



PRONICARE - TRANSNATIONAL COOPERATION FOR PROTECTING NICHE AREAS FROM MARINE CORROSION AND BIOFOULING BY GREEN COATINGS AND NEW TEST TECHNOLOGIES

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BACKGROUND AND OBJECTIVES

Marine biofouling and corrosion are two substantial challenges for maritime infrastructures and technologies. Expensive corrosion resistant materials are often needed to ensure long term equipment functioning, while antifouling solutions are needed for surfaces and niche areas on ships which are substantial hot spots for the accumulation of biofouling organisms. Historically, tributyltin (TBT) based coatings have been used to prevent biofouling buildup across the maritime industries. Following the ban of TBT due to its toxicity to marine life, new sustainable and effective rust and fouling management innovations are needed.

The PRONICARE project aims to develop environmentally friendly and cost-effective solutions to protect niche areas offering a combination of corrosion and biofouling protection of metal surfaces. This will be achieved through the investigation and use of high-tech nanomaterial-based formulations, the creation of a thin coating with functional antifouling and anti-rust additives in a green and eco-friendly final product that will be tested in a newly developed innovative testing unit. PRONICARE project will also improve the understanding of biofouling propagation and protection of niche areas and offer best practices to address this maritime challenge.

THE PRONICARE CONSORTIUM

The PRONICARE consortium is a multidisciplinary partnership of 6 partners, representing research institutes and industry organisations in Norway, Germany, and Malta.



Norwegian partners include the Norwegian research institute **SINTEF AS** and the Norwegian SME **Bioenvision AS**.



German partners include the German research institute Helmholtz Centre for Polar and Marine Research at the **Alfred Wegener Institute**, German SME **Ankron Water Services**, and the German company **Kelvion**.

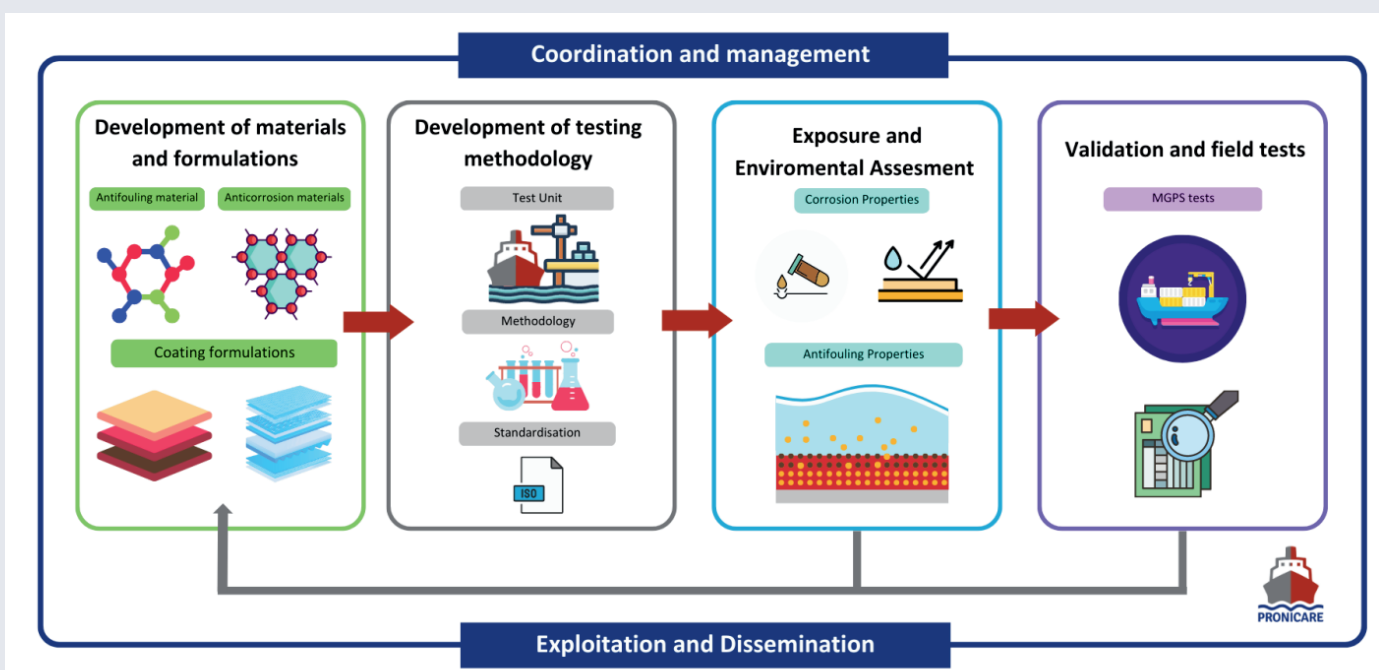


Maltese partners include the Maltese SME **AquaBioTech Group**.

