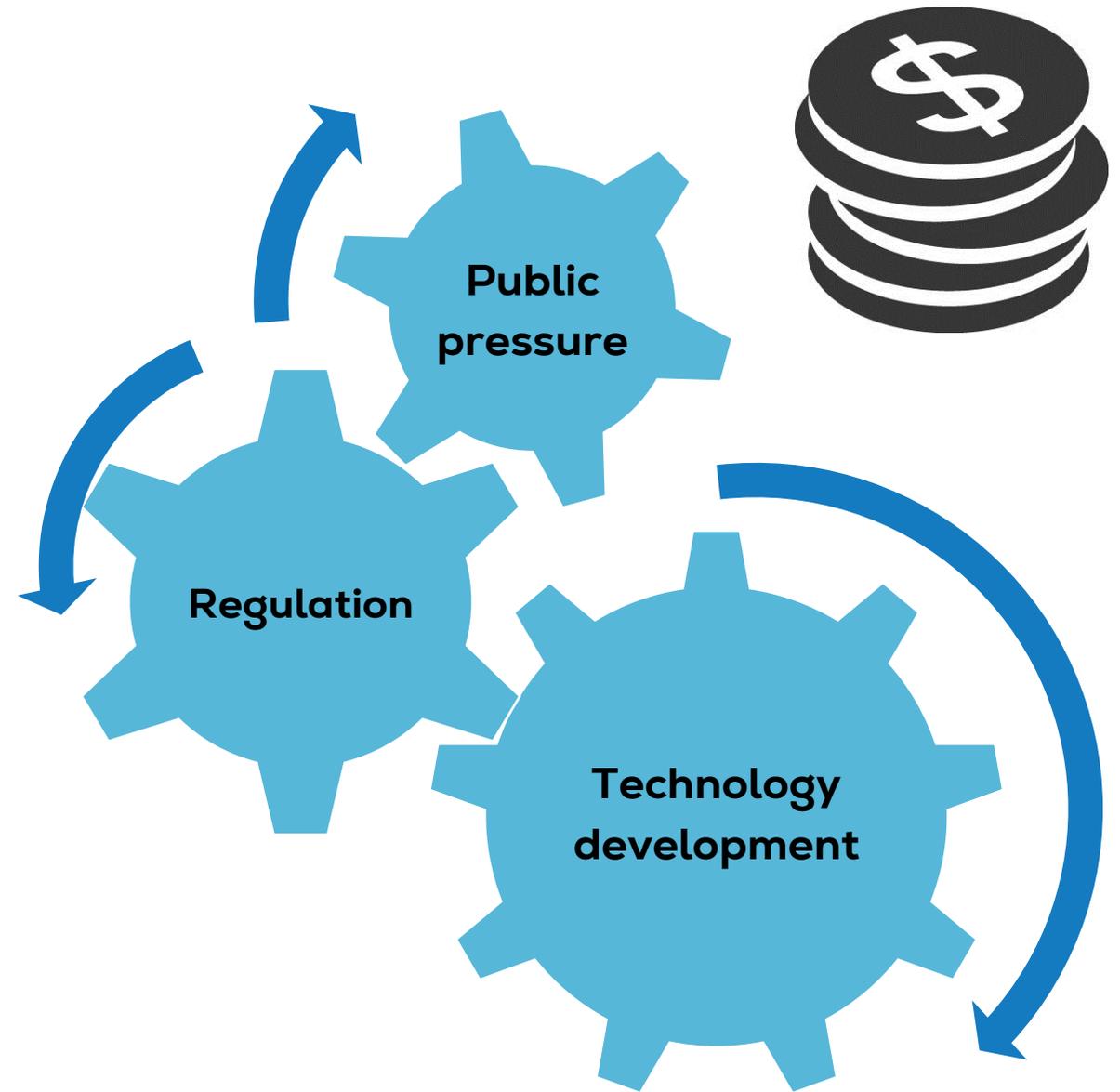
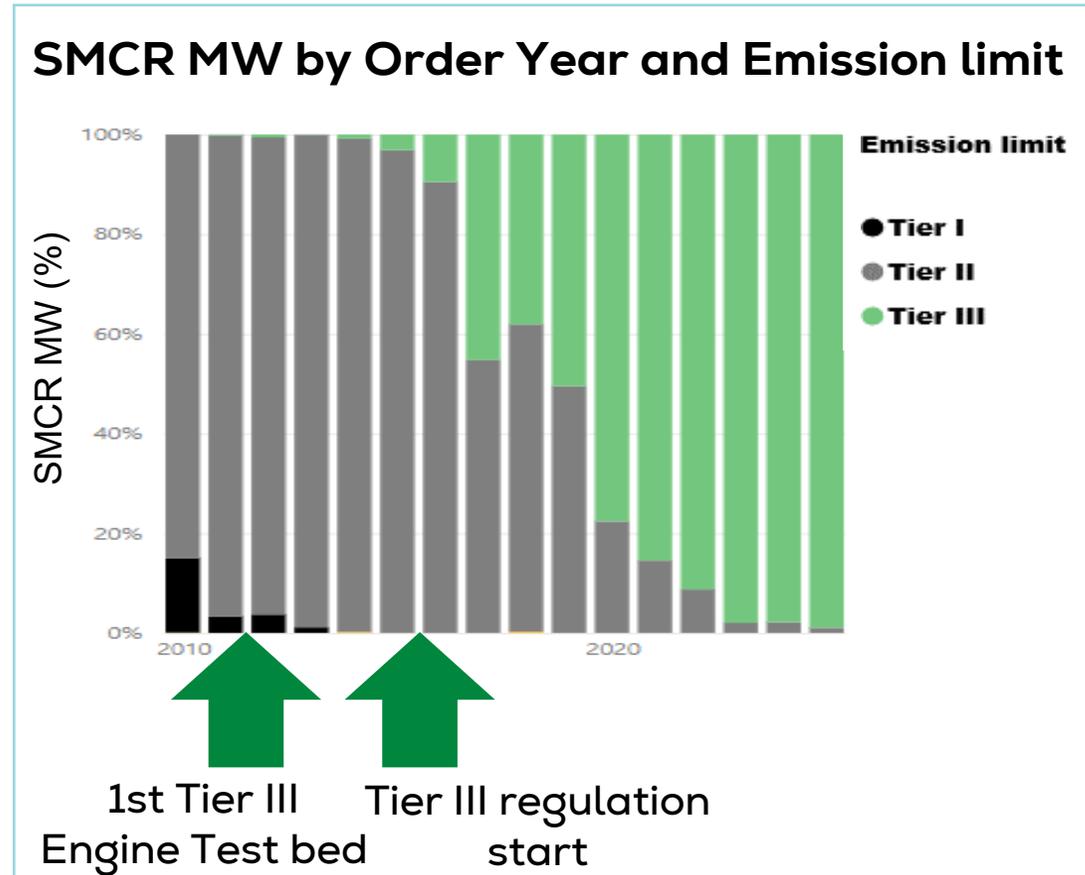
January 2026

