

Scenarios, risks and opportunities of digital solutions in transition towards green and sustainable marine logistics

About the Project

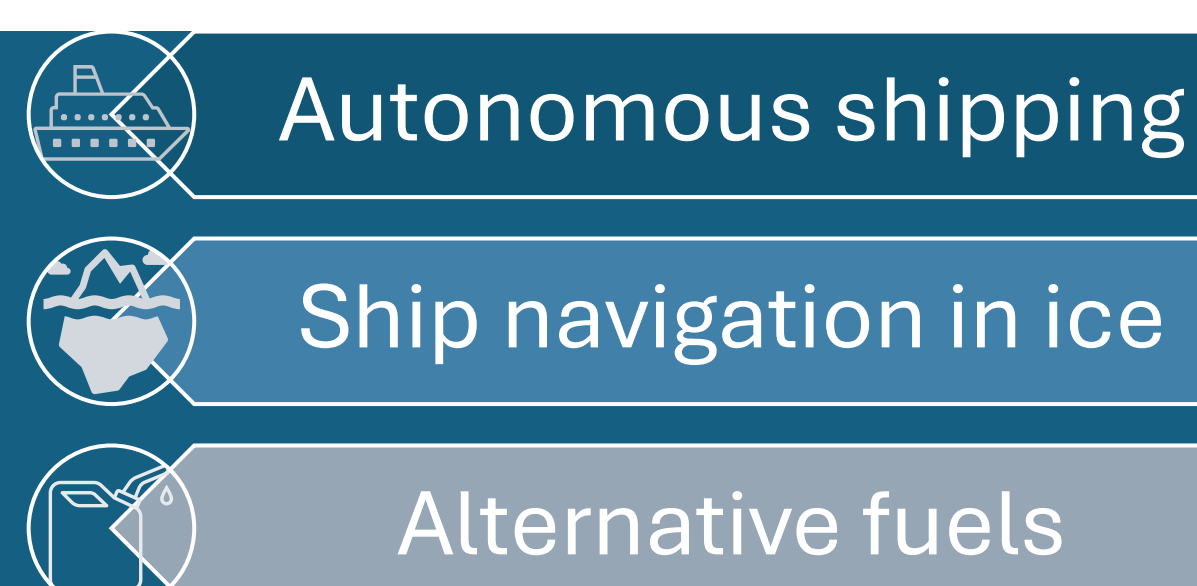
GYROSCOPE investigates opportunities provided by and risks associated in the context of green transition of the maritime sector.

The project combines stakeholder participation, modern risk analytics, and the exploration of alternative pathways.

Project Goals

- Produce a holistic picture of sustainable transition to green marine logistics in Finland
- Bring different actors of the Finnish maritime cluster together
- Produce potential policy pathways
- Create collective future scenarios

Three case contexts:

