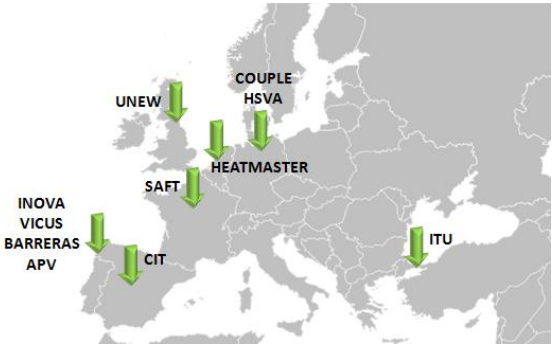
TEFLES

TECHNOLOGIES AND SCENARIOS FOR LOW EMISSIONS SHIPPING

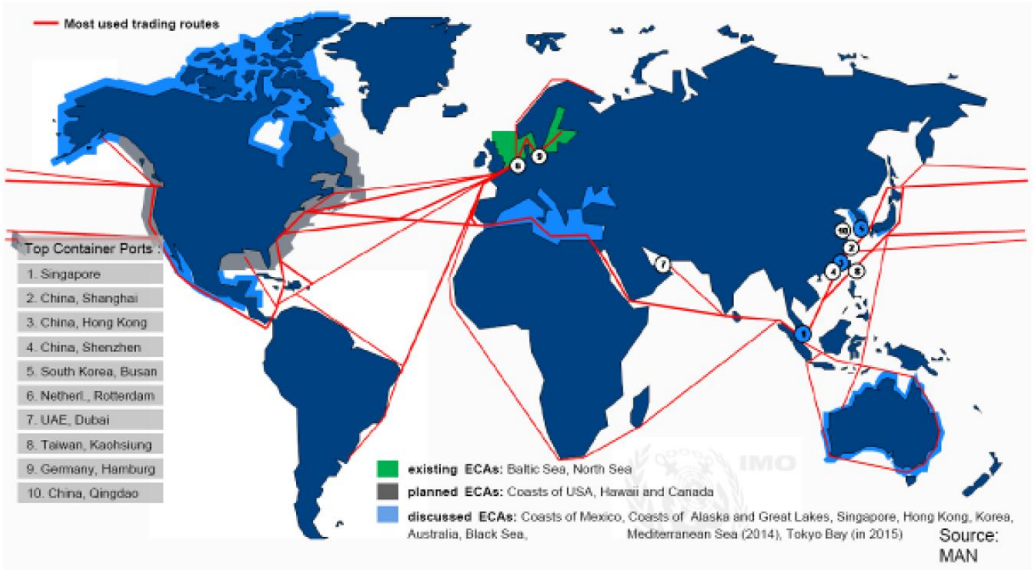
PROJECT PARTNERS

Third parties and End Users



OBJECTIVES

To develop the use of combined new technologies and operation strategies for emissions reduction in RoRos and ferries in all operating conditions



OBJECTIVES

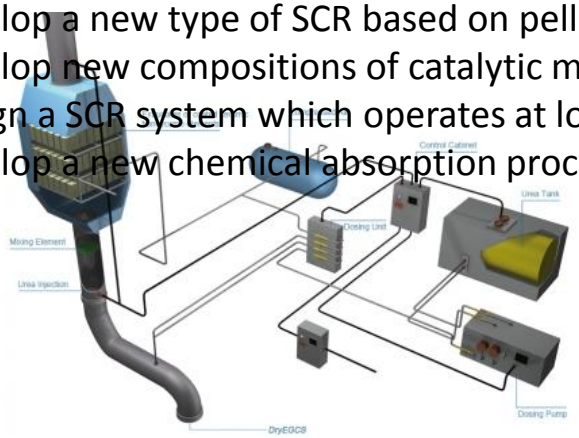
- Assessment and validation of new cost effective technologies and systems for after treatment, scrubbing and other exhaust treatments
- Assessment and validation of new cost effective procedures for minimizing emissions from main propulsion engines
- Minimizing emissions of energy for auxiliary powering port
- Definition and validation of an optimized scenario model for emission reduction at sea (MoS, cruise and ferry vessels)
- Definition and validation of an optimized scenario model for emission reduction at port approach and maneuvering (MoS, cruise, ferry)
- Definition and validation of an optimized scenario model for ships in port operation (MoS, ferry, cruise and port service vessels)
- Disseminate results and provide technologies and models for emissions reduction on support of ports and shipping

