GREEN MARINE: RETROFITTING TOWARDS CLIMATE NEUTRALITY

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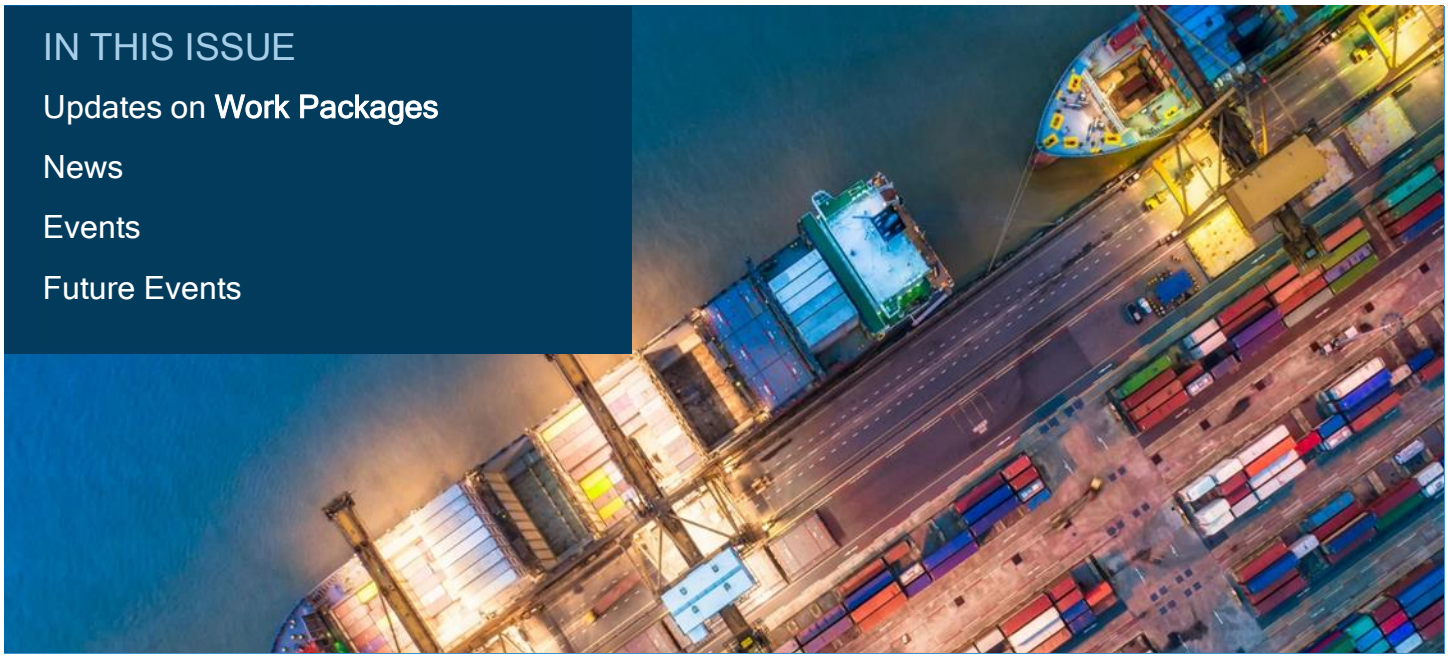


UPDATES ON THE EXPLOITATION AND DISSEMINATION ACTIVITIES

We are thrilled to bring you the latest developments from Work Package 6 (WP6) - Exploitation and Dissemination. As we continue to chart our course towards a greener and more sustainable maritime industry, our efforts in WP6 play a vital role in spreading the message and impact of the Green Marine project.