PROJECT FRAMEWORK

PRONICARE will achieve its goals by:

- Developing environmentally safe and effective antifouling and antirust coatings using nanomaterial technology.
- Developing laboratory and in situ testing units and standardisation procedures for antifouling and anticorrosion properties.
- Assessing environmental exposure across different trophic levels of biofouling organisms.
- Conducting validation, performance, and field tests.
- Facilitating the creation of a Regulatory Advisory Board and an Industry Advisory Board.



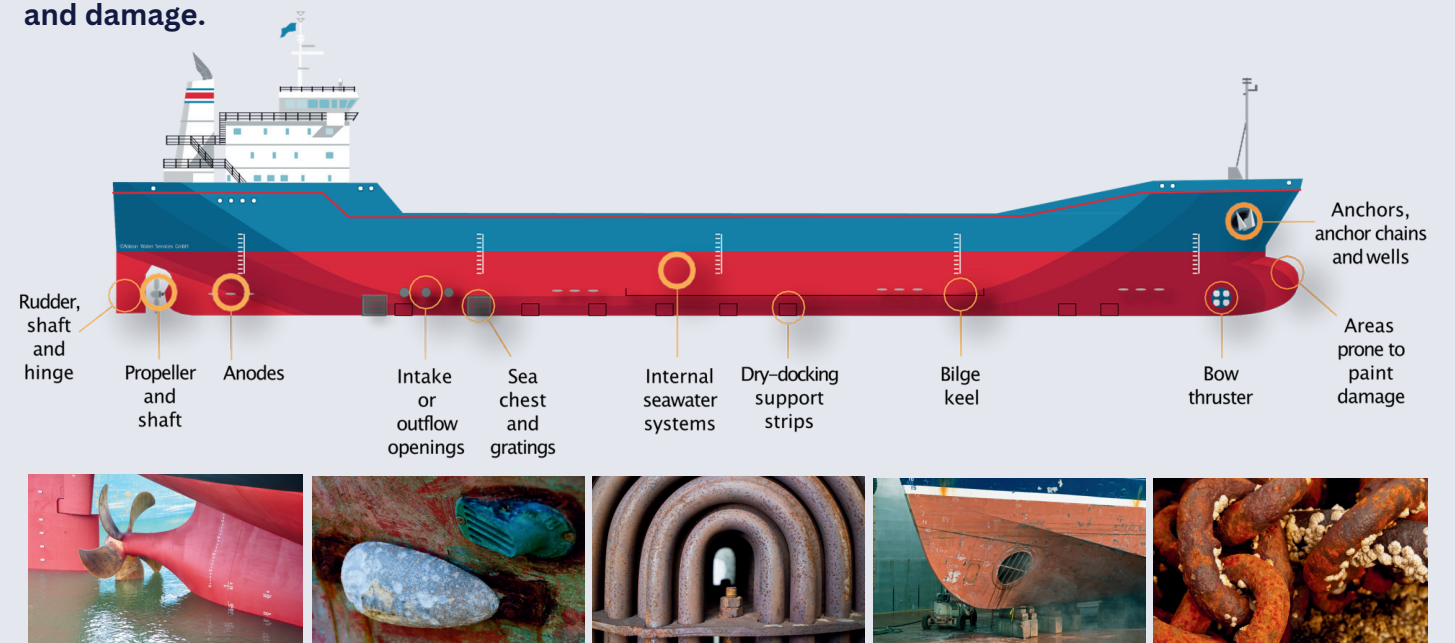
ADVISORY BOARDS

PRONICARE aims to be an active member of the biofouling sector by collaborating with stakeholders, identifying industry needs and risks, engaging in biofouling developments and guidelines, and disseminating project results. To accomplish this, PRONICARE will be establishing two differently oriented advisory boards.

- The **Regulatory Advisory Board (RAB)** will focus on the discussion and dissemination of policies and guidelines, interpretation of existing standards, and future regulatory challenges.
- The **Industry Advisory Board (IAB)** will focus on technology development, market trends and insights, and compliance and challenges.

NICHE AREAS

Niche areas of ships consist of locations that are more vulnerable to corrosion or biofouling, as a result of direct contact with and exposure to seawater, hydrodynamic forces, and coating wear and damage.