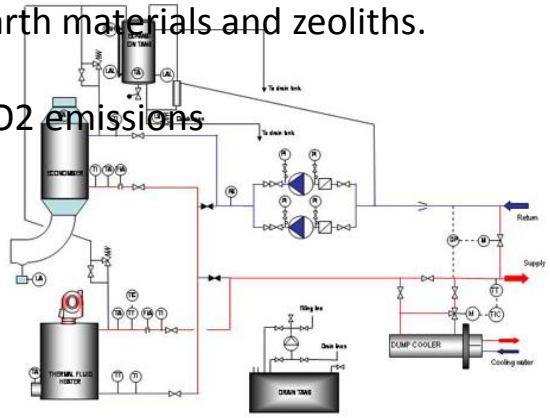
STAGES


WP1
Administrative Coordination
3
Technologies & Strategies
- Assessment, combination and integration of technologies for emission reductions
WP2
After Treatment & Thermal Energy
- Exhaust gas cleaning
- Exhaust gas energy recovery
- Thermal energy at port
WP3
Propulsion & Maneuvering
- Hydrodynamic technologies
WP4
Power Generation & Propulsion
- Ship performance modelling
- Alternative propulsion
- Auxiliary drives
3
Scenarios
- Scenarios for emission reductions
WP5
At Sea
- Emission Reduction Model
WP6
Port Approach & Maneuvering
- Emission Reduction Model
WP7
At Port
- Aiming at Zero Emissions
WP8
Implementation Strategy & Economical Aspects
WP9
Dissemination

WP2 AFTER TREATMENT AND THERMAL ENERGY

- Development of advanced engine and exhaust gas cleaning devices models
- To identify and develop the most efficient after treatment technology with respect to lowest emissions and highest energy efficiency
- Develop a holistic energy efficiency model including adjustments of engine, EGCS and energy recovery
- Develop a NOx abatement system with the smallest possible footprint
- Integrate technologies on new more compact systems
- Improve cleaning efficiency and exploitation costs of the systems
- Develop energy recovery systems with new refrigeration processes and thermal storage solutions
- Design and validate a SCR system for vessels with installed power generation between 1 MW and 50 MW
  (both 2-stroke and 4-stroke engines)
- Develop a new type of SCR based on pellets
- Develop new compositions of catalytic materials based on rare earth materials and zeoliths.
- Design a SCR system which operates at lower temperatures
- Develop a new chemical absorption process to partially reduce CO2 emissions



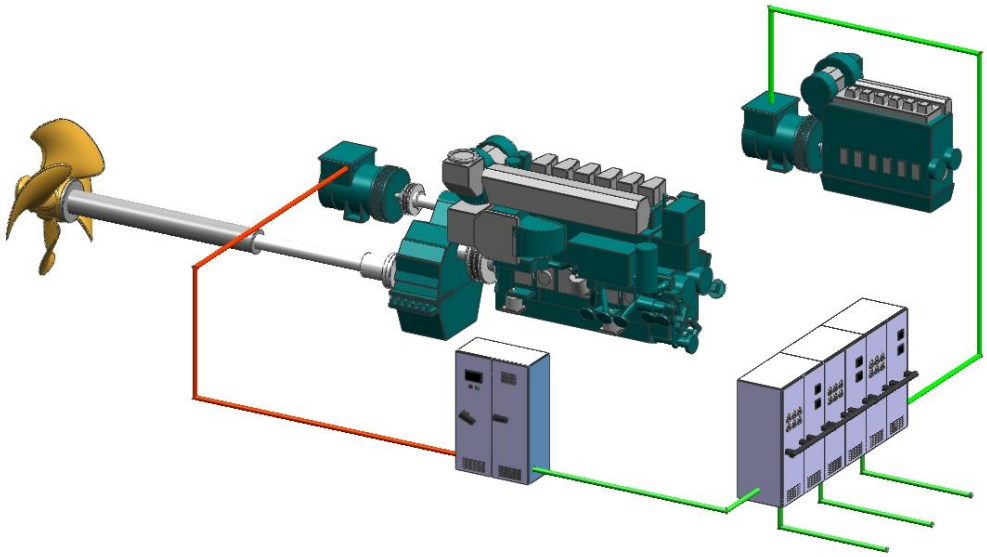


WP 3 PROPULSION AND MANOEUVRING

- Development of advanced hydrodynamic models to reduce fuel consumption on sea and port scenarios
- Validate models with data at sea navigation conditions
- Develop innovative cost-effective solutions for reducing consumption by rudder interaction on new and existing ships
- Develop a ship-tug interaction model for reducing consumption and time on manoeuvering
- Develop a model for port approach speed reduction

WP4 POWER GENERATION AND PROPULSION

- Develop the knowledge needed to model different technological solutions able to partially reduce the emission levels of a given ship
- To assess combinations of technologies resulting in simplified propulsion systems for ships
- To model different uses of power electronic variable frequency supplies application to deliver the required improved emissions/performance profiles of a vessel fitted with generation/propulsion systems
- Evaluate the impact of power share strategies on ship power plant performance in order to minimize the emissions levels for a given load



WP 5 AT SEA EMISSIONS REDUCTION MODEL

- Develop a computational model for emissions at the open sea transport and reduction model
- Review of emissions models for maritime transport
- Establishment of emissions database for different types of vessels
- Development of model to calculate emissions for the motorways of the sea
- Reduction measures for emissions for the motorways of the sea
- Each model will comprise the following steps:

  -Definition of the scope and methodology

  -Data sources, quality and quantified reduction objectives

  -Model development

  -Constraints and risk assessment

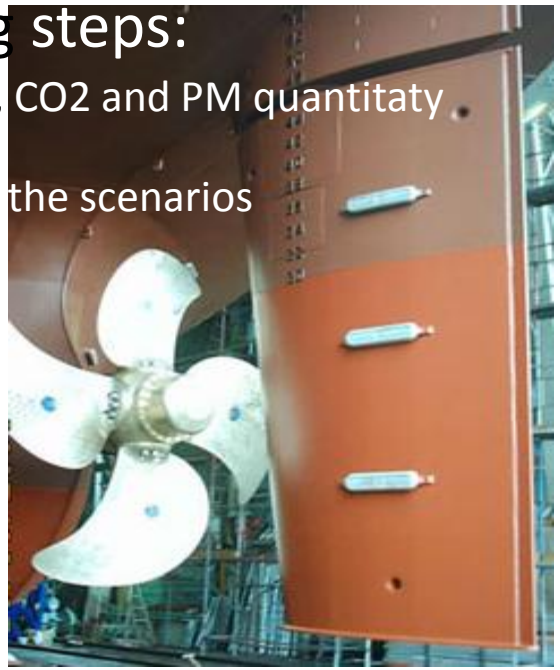
  -Model testing and validation

WP 5 AT SEA EMISSIONS REDUCTION MODEL

- Holistic analytic model for ship operation simulation (actual & most efficient configurations analysis)
- Environmental conditions
- Ship hull hydrodynamics
- Propulsion
- Electric Network
- Main consumers
- Energy storage systems
- Hybrid plants
- Analysis in every ship condition

WP6 SCENARIO 2 PORT APPROACH AND MANOEUVRING EMISSION REDUCTION MODEL

- Model involving the technologies and the different types of vessels in the corresponding scenario in order to evaluate the achieved emission reduction
- Energy-emissions trade-offs by use of the after treatment solutions on the ship side and the emissions produced
- Each model will include the following steps:
  - Previous estimation of the different SOx, NOx, CO2 and PM quantitaty reduction
  - Definition and scope and methodology and of the scenarios
  - Definition of the of the architecture and tools
  - Identification of base Data sources
  - Model development
  - Model testing and validation

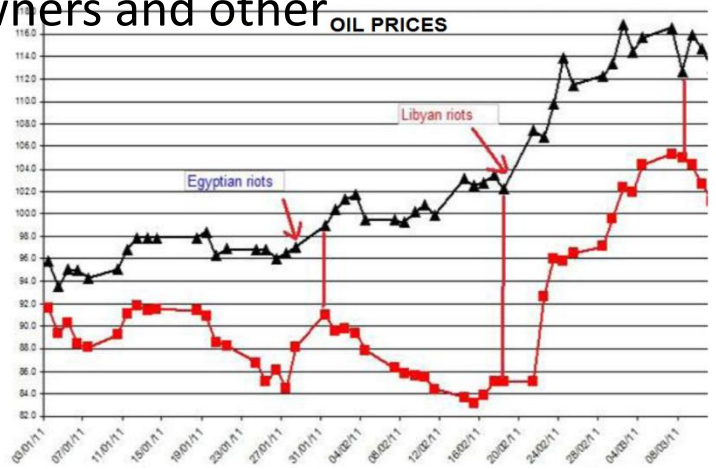


WP7 SCENARIO 3 AIMING AT ZERO EMISSIONS WHEN SHIP DOCKED

- Develop models for the loads and power supply systems for various types of ships
- Identify the state of the art for shore energy supply systems, including current research and analysis of the effectiveness of cold ironing
- Identify the requirements for retrofitting a number of ship types and size with cold ironing capability
- Develop models for ship and port loads and generation resources for power supply
- Assess the potential impact and cost efficiency of cold ironing and capacity for emission reductions
- The models will be developed through the following steps:
  - Definition of the ship type and port scenarios, scope and end user specifications
  - Methodology, data sources, model architecture
  - Model development
  - Constraints and risk assessment
  - Model refinement, testing and validation

WP8 IMPLEMENTATION STRATEGY AND ECONOMICAL ASPECTS

- Assessment of the economic aspects of emissions reduction scenarios and operations dealt on WP5 WP6 and WP7
- Assure feasibility and consistency of the models for scenarios and operations from WP5, WP6 and WP7 with regards for cost of investment and operation, against the benefit of emissions reduction achieved
- Facilitate the choice of emissions reduction systems more suitable to different ships and propulsion types and operational characteristics
- Contribute to the definition of Emission Reduction Efficiency indexes complementary to the new Energy Efficiency indexes
- Verify acceptance and validate, the emissions reduction technologies and TEFLES scenarios and tools with ship owners and other
- Develop a methodology for emissions reduction assessment for vessels, also during port operations



Thank you

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