Source: FRD/Everllence

# Drivers for change

Public pressure + Regulation  
+ Technology development

## Market introduction: NOx reduction technology



# 3

## What is biofuel?

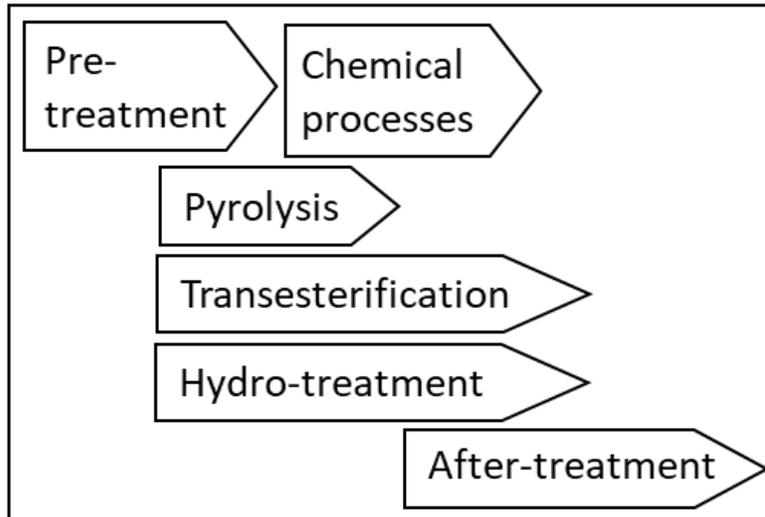
# The biofuel era has begun

## Important notes

- Differentiate between feedstock, production process and level of upgrading, and final product
- Clear and transparent communication is necessary

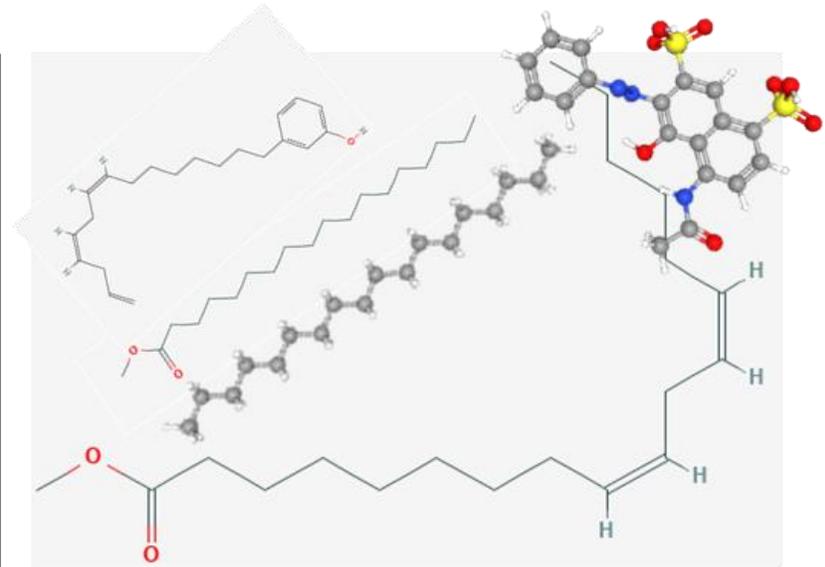


**Feedstock**



**Production process**

- Chemical processes
- Level of upgrading



**Product**

- Type of fuel, type of molecules
- FAME, HVO, pyrolysis oil, etc.

