

# ROADMAP for Zero Emission Marine

03 / 2022



## VISION:

A Zero emission marine Future

## MISSION:

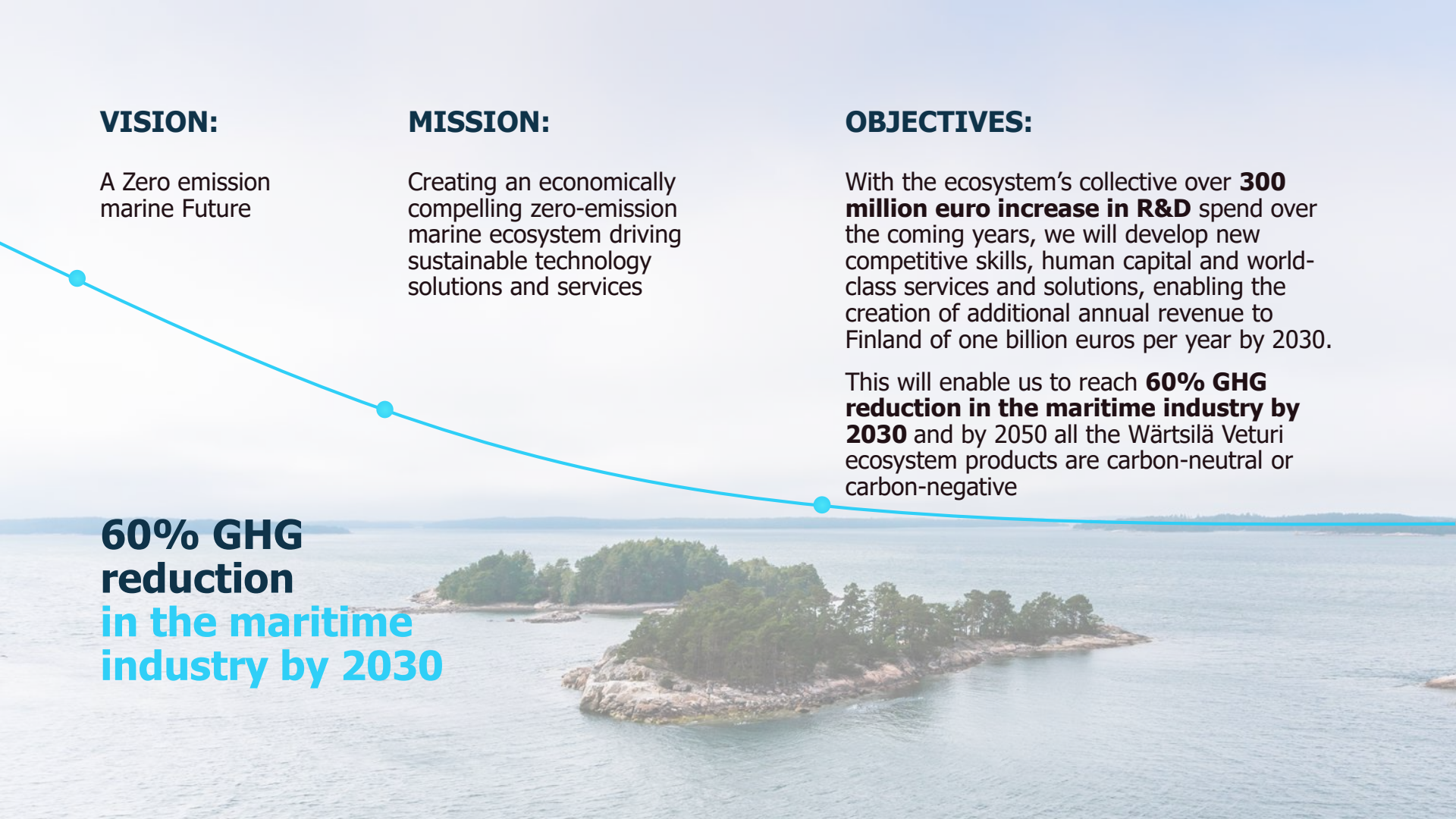
Creating an economically compelling zero-emission marine ecosystem driving sustainable technology solutions and services

## OBJECTIVES:

With the ecosystem's collective over **300 million euro increase in R&D** spend over the coming years, we will develop new competitive skills, human capital and world-class services and solutions, enabling the creation of additional annual revenue to Finland of one billion euros per year by 2030.

