

GREEN MARINE: RETROFITTING TOWARDS CLIMATE NEUTRALITY

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We are pleased to present the latest progress report for the Green Marine project, highlighting key milestones from the past six months as we advance toward a more sustainable maritime sector.

Demonstration of Retrofitting of Existing Fleets

Over the past six months, the project consortium has made significant progress in advancing retrofitting activities through WP1. A comprehensive report on retrofitting ships, which also was a named deliverable of the Green Marine Project, was compiled. It presents the consolidated engineering, regulatory, and risk-based preparations required for the planned retrofitting of the Green Marine Integrated System (GMIS), a membrane-based carbon capture system supported by auxiliary technologies, onboard the target vessel and brings together the extensive work completed under WP1 to date, including early engagement with Lloyd's Register (LR) and the UK Maritime & Coastguard Agency (MCA), the development of updated system designs, and the completion of both internal and formal HAZID processes. These activities have resulted in a refined Process Flow Diagram (PFD), updated 3D spatial arrangements, and a consolidated set of 41 LR/MCA recommendations, all of which will be incorporated into the maturing design. Work on addressing the LR/MCA recommendations that arose from the relevant Report an Approval in Principle (AiP) is ongoing. Project partners continue to address these recommendations collaboratively, through a series of internal workshops and technical meetings.

Other work towards WP1 completion is also ongoing. A Failure Modes, Effects and Criticality Analysis (FMECA) within the CCM technology framework was initiated, similar to the one applied on the Green Marine Integrated System (GMIS), which has been completed. The results of the consortium's efforts are being consolidated into a report summarising the lessons learned from the project and the technology demonstration results - the final outstanding deliverable of WP1.

Testing and Integration of Solutions

During the previous six months, land-based testing was successfully conducted in Cyprus. Since then, all outstanding deliverables have been submitted, and additional equipment necessary for onboard testing has been procured. Work is underway on assessing the impact of one of the most suitable solutions on the hydrostatic stability and structural integrity of the target vessel, which will be available for onboard testing during the final months of 2026.

KPIs, Integration, TEA, SEA, LCA, Risk, Safety

This work package continues to drive technical validation, recently finalising a socioeconomic assessment on the public acceptance of sustainable marine tech. A refinement of licensing-based business models to secure long-term exploitation pathways is underway, as well as one for the techno-economic assessment (TEA) models.

Software Tool Catalogue for GHG-Reduction

Over the past six months, the Software Tool Catalogue for GHG emission reduction solutions has successfully launched into operation. To improve the user experience during ship registration and simulation workflows, an AI chatbot is currently being integrated. Additionally, TEA functionality has been incorporated into the Catalogue, while development of the mobile application is nearing completion. The app will be released publicly following a final stage of testing and refinement.

Exploitation and dissemination

Through active participation in domestic and international events, the project team effectively showcased key outcomes, shared best practices, and engaged with industry experts and stakeholders. Project methodologies and major milestones were presented via oral presentations, interactive workshops, and panel discussions. These engagements not only expanded the project's visibility and impact, but also fostered valuable professional networks and laid the groundwork for future research collaborations. A detailed list of events with Green Marine presence can be found in the News section of this Newsletter.

NEWS

MARTECH 2026

UoS participated in the 8th International Conference on Maritime Technology and Engineering (MARTECH) in Lisbon, Portugal, on May 27-29, where a paper entitled “Comparative assessment of carbon capture systems via a digital twin framework for ships” was presented. In this paper, the decarbonisation potential of different onboard carbon capture systems was investigated utilising a digital twin of a container carrier vessel to compare chemical absorption, cryogenic separation, and membrane separation technologies.

ISOPE 2026

CMMI presented part of the paper “Retrofitting a Marine Engine for CO₂ Capture Integration: Design Methodology and Digital Monitoring Framework” online at the ISOPE conference that took place in Orlando, USA, on July 1. All retrofit activities carried out during the Green Marine Project, the preparation of a marine engine for future CO₂ capture integration, the development of a custom exhaust bypass system to control flue-gas routing, sensors installation, and an IoT platform for real-time monitoring and data acquisition were presented.

Posidonia 2026

UoS represented the Green Marine Project at the Posidonia International Shipping Exhibition that took place in Athens, Greece, on June 1-5. During the exhibition, the UoS in-house developed virtual reality (VR) application was demonstrated to the public and the latest developments and research were discussed.