# Biofuel types and blending ratios

Know what you bunker

## Biofuels covered by ISO 8217:2024



- FAME (EN 14214, ASTM D6751)
- Hydrotreated vegetable oil (HVO)
- (0 to 100%) Blends of the above with ISO 8217 compliant distillate and residual fuel grades

## Biofuels covered by Everllence SL2023-741



- FAME – up to 100%
- HVO – up to 100%
- Similar FAME-type fuels – up to 100%
  - E.g. “bottoms of FAME esterification” – certain conditions apply → SL2023-741
- Blends of the above with ISO 8217 compliant distillate or residual fuel grades

## Other bio-components

- Distillation bottoms from FAME production (FDR)
- Cashew nutshell liquid (CNSL) – different qualities
- Pyrolysis oil – different qualities
- Straight / unprocessed waste and residue fats and oil

# Biofuels for Everllence B&W two-stroke engines

SL2023-741 / Biofuel Operation



Technology	Biofuel			
	FAME	HVO	Similar FAME-type	Blends
Engine design: MC/MC-C, ME/ME-C, ME-B, ME-GI, ME-GIE, ME-LGIM, ME-LGIP, ME-GA and ME-LGIA	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>
Tier III: EGR, Tier II: EcoEGR	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>
Tier III: High pressure SCR <sup>2)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>
Tier III: Low pressure SCR <sup>2) 3)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>
Pilot fuel for dual-fuel engines	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>	Acceptable <sup>1)</sup>

1) Lifetime of components may be reduced.

2) Urea consumption may slightly increase due to potentially slightly increased NOx during biofuel operation.

3) LPSCR is only for max 0.10% S fuels.

# Liquefied biogas (LBG) or Bio-LNG

A biofuel to engines capable of operating on LNG

## Biogas

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Feed stocks: organic waste, manure, etc.

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Methane, CO<sub>2</sub>, various impurities

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Low energy density due to CO<sub>2</sub> content, Variable composition

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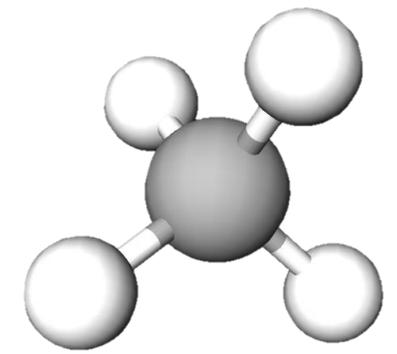
Impurities damaging equipment

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Main use: Electricity generation and heating



**Purification**  
**Cooling**  
**Liquefaction**



## Liquefied biogas (LBG)

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Impurities and CO<sub>2</sub> removed

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Mainly methane - similar to LNG

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Higher energy density

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Less variation in composition

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ISO 23306:2020 Specification of liquefied natural gas as a fuel for marine applications

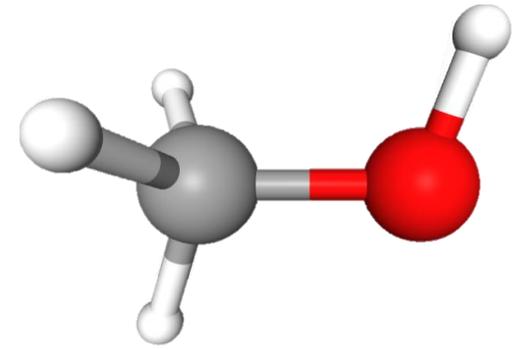


Feed stock agnostic

# Bio-methanol

A biofuel to engines capable of operating on methanol

- Engines capable of operating on methanol from conventional sources as well as bio-methanol
- ISO 6583:2024 Methanol as a fuel for marine applications – General requirements and specifications
  - Feedstock and production agnostic



**ISO 6583**

**First edition  
2024-11**

**Methanol as a fuel for marine applications — General requirements and specifications**



**CIMAC**

INTERNATIONAL COUNCIL  
Power | Drives | Propulsion

**01 | 2025**

**CIMAC Guideline**

Frequently Asked Questions (FAQ)

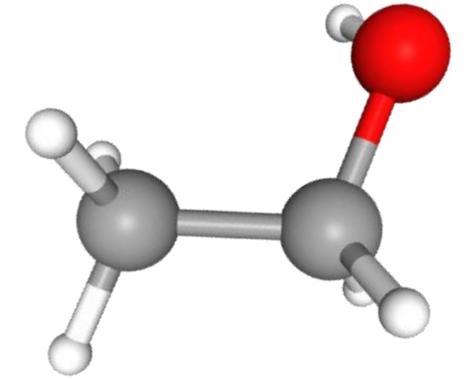
ISO 6583:2024: Methanol as a fuel for marine applications – General requirements and specifications

# Bio-ethanol

A biofuel to engines capable of operating on ethanol/methanol

ISO/TC 28/SC 4/ WG 18 "Specifications of alternative fuels for marine applications"