ONGOING RESEARCH

Coating Development

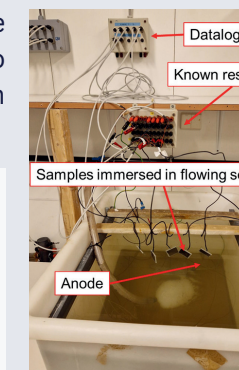
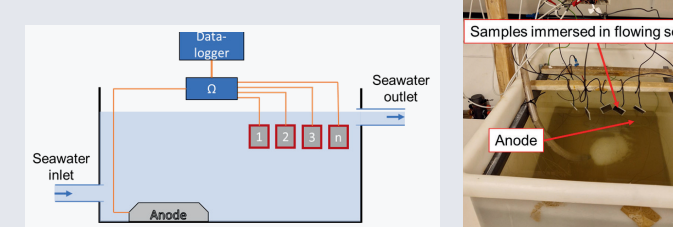
SINTEF and Bioenvision are developing multiple nanomaterial coating formulations. Desired properties include:

- Adhesion to metal surfaces by spray or dip application
- Resistance to cracking and flaking
- Prevention of calcareous scale formation
- Hydrophobicity
- Antifouling and anticorrosion capacities



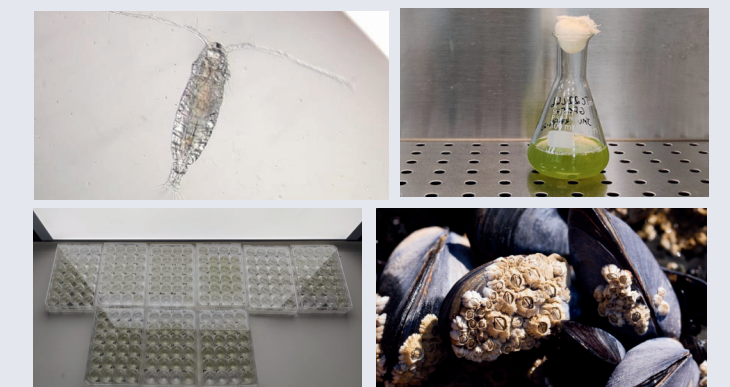
Corrosion Testing

Laboratory corrosion testing is being conducted by SINTEF to mimic performance in field conditions. During preliminary testing, steel plates were coated in PRONICARE coatings and immersed in seawater with cathodic protection for 4.5 months. The corrosion on these samples will be compared to field testing in Germany and in Malta.



Ecotoxicity Analysis

Coating and lixiviate ecotoxicology analysis is being conducted by AquaBioTech Group in accordance with OECD and ISO guidelines. Coating exposure is being conducted on microalgae, copepods, mussels, and bryozoans.



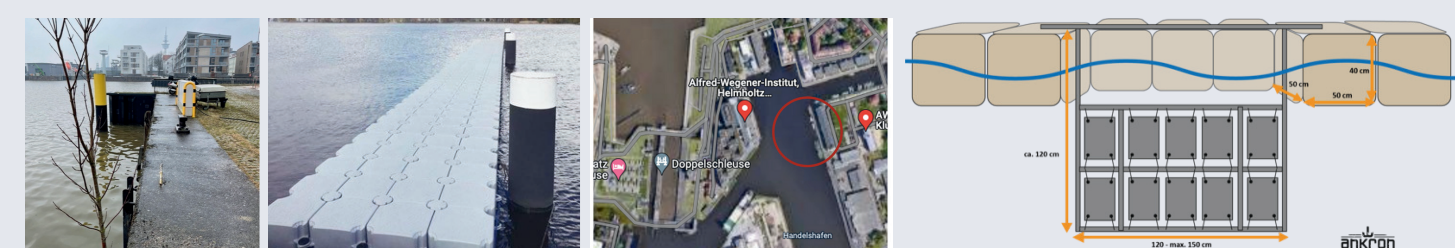
Robotic Microfouling Assay

Microfouling inhibition and initial biofilm formation will be assessed by SINTEF with a robotic microfouling microwell assay. In addition to AquaBioTech Group's analysis of anti-macrofouling properties, SINTEF will help assess the immediate effects of the PRONICARE coatings on the biofouling process.



Field Test Unit and Field Test Sites

Ankron Water Services, AWI, and Kelvion are developing a mobile field testing unit to assess the anticorrosion and antifouling performance of the PRONICARE coatings in the North and Mediterranean Seas. The test unit will include testing of coated steel plates and models of niche areas. Initial field testing will be based in Bremerhaven, Germany and further field testing will also be implemented in Malta. Standardisation and validation protocols will be developed for the novel testing unit.



Parties interested in participating in either the RAB or IAB should express interest to Maren Schnier (maren.schnier@ankron.de) indicating which advisory board is preferred



The PRONICARE project has received funding from the Research Council of Norway, The Malta Council for Science and Technology, and The Federal Ministry for Economic Affairs and Climate Action Germany (BMWK) via the MarTERA - ERA NET co-fund scheme (under grant agreement No 728053-MarTERA) of the European Commission's H2020 initiative.