RECENT ACTIVITIES

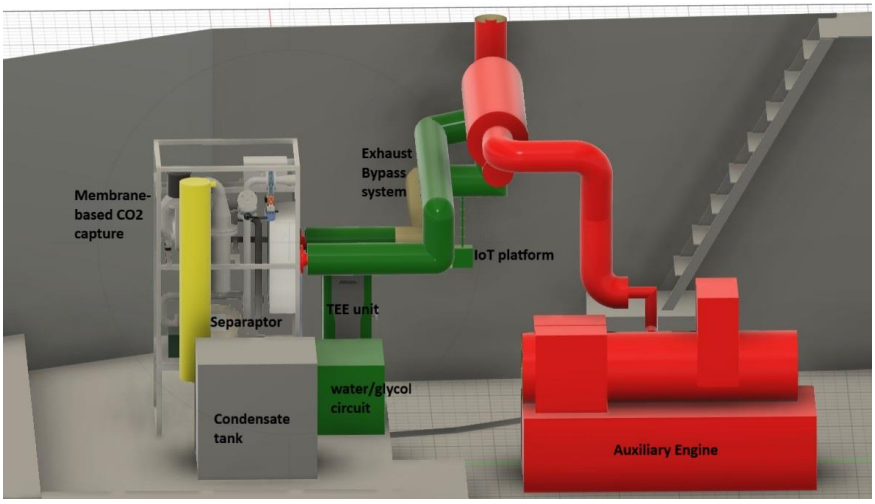
As we continue to work towards our goal of creating a sustainable and eco-friendly maritime industry, we are pleased to share the progress we have made on our work packages over the past six months.

Demonstration of Retrofitting of Existing Fleets

Over the past six months, the project consortium has made significant progress in advancing retrofitting activities through WP1. The project partners finalised the process flow diagram (PFD) of the Integrated Green Marine System, demonstrating a membrane-based CO2 capture unit, a separaptor unit, an exhaust bypass system, and a TEE unit for waste-heat to electricity. Following a series of HAZID and Approval in Principle (AiP) workshops with Lloyd's Register (LR), the University of Strathclyde (UoS) compiled 45 recommendations, which are addressed

collaboratively across partners through weekly technical meetings. UoS created specific folders to upload certificates and documents supporting the implemented actions. A comprehensive “List of Tasks” for Naval Architect consultant has been prepared (including the reports/drawings that are needed), aligned with LR recommendations, and refined with partner contributions. Feasibility assessments of installation options have been carried out based on the LR workshop and identified a particular location as the viable solution, which facilitates access to the key components inside the engine room.

Gantt charts for both land-based and onboard installation, along with an onboard testing matrix, have been developed to guide implementation and system validation. Also, UoS has developed a document for the list of materials, components, and installation works to be shared with the shipyard for the actual onboard installation. FMECA analysis for the integrated system has been initiated. Engagement with the UK Maritime and Coastguard Agency (MCA) is ongoing, with further workshops planned to ensure regulatory alignment of the integrated system. The consortium is now focused on finalising LR comments following the HAZID workshops, securing a naval architect consultant, and refining onboard installation plans to enable smooth demonstration activities in the next phase.



Land-Based Testing and Integration of Solutions

Milestones Achieved: Submission of Deliverable D2.2, Integration of Marine Genset and IoT Platform for Real-Time Monitoring & First Set of Experiments Completed to Map Engine Characteristics

Our team has successfully submitted Deliverable D2.2 – First Report on Work Procedure & Best Practices for Retrofitting early this year. This deliverable outlines the best practices for retrofitting compression ignition engines to operate with syngas in dual-fuel mode, along with requirements for engine back pressure and bypass systems. It further details retrofitting protocols and safety regulations set by the subcontractor hosting the engine for land-based tests. Additionally, the document provides a comprehensive description of the data acquisition