- Has started to investigate the qualities worldwide



# Ethanol as fuel for LGIM/E engine

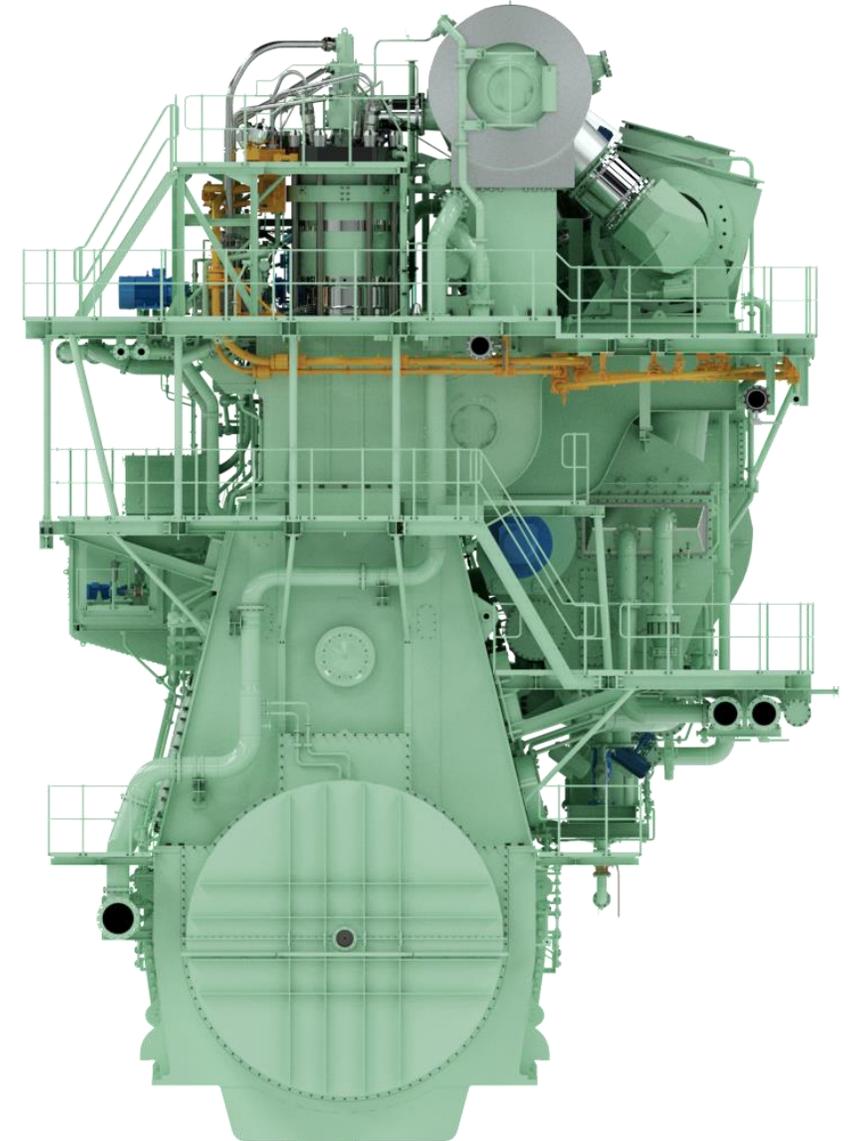
## Ethanol vs Methanol

### Current results

- ✓ Ethanol burns just as nice as Methanol
- ✓ The same LGIM system can be used
- ✓ NOx emission changes. It depends...
- ✓ Fuel consumption trends follow the expected trends regarding atomizer layout and engine tuning
- ✓ An LGIM engine can be optimized for Methanol **or** Ethanol

### Next steps

- Future Alcohol grades can potentially have larger variability
  - What can be tolerated?
- Maintenance?
- Regulation?