CMT–UPV Workshop

An overview of the Green Marine project was presented by UoS during the jointly organised workshop with the Clean Mobility and Thermofluids lab of the Polytechnic University of Valencia (CMT-UPV) on July 10. The presentation focused on ongoing work related to the retrofit of ships for onboard carbon reduction technologies and included a high-level introduction to the project objectives, system integration approach, and the challenges associated with implementing novel decarbonisation solutions on existing vessels.



RETROFIT55 Closing Event

RETROFIT55, a sister project of Green Marine, came to a highly close in July. During its highly successful run, we collaborated with RETROFIT55 and participated in a series of joint workshops focusing on developing and expanding a comprehensive software catalogue of green maritime tools. To mark the occasion, UoS represented the Green Marine Project at the RETROFIT55 closing event, where the highlights of our progress were presented, including the shared challenges, unique opportunities, and the lasting impact of our joint efforts.



Green Marine project – decarbonizing the maritime sector by retrofitting technologies onboard

24 June 2026

Professor Iraklis Lazakis

Department of Naval Architecture, Ocean & Marine Engineering - University of Strathclyde

Green Marine is funded by the European Union funding from the European Union's Horizon Europe research and innovation program under grant agreement No. 101096522. UK participants in Horizon Europe Project Green Marine are supported by UKRI grant numbers 10064539 (University of Strathclyde), 10068477 (CallMac Ltd) and 10064666 (CCM).

UoS NAOME Summer School

The Naval Architecture, Ocean and Marine Engineering department of UoS organised a summer school in August, where students from China and Japan participated. During the Summer School, a UoS-organised teaching session was held, focusing on how the maritime sector can accelerate its transition towards a lower-carbon and ultimately climate-neutral future. Amongst the information shared was the role of Onboard Carbon Capture and Storage (OCCS) systems, different OCCS technologies for marine applications and shipboard integration. Work undertaken and lessons learned from the Green Marine and TWIN-POWER projects was presented during this session.



Green Marine Project Overview

Green Marine: Retrofitting towards climate neutrality

EUHAK funded project

Duration: 4 years (Feb. 2023 – Jan. 2027)

10 partners across Europe and UK

Addresses CO₂ capture and testing of emission reduction technologies for marine use on large coastal and inland ships

Visible H₂O₂ (hydrogen peroxide) as fuel

Link: <https://www.greenmarineproject.eu/>

Maritime Decarbonization Onboard Carbon Capture Systems

Dr. Ahmad Elkhalaf

Research Associate (MSc, PhD)

Naval Architecture, Ocean and Marine Engineering (NAOME)

University of Strathclyde

ahmad.elkhalaf@strath.ac.uk

Maritime Decarbonization Advanced Energy Systems for Sustainable Shipping

Dr. Ahmad Elkhalaf

Research Associate (MSc, PhD)

Naval Architecture, Ocean and Marine Engineering (NAOME)

University of Strathclyde

ahmad.elkhalaf@strath.ac.uk

CMMI MaRITeC-X Teaming Project Legacy Celebration

CMMI represented the Green Marine Project at the CMMI MaRITeC-X Teaming Project Legacy Celebration that took place in Larnaca, Cyprus, on September 10. During the exhibition, the CMMI disseminated the results to the and eminent guests, public and the latest developments and research were discussed.



From Vision to Impact:
Seven Years of MaRITeC-X and CMMI
Shaping the Future of Marine and
Maritime Innovation in Cyprus,
the Mediterranean and beyond



Thursday, 10 September 2026
Radisson Beach Resort
Larnaca, Cyprus

CMMI × SMMI Seminar: Towards a Sustainable Maritime Future

Green Marine project results and activities were disseminated during the CMMI × SMMI Seminar “Towards a Sustainable Maritime Future,” held on 9 September 2026 at CMMI House, Larnaca, Cyprus. The seminar provided an opportunity to share Green Marine research, technologies and project outcomes with SMMI colleagues, Southampton, U.K., and to promote wider awareness of the project’s objectives and results.



S&E 2026

UoS presented the in-house developed VR application along with relevant lessons learned and outcomes of the Green Marine Project at the 4th Shipping and Environment conference which was hosted by Chalmers University in Gothenburg, Sweden, on September 21 -24.



Retrofitting towards climate neutrality

Virtual Reality Application in Naval Architecture

21–24 September 2026

Dimitrios Sykas, Iraklis Lazakis



WHO WE ARE

Given its knowledge, experience and innovative techniques, methods, and tools, the Green Marine consortium will develop and implement real-world solutions for retrofitting vessels in an effort to mitigate climate change.

Coordinator:



Partners:



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