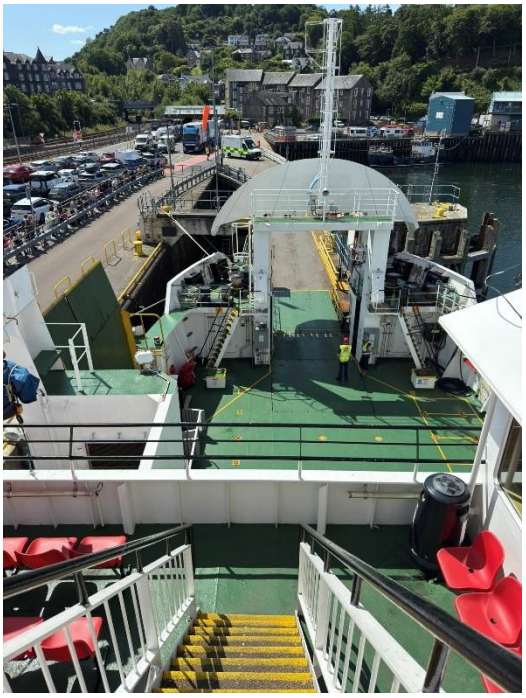
system, monitoring sensors, and the in-house IoT platform that will support performance monitoring and integration activities. Looking ahead, the findings of this report will be expanded and updated in Deliverable D2.3 – “Second Report: Work Procedure & Best Practice Methods for Retrofitting” (M42). This milestone marks a significant step forward in our collective efforts to advance retrofitting solutions that will contribute to a more sustainable and climate-neutral future for the maritime sector.

Another achievement in the Green Marine project early this year is the successful integration of the marine genset with our in-house IoT platform for real-time monitoring. This milestone represents a crucial step forward in enabling continuous data acquisition, sensor-based performance tracking, and system optimisation. The integration provides valuable insights into engine operation, emissions performance, and retrofitted system behaviour, creating a strong foundation for the upcoming land-based trials and future onboard demonstrations. With this successful step, the project moves closer to delivering scalable and sustainable retrofitting solutions for the maritime sector.

The first set of experiments has been successfully carried out to map the engine’s characteristics. This was achieved after designing, fabricating, and installing the bypass system and its associated components. To ensure accurate and comprehensive mapping, we employed a wide range of advanced sensors and instruments, including gas analysers, pressure sensors, air and fuel flow meters, vibration analysers, and a thermal camera. All data were collected through the in-house developed IoT platform, enabling real-time monitoring, centralised data acquisition, and precise analysis of engine behaviour. The wealth of data captured is crucial for building a detailed understanding of how the engine responds under various operating conditions. By establishing this benchmark with high-resolution measurements, the project team can now proceed with confidence toward testing and validating advanced retrofitting solutions, both on land-based testbeds and in future onboard applications. This achievement marks steady progress in our mission to develop and implement effective pathways toward climate-neutral marine operations.

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

Over the past six months, this work package has made significant progress in evaluating the Green Marine project's various aspects, including technical, economic, environmental, and social readiness. A major focus has been on advancing the Life Cycle Assessment (LCA), with conceptual modelling, inventory analysis, and impact assessment completed for the manufacturing stages of the SepaRaptor, TEE, and Separaptor for the flue gas unit., as well as for the engine and bypass systems.



In the Techno-economic assessment (TEA), the team has been refining models and simulations, in order to test the behaviour of some components virtually. Python scripts and COCO simulators are being used for the marine engine and process modelling.

For the Assessment of Social Readiness, fieldwork in Scotland onboard the MV Coruisk has been carried out, collecting 75 surveys from passengers to gauge their views on sustainable marine technologies.

This data will contribute to a preliminary report that aims to identify key trends and provide valuable input for policy and investment decisions. The team is currently in the process of transcribing and analysing this data. The work on the financial tool for exploitation strategies is also ongoing, with preliminary business plans prepared and a market review included in a recent deliverable to assess scalability and market size.

Software Tool Catalogue for GHG-Reduction

This work package has continued to make steady progress across multiple technical fronts. The engine simulation has been fine-tuned using operational data from the land-based engine, improving accuracy and reliability. A working version of the Techno-Economic Assessment tool for the CCU chain, with integration into the main toolbox portal is currently underway. In the last few months, preliminary CFD simulations of cabin air flow, assessing how the Separaptor technology influences engine energy demand, were completed. Meanwhile, a new simulation model based on the membrane technology is being tested to support digital twin implementation with efficient computational requirements. Preliminary machine learning models for the membrane filtration system and engine have also been developed. Additionally,

a dedicated chatbot is under training to acquire knowledge of Green Marine technologies and applications.