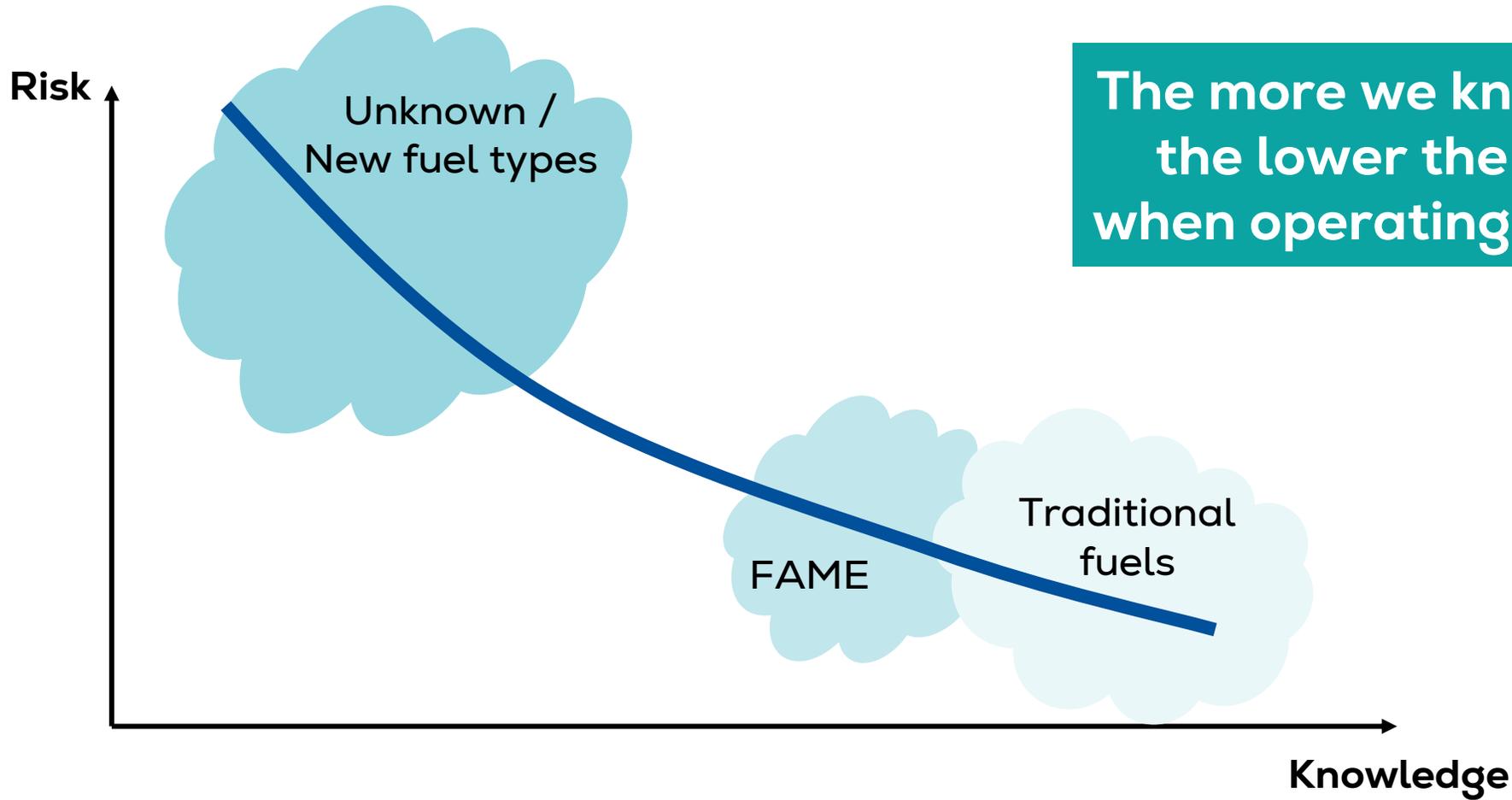


**4**

# **How do we approach biofuel?**

# Fuel testing program

Risk based approach

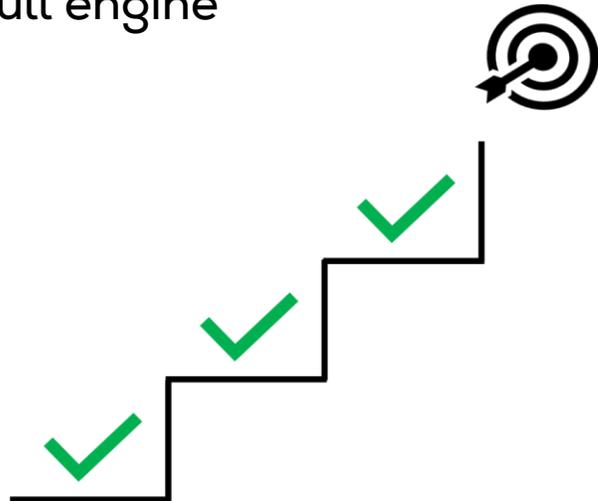


The more we know and learn,  
the lower the risk will be,  
when operating on a new fuel

# Fuel testing program

## Fuel testing program outline

1. Market evaluation
2. Fuel examination
3. Pump rig tests
4. Test engine (commonly land based)
5. Service test
  1. 1 cyl. / half engine?
  2. Full engine



## Risk based approach:

- If the fuel is largely unknown or very different to known fuels:
  - Proceed with all 5 steps
- If the fuel is similar to known fuel types:
  - Skipping some steps can be discussed



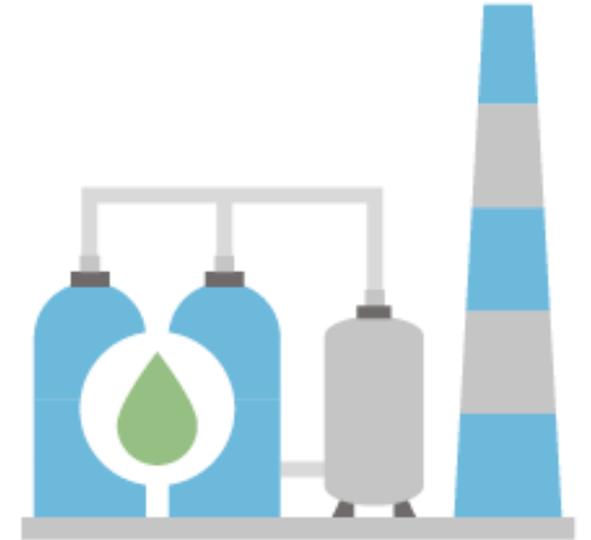
# 1. Market evaluation

## Information required

- Technology readiness level of fuel production?
- Feedstock information? – incl. sustainability evaluation
- Production process info?
- Production Scalability, Amounts possible?
- Worldwide availability?
- Supply chain and Logistical information / challenges?
- Etc.