This will enable us to reach **60% GHG reduction in the maritime industry by 2030** and by 2050 all the Wärtsilä Veturi ecosystem products are carbon-neutral or carbon-negative

**60% GHG  
reduction  
in the maritime  
industry by 2030**





# Wärtsilä roadmap for Veturi project Zero Emission Marine

Technologies enabling introduction of green fuels



Green fuel production



Automated and optimized operations – increased level of autonomy



Outcome based business model – OBBM



 Wärtsilä's effort

 Ecosystem effort



Path to Zero Emission Marine

# Technologies enabling introduction of green fuels

Hydrogen Internal Combustion Engine (ICE) concepts and related enabling technologies

Ammonia Internal Combustion Engine (ICE) concepts and related enabling technologies

Further develop the methanol and ethanol ICE concepts

Operating on blends – Develop technologies, testing and approving the use of various blends

Aftertreatment – further reduction of global and local harmful emissions

Further integration of new and existing Energy Storage systems for the Marine and Energy Markets

2022

2023

2024

2025

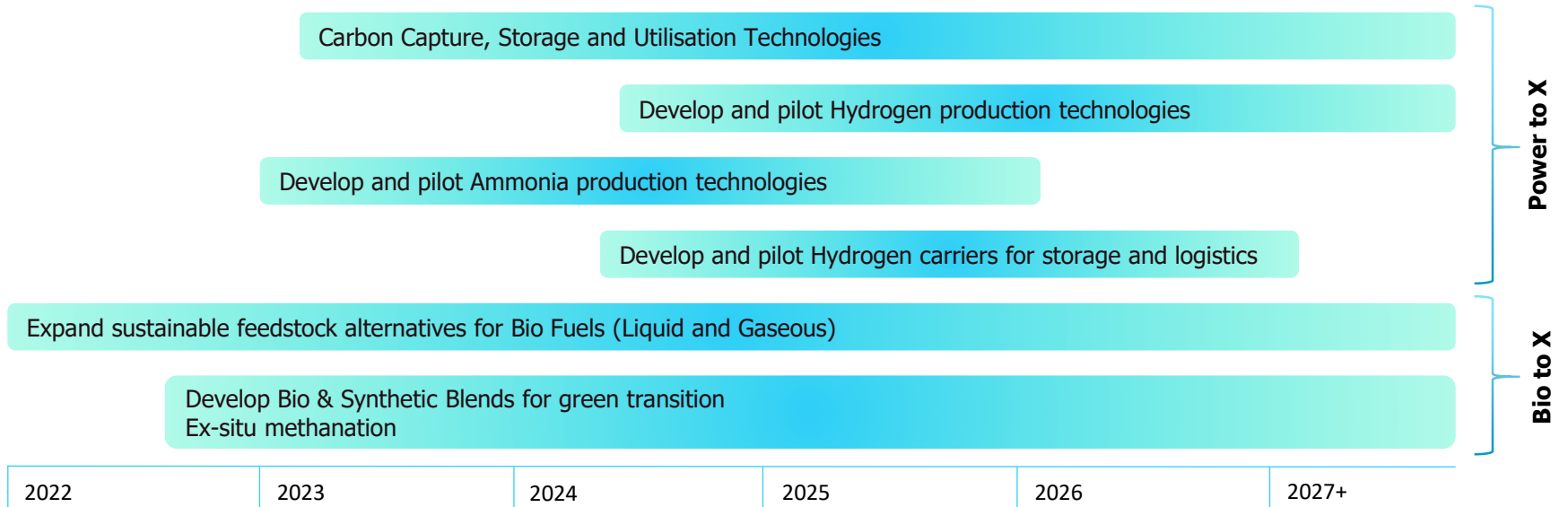
2026

2027+



Path to Zero Emission Marine

# Green fuel production





Path to Zero Emission Marine

# Automated and optimized operations – increased level of autonomy

Platform enabling cloud applications

Models & APIs - Development of optimization and "autonomous ready" models, APIs and libraries, helping to quantify vessel and ecosystem level energy usage and related emissions

Integrations and data sources – Open APIs for equipment integration onboard, enabling new data for model development as well as integration of new data sources

Applications for automated, connected and optimized operations

2022

2023

2024

2025

2026

2027+



## Path to Zero Emission Marine

# Outcome based business model – OBBM

ENGINE SFOC OPTIMIZATION – Engine efficiency and emission reduction through upgrades and optimized operations

VESSEL FUEL OPTIMIZATION - Vessel fuel efficiency and emission reduction through propulsion upgrades and energy savings devices

EMISSION COMPLIANCE (CII) – Capability to guarantee fuel savings that are required for targeted CII rating

FINANCING & RISK MANAGEMENT – Capability to offer financing and performance guarantees for fuel savings

ASSET USAGE – Fuel & emission savings through optimized usage of the powertrain and the vessel

Scaling up the released OBBM offerings to new segments and customer bases

Extend OBBM offering with addition value propositions (e.g. conversions to future zero-carbon fuels & lean manned engine room)

2022

2023

2024

2025

2026

2027+





# Research topics

## Knowledge creation

- Risk management
- Sector coupling & regulations
- Green fuel material questions
- Resilience
- Emission monitoring
- Cyber-security
- Safety

## New solutions

- Ex-Situ Methanation
- Green Fuel storage and logistics
- Emission reduction concepts (gas, noise)
- Cloud application platform and interfaces
- Commercial models for fuel and emission reduction
- Commercial lifecycle models for alternative fuels

## Simulations / modelling

- Combustion concepts
- Engine and propulsion efficiency
- Energy optimization & AI
- Emission forecasting with data models
- Data models and API
- Integration pilots for applications

## Market studies

- Socio-economic study
- Combustion concepts
- Green fuel cost & availability





**Funded by the  
European Union**  
NextGenerationEU