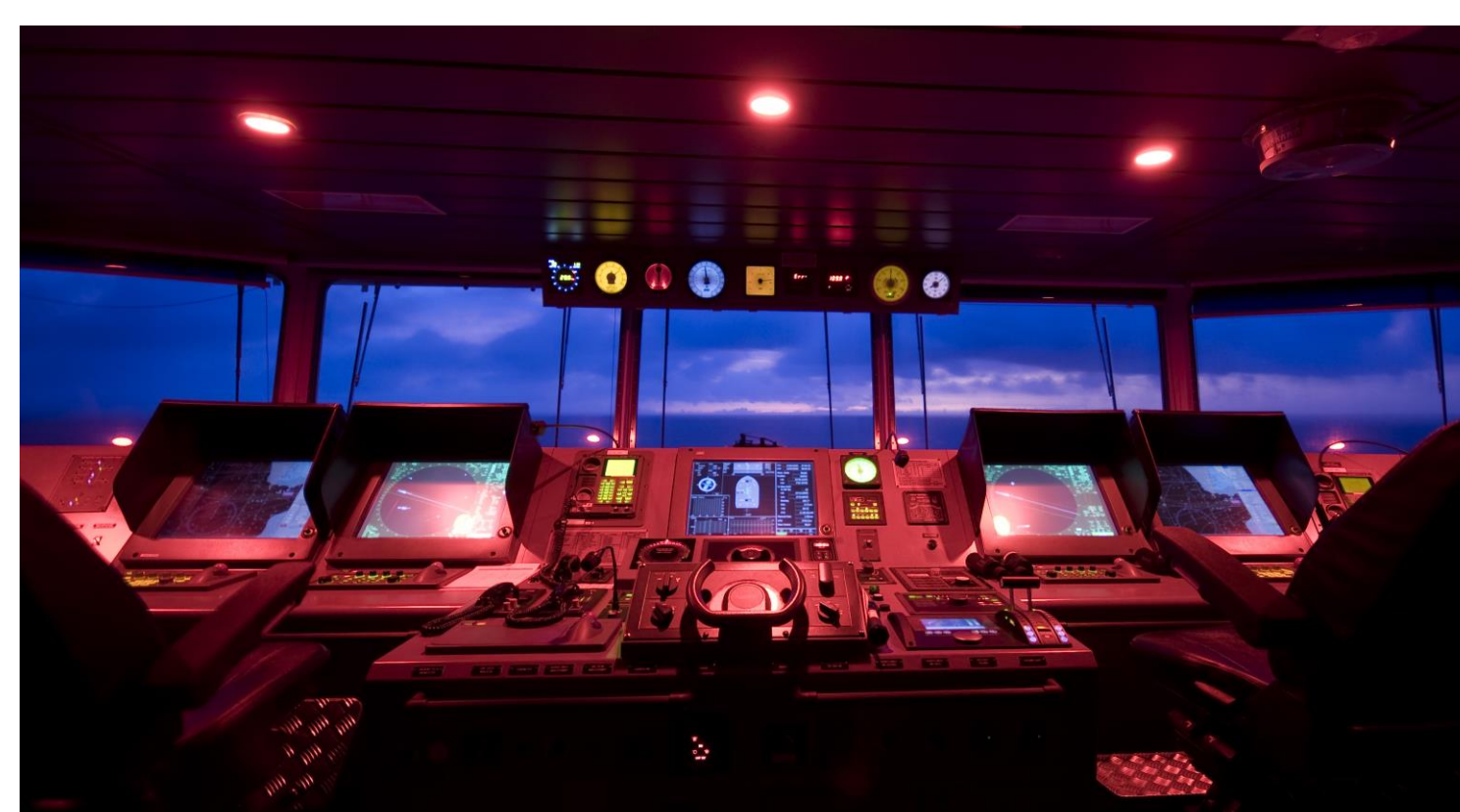


Key Findings

- The green maritime transition depends on alternative fuels but also on safe, reliable digital systems
- Policies should enhance data transparency and collaboration while balancing innovation with risk management
- Global and long-term level impact assessments are crucial



- A “chicken-and-egg” dilemma persists: suppliers await demand, and shipowners delay adoption
- As maritime emissions rise, a rapid shift to green fuels is essential
- This requires large-scale, and risky technological and regulatory solutions
- Inaction out of fear will hasten social and environmental tipping points



- Shipping will see more diverse energy solutions; strategies must fit context-specific decarbonization options
- Regulation focusing only on fuels' CO₂ emissions can overlook broader impacts and risks
- Life-cycle risks and their management costs should be recognized
- Autonomous technologies can directly support decarbonization in Arctic and ice-bound waters



Project partners

- University of Turku, Finland's Futures Research Centre
- Kotka Maritime Research Association
- Aalto University, Department of Energy and Mechanical Engineering (Marine and Arctic Technology)
- University of Helsinki, Ecosystems and Environment Research Programme
- University of Helsinki, Helsinki Institute of Sustainability Science



Materials and Methods

- Interviews
- Workshops
- Literature reviews
- Systems analysis tools



Policy Recommendations

1. Advance sustainability through systemic transformation

2. Anticipate risks and account for key uncertainties

3. Broaden sustainability metrics from GHG emissions only to holistic life-cycle perspectives

4. Align regulations and incentives to steer major actors' investments in the green transition

5. Integrate cold-region perspectives into the maritime green transition