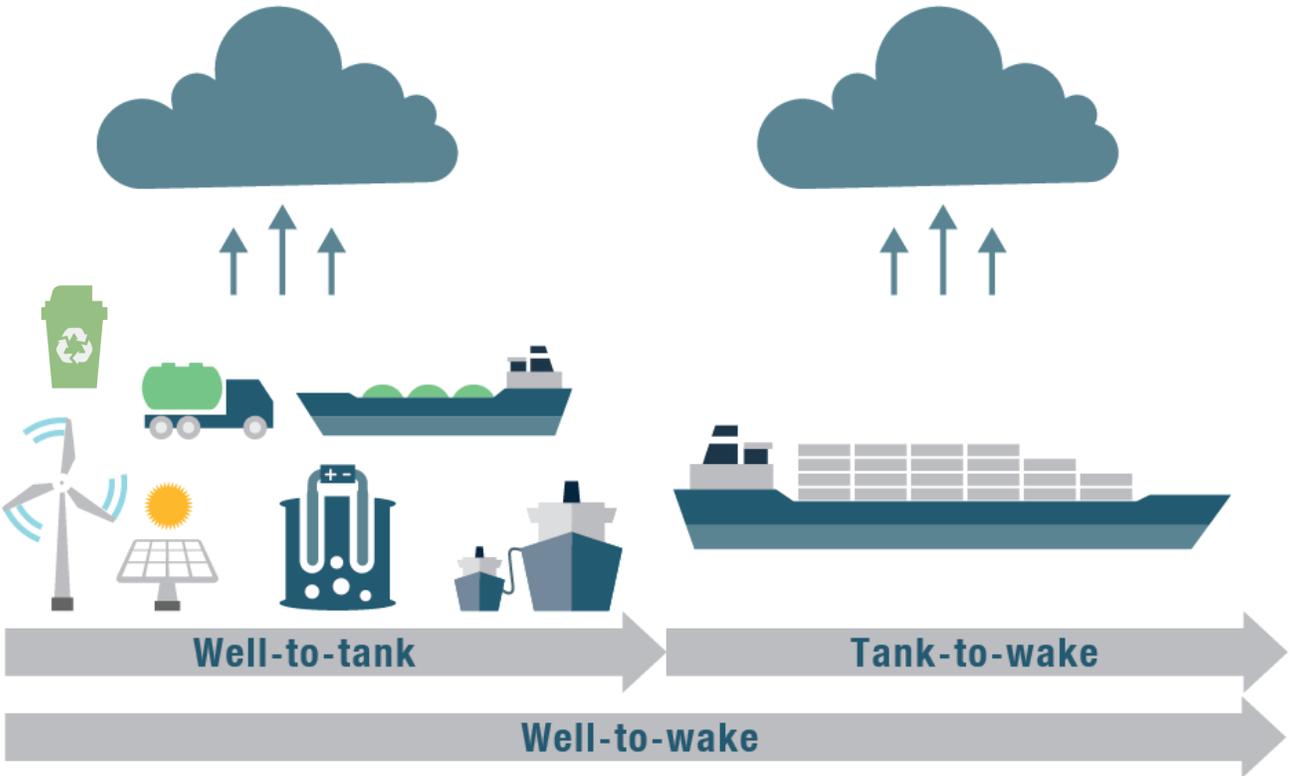
## Time is limited

- Everllence will be hesitant to commit resources to evaluating commercially unviable products
- Sustainable fuels are weighted higher

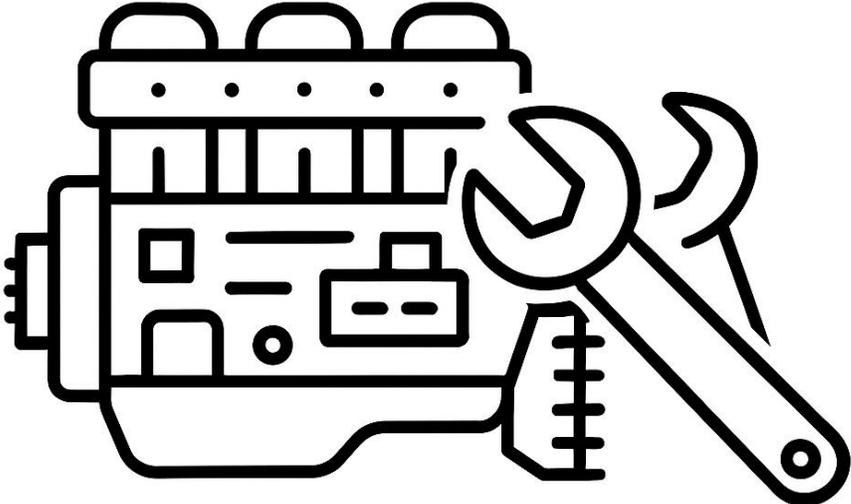


# Fuel quality and sustainability

Fuel sustainability is important for the environment



Fuel quality is important for the equipment on board – and possibly the environment



# Fuel quality matters

Marine engines are robust – but there are limits!

## Chemical and physical properties of the fuel matter

- Chlorinated organic compounds in the fuel caused heavy corrosion damages in the fuel system onboard the ships
- The chlorinated organic compound case in 2022 resulted in an addition in ISO 8217:2024



ISO 8217:2024(en)

5.3 The fuel shall be free from inorganic acids and organic chlorides (chlorinated hydrocarbons).

### 6.17 Organic chlorides

A fuel shall be considered to be free from organic chlorides (chlorinated hydrocarbons) when the total organic halogen content as chlorine is not exceeding 50 mg/kg when tested in accordance with EN 14077.



CIMAC WG 7 – statement: 2022 Organic chlorides, marine fuel incidents. October 2022