Exploitation and dissemination

The project team actively engaged in dissemination activities by participating in various national and international events and conferences. These platforms provided valuable opportunities to present project outcomes, share best practices, and exchange knowledge with experts and stakeholders. Through poster sessions, workshops, oral presentations, and panel discussions, the team highlighted key achievements and innovative methodologies developed during the project. Participation in such events also facilitated networking and the establishment of new collaborations for future research and implementation. Overall, these dissemination efforts significantly enhanced the project's visibility and contributed to the broader impact of its findings.

Project Management

The 6th consortium and General Assembly meeting for the Green Marine project was successfully conducted on September 2nd, 2025, via online platform. During the meeting, partners reviewed key project milestones, discussed impending issues, and collaboratively defined decisions, directions, and actionable plans to ensure smooth progress. The meeting provided an important forum for aligning on objectives, addressing challenges, and strengthening coordination among consortium members, reinforcing our commitment to advancing climate-neutral retrofitting solutions for the maritime sector.

NEWS

First Blog Post (May 2025):

Our website has a new addition – a blog page for knowledge dissemination on emerging maritime decarbonisation technologies. You

can find the latest post on carbon capture technologies on our blog page!

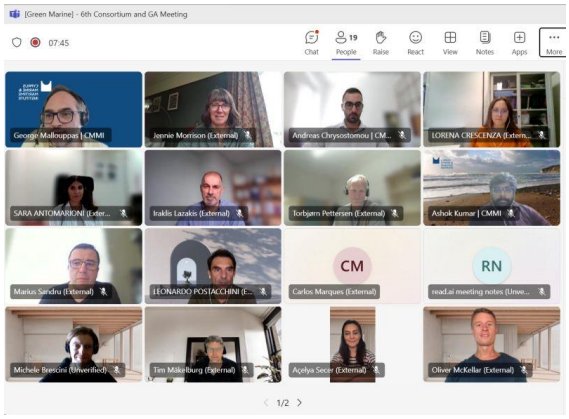
Demo of VR tool at CalMac HQ (May 2025):

In preparation for the land-based and onboard testing activities of the Green

Marine project, University of Strathclyde colleagues had the opportunity to visit CalMac Ferries Ltd. (CalMac) HQ in Gourock, Scotland. The UoS team demonstrated a portable Virtual Reality (VR) application developed in-house to both technical and non-technical personnel, providing an immersive 360° exploration of the MV Coruisk vessel. The VR tool aids in visualising and building familiarity with the engine room, stabiliser room and additionally provides external views during the vessel's drydocking!

BlueXPRT visit to Scotland:

Our BlueXPRT colleague visited the MV Coruisk vessel in Scotland. Spending over 1.5 days on the vessel on the route between Oban and Craignure, 75 responses were collected for a social readiness survey for our novel technologies! Most of the questions were related to the perception of sustainable technologies and their importance - especially in the context of marine transportation. The obtained information, together with previous and future responses, will help to identify common trends and main patterns alongside other valuable insights to support policy and investment decisions.



6th Consortium Meeting (Sep 2025):

The 6th Consortium and General Assembly meeting of the project was held online on 2nd September 2025. The meeting saw participation from all partners, providing their updates over the last 6 months.

Green Marine x RETROFIT55 x SYNERGETICS collaborative workshop #2 (Sep 2025):

During this workshop, project consortia members reflected on the way forward for an integrated software catalog platform for retrofitting solutions along with lessons learned from individual project endeavours.

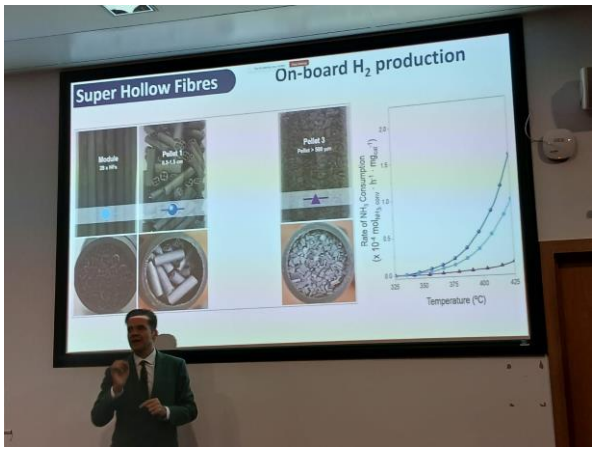
Green Marine x RETROFIT55 collaborative workshop #3 (Oct 2025):

Green Marine and RETROFIT55 colleagues discussed further about the development of an integrated software catalogue platform through brainstorming activities.

