

## D3.4 Demonstration hydrogen dual fuel engine

Synergetics | Synergies for Green Transformation of Inland and Coastal Shipping

<b>GRANT AGREEMENT NO.</b>	101096809
<b>DURATION OF THE PROJECT</b>	42 months
<b>DELIVERABLE NUMBER</b>	D3.4 / D11 (DEM)
<b>DELIVERABLE LEADER</b>	CMB.TECH
<b>STATUS</b>	IN PROGRESS
<b>SUBMISSION DATE</b>	27-12-2024
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Deliverable D3.4 is a deliverable of type "demonstrator, pilot, prototype" (DEM). This document provides additional information on the background, status and plans. A detailed report will be submitted in June 2025 with the deliverable D3.5 Evaluation report hydrogen dual fuel on CTV.

## Project Overview

Within the SYNERGETICS project, CMB.TECH is converting and calibrating the Volvo Penta D8 marine engine to a dual-fuel hydrogen/diesel configuration. The Volvo Penta D8 engines are widely used in inland navigation and short-sea vessels, serving as main propulsion engines, variable speed gensets, or fixed speed gensets. This demonstration has the potential for significant environmental and operational impact across a broad fleet of marine vessels.

## Technology Highlights

- **Dual Fuel Combustion:** Utilises a pilot diesel injection to ignite a hydrogen/air mixture, enabling reduction of diesel consumption. This directly reduces CO<sub>2</sub> emissions, diesel particulates, and AdBlue consumption.
- **Cost-Effective Retrofitting:** Allows existing fleets to adopt dual-fuel technology with minimal modifications.
- **IMO Tier III and Stage V Compliance:** Achieves ultra-low NO<sub>x</sub> and particulate emissions, easing regulatory burdens while improving environmental outcomes.
- **Operational Benefits:** Enables ship operators to gain hands-on experience with hydrogen safety, refuelling, and availability without full dependence on hydrogen infrastructure.

### Progress to Date

- The **Volvo Penta D8** engine has been installed on a state-of-the-art dynamometer.
- Calibration for hydrogen and diesel dual fuel operation is ongoing, with emissions certification and class approval expected by summer 2025.
- In parallel, the CAD team is finalising the design of a hydrogen injection system optimised for marine applications, addressing safety and operational challenges.



## Future Work

- Completion of engine calibration for optimal performance and emissions.
- Emissions testing and certification in compliance with marine standards.

## Impact

This project demonstrates a scalable pathway for reducing greenhouse gas emissions in the maritime sector, leveraging existing assets and infrastructure to accelerate the adoption of hydrogen as a clean fuel.