## Damaged fuel equipment



# Responsibilities and Actions: Biofuel in operation

We all have roles to play



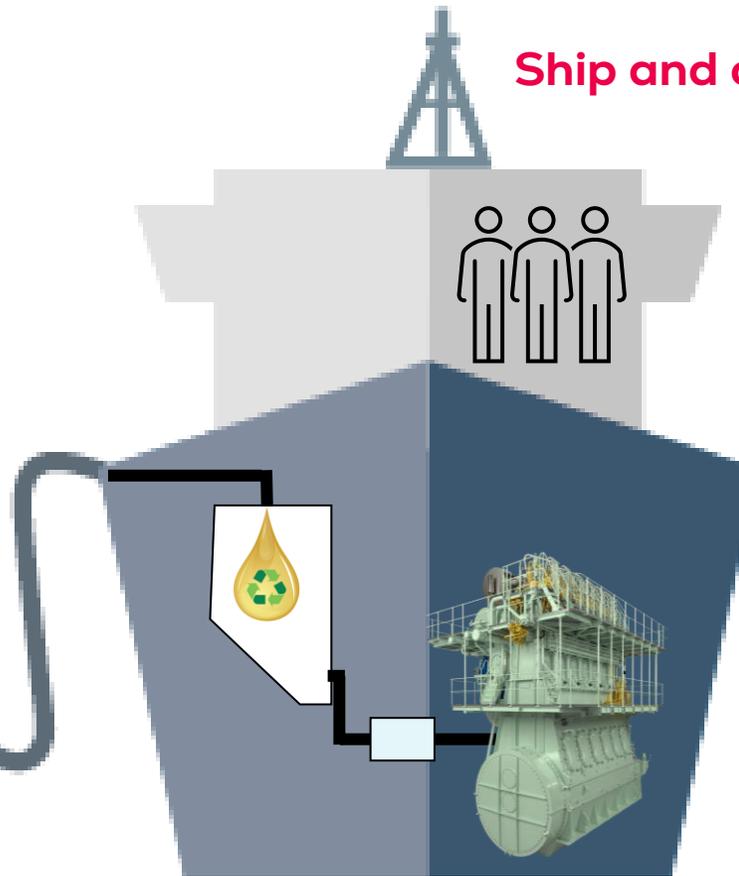
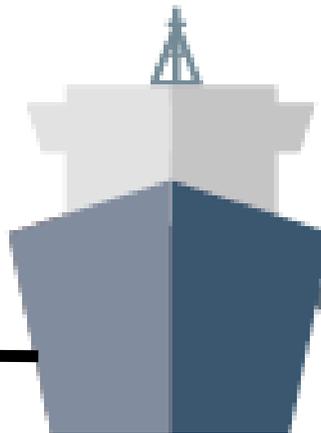
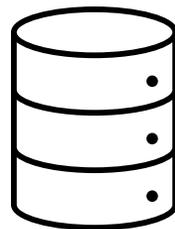
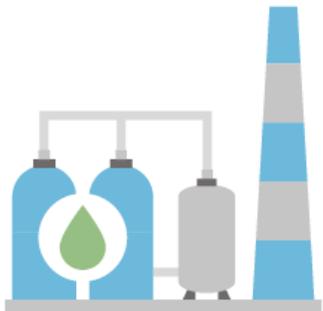
Fuel buyer



Onshore technical management



Fuel producer  
Fuel seller



Ship and crew onboard

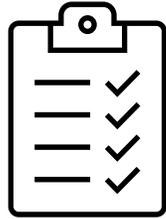
Engine

# Biofuel operation in service – SL2023-741

Most operational recommendations are the same as for conventional fuels



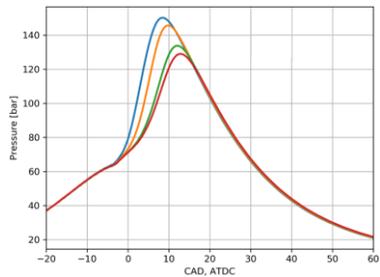
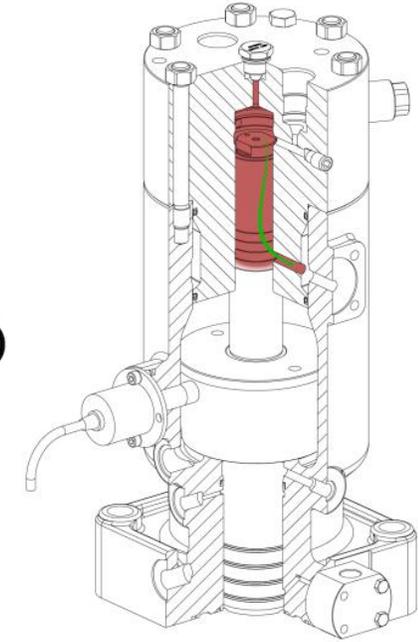
Cylinder condition