EVENTS:

NAMS conference, Nashville, USA (17th-21st May 2025):

SINTEF partners of the consortium participated in the NAMS 2025 conference, that brings together leading membrane technology developers worldwide. One of our core technologies is the membrane system to conduct carbon capture; this was a great opportunity to present and discuss our ideas with stakeholders in the membrane industry. The central theme for this year, 'Emerging Frontiers,' resonated strongly with our vision. We were happy to represent our novel membrane-based carbon capture solution through a poster presentation, designed for retrofit applications on ships, promoting sustainable maritime operations.



UK CCS Workshop (10th Sep 2025):

The Decarbonising UK Shipping: Industry Engagement on Onboard Carbon Capture workshop was hosted by UoS partners and was successfully attended by 50+ participants both in-person and online. We'd like to thank all speakers for sharing their valuable learnings!

UKCCSRC 2025 Annual Conference (10th–11th Sep 2025):

We are excited to have participated in the UKCCSRC 2025 Annual Conference, held in Sheffield, United Kingdom, between September 10 and 11. The project's advances on carbon capture technologies were presented, focusing on the unique challenges of adapting CCS solutions to the onboard environment. We had the opportunity to present the current progress and initial results of the project as part of the 'CO2 Transportation' session of the conference. Several discussions took place with colleagues during the conference, during which the specific requirements and challenges of Carbon Capture and Storage system installations onboard vessels were presented.

European Researchers' Night 2025 (26th Sep 2025)

CMMI partners had the pleasure of participating in the European Researchers' Night 2025 in Nicosia, Cyprus. We presented our work on making the maritime industry greener and more sustainable, showcasing innovative solutions for retrofitting

ships and reducing emissions with carbon-capture technologies.

IMAM 2025 (29th Sep – 3rd Oct 2025)

We were happy to participate at the 20th International Congress of the International Maritime Association of the Mediterranean conference held at Crete, Greece, between 28th Sep and 3 Oct 2025. A joint meeting and discussions involving 3 project consortia from the same funding call – Green Marine, RETROFIT55 and SYNERGETICS. Colleagues from the three projects shared their project results so far, discussed the way forward, and future collaboration plans. It was an exciting opportunity for the three projects to come together, while also planning further knowledge exchange activities.

Maritime Cyprus 2025 conference (6th-8th Oct 2025):

CMMI partners took part in the Maritime Cyprus 2025 event, held at the Parklane Resort & Spa in Limassol, Cyprus.
This prestigious maritime event brings together global industry leaders, innovators, and policymakers to discuss the future of shipping under the theme “Unlocking the Future of Shipping.”
Green Marine project’s goals and mission to industry professionals, accelerating the transition to sustainable and low-emission maritime transport through innovative ship retrofitting and carbon-capture technologies.

FUTURE EVENTS:

We are thrilled to announce the gearing up of activities to undertake land-based testing of our technologies in December 2025 in Cyprus!

Moreover, we have planned our attendance at the CAPE-OPEN Annual Conference 2025 in Ghent, Belgium on 29th-31st October 2025 and the ELINT conference 2025 at Piraeus, Greece on 9th-10th December 2025. Further, we plan to participate in the Posidonia 2026 exhibition, GEET 2026 and SOME 2026 conferences!

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:

Follow us on:

https://greenmarine-project.eu/

https://www.linkedin.com/company/green-marine-project/

https://www.youtube.com/@GreenMarineproject/featured

https://twitter.com/GreenMarineProj

Project details also available on CORDIS: https://cordis.europa.eu/project/id/101096522

Funded by the European Union

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 (CalMac Ltd) and 10064666 (CCM).