



Retrofitting towards climate neutrality

D2.4 Summary report of results of land-based testing

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Author(s)	Ashok Kumar (CMMI)
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Nomenclature

Abbreviation	Meaning
BX	BlueXPRT
TEE	Thermoelectric Element
PFD	Process Flow Diagram
P&ID	Piping and Instrumentation Diagram
DWT	Dead-Weight Tonnage
DAQ	Data Acquisition
IoT	Internet of Things
MAP	Manifold Absolute Pressure
CO	Carbon Monoxide
CO₂	Carbon Dioxide
NO	Nitric Oxide
NO₂	Nitrogen Dioxide
NO_x	Nitrogen Oxides
SO₂	Sulphur Dioxide
C_xH_y	Hydrocarbons
STP	Standard Temperature and Pressure
RH	Relative Humidity
GC	Gas Chromatograph
VPN	Virtual Private Network
GUI	Graphical User Interface
CFD	Computational Fluid Dynamics

Abbreviation	Meaning
TEA	Techno-Economic Assessment
LCA	Life Cycle Assessment
KPI	Key Performance Indicator
PPE	Personal Protective Equipment
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
PAT	Portable Appliance Testing

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EXECUTIVE SUMMARY

This document is Deliverable D2.4, Summary report of results of land-based testing, of the Green Marine project under Grant Agreement No. 101096522. It summarises the land-based testing campaign carried out on the CMMI's marine diesel genset at the Petronav facility to assess baseline engine performance and evaluate the Green Marine retrofit technologies under representative operating conditions.

The tests established the reference engine mapping, both without and with abatement systems, and generated the exhaust conditions required for technology assessment. The upgraded instrumentation, bypass arrangement, IoT/DAQ platform, gas analysers, flow meters, thermal imaging and backpressure monitoring enabled controlled testing and reliable data collection across different engine loads.

The results demonstrate the performance of the membrane-based CO₂ capture system, thermoelectric energy recovery system and chemical absorption-based carbon capture system. The campaign confirmed CO₂ enrichment through membrane separation, positive net electrical output from waste-heat recovery at higher loads, and effective CO₂ capture and mineralisation using the chemical absorption system.

Overall, D2.4 provides the technical evidence and lessons learned from land-based testing to support further optimisation, regulatory preparation and future onboard demonstration of the Green Marine solutions.