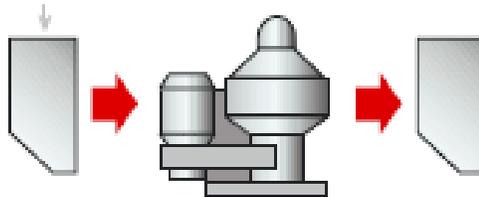
Fuel analysis



Viscosity,  
temperature,  
fuel system



Energy density  
/ Performance



Fuel cleaning



Compatibility  
Fuel management  
Remove water

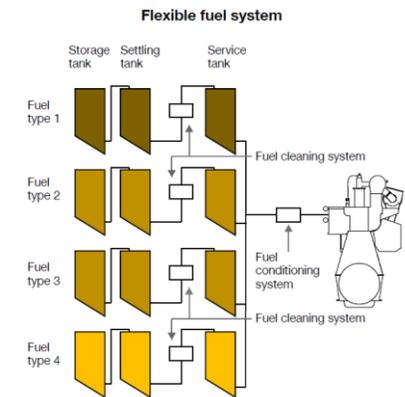


Figure 1: Schematic of a flexible fuel system

# 5 Regulatory clarity

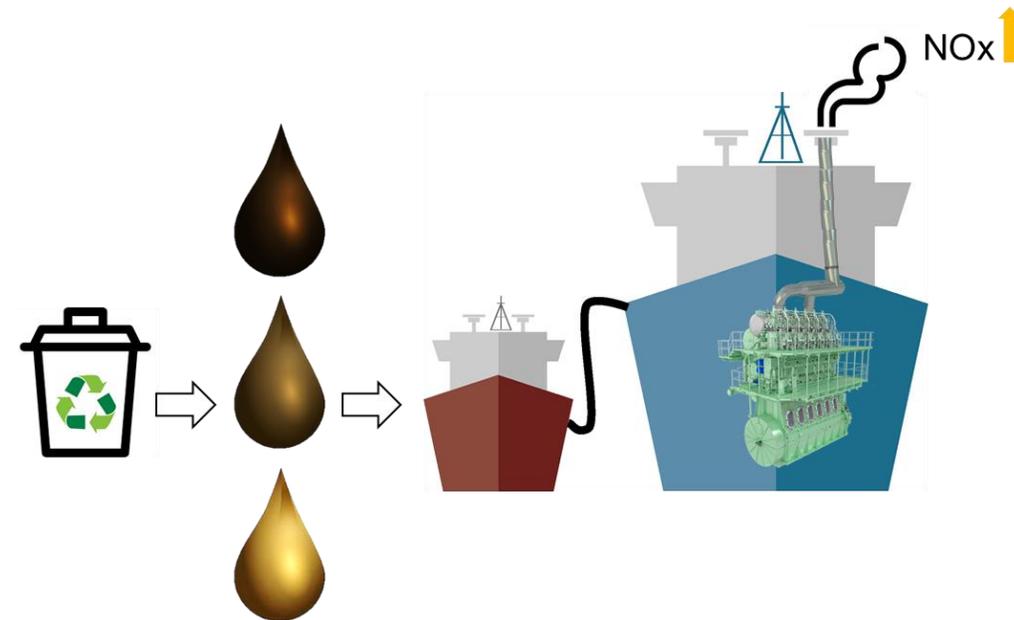
# NOx compliance and Biofuel

Unified Interpretation MEPC.1/Circ.795/latest rev. and SL2023-741



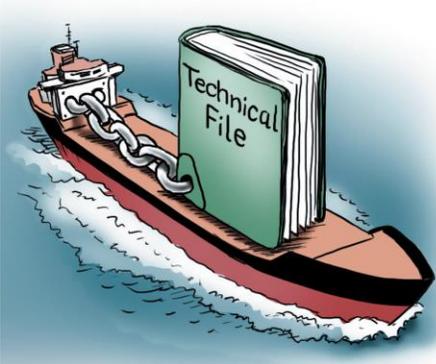
For Everllence B&W two-stroke engines operating on biofuels, up to 100% (B100), defined in SL2023-741, **changes** to NOx critical components or setting/operating values outside those given by the engine's approved Technical File **are not required**.

As always when changing fuel, it is the responsibility of the operator to ensure that the settings/operating values stated in the Technical File are fulfilled.



# NOx compliance strategy

Parameter check method



**NOx critical components**

**Operating values**

**Settings: NOx checksums**

Controller Unit		Parameters Check Sums						
ID	Addr.	Type	User	Chief	Service	Design	IMO Design	IMO Chief
ACU1	224	ACU	0	390	41505	2739	0	0
ACU2	225	ACU	0	390	41496	2742	0	0
ACU3	226	ACU	0	390	40516	2743	0	0
CCU1	240	CCU	0	511	77358	199600	58835	22571
CCU2	241	CCU	0	511	77358	199600	58835	22571
CCU3	242	CCU	0	511	77358	199600	58835	22571
CCU4	243	CCU	0	511	77358	199600	58835	22571
CCU5	244	CCU	0	511	77358	199600	58835	22571
CCU6	245	CCU	0	511	77358	199600	58835	22571
CCU7	246	CCU	0	511	77358	199600	58835	22571
CCU8	247	CCU	0	511	77358	199600	58835	22571
CWCU	234	CWCU	0	1	30496	417	0	0
ECUA	208	ECU	0	14585	178274	90073	42437	29607
ECUB	209	ECU	0	14585	178275	90073	42437	29607
EICUA	192	EICU	0	428	136004	24	0	0
EICUB	193	EICU	0	428	127576	24	0	0
ESU	223	ESU	366	1	17820	0	0	0

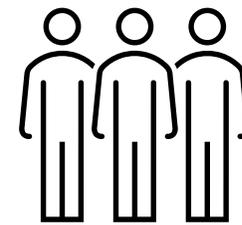
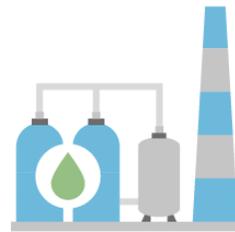
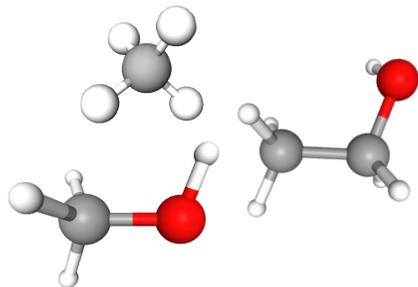
# 6 Sum up



# Sum up

## Biofuels in Everllence B&W two-stroke engines

- **Biofuel – as fuel oil** – is already in the market
  - The accepted qualities can be used with attention and care → SL2023-741
- Other biofuels are emerging: **Bio-methanol**, bio-gas (as **LBG**), **bio-ethanol** (when the engine is ready)
- **Fuel quality** is important for the engine and equipment on board
- **Fuel sustainability** is relevant for the environment
- **Regulation** should be clear to support a level playing field
  - Regulation is necessary to support market uptake
- **We** all have our roles and responsibilities



# Disclaimer

All data provided in this document is non-binding. This data serves informational purposes only and is especially not guaranteed in any way. Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project.

This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.



**Thank you!**  
**Questions?**

Dorthe Jacobsen