TEFLES PROJECT

VICUS DESARROLLOS TECNOLÓGICOS S.L.

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THE PROJECT

Project Acronym:	TEFLES
Project full title:	Technologies For Low Emissions Shipping
Grant Agreement no:	266126
Call ID:	FP7-SST-2011-RTD-1
Start Date:	01/02/2011
End Date:	31/01/2014
Project Duration:	36 months

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THE CONSORTIUM

- INOVA – Coordinator
- VICUSdt- Technical coordinator
- CIT sl (Spain)
- MWB (Germany)
- Couple systems (Germany)
- HSVA (Germany)
- HEATMASTER(The Netherlands)
- University of Newcastle (UK)
- University of Istambul (Turkey)
- SAFT(France)
- APV (Spain)

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BACKGROUND

TEFLES

- Response to Call 2010
- Technologies (existing and new one) for emissions reduction
  - Development an after treatment unit
  - Assessment of existing technologies for emissions reduction
  - Models development in three scenarios (At sea, Manoeuvring and at Port) for emissions reduction assessment
- Type of project
  - Level 1
  - Maximal funding 3MEuro

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BACKGROUND

TEFLES project addresses not only the urgent need from industry for fuel consumption reduction but the need for emissions reduction also (mainly in coastal areas), driven by more strict regulations

TEFLES project is concerned about RoRos, Ferries and Tugs

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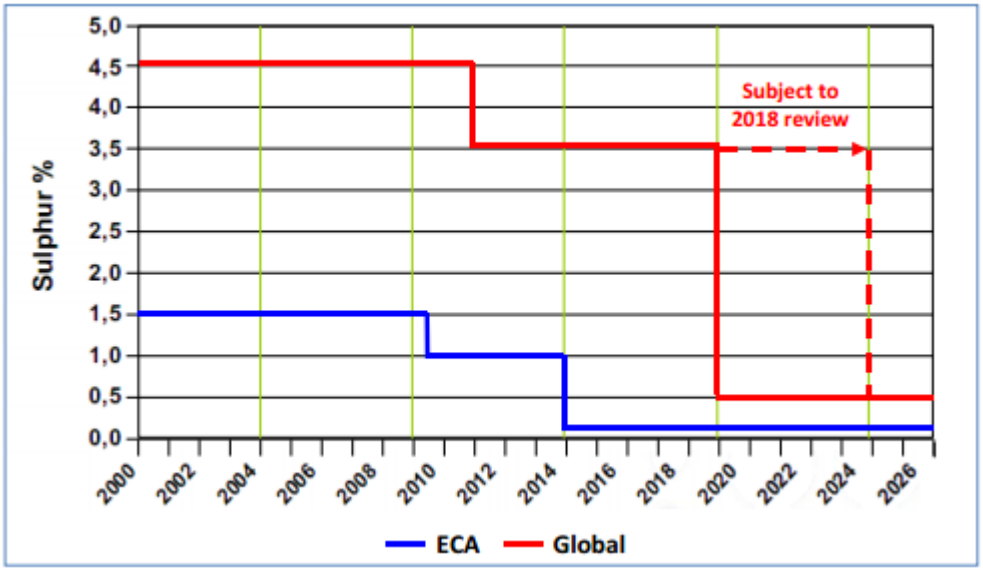
BACKGROUND

ECAs, SECAs and NOx Tier limits are setting new requirements for ships emissions

- **Which technologies can be used?**
- **Which combination of them is best?**
- **Which emissions reductions can be achieved?**
- **With which ROI?**



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BACKGROUND

UP TO DATE, IT DOES NOT EXIST A HOLISTIC SHIP MODEL FOR SHIP EFFICIENCY AND EMISSIONS REDUCTIONS ASSESSMENT AS A SUPPORT DECISION TOOL FOR:

- Ship owners
- Ship operators
- Design offices
- Class societies

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OBJECTIVES & RESULTS

•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 on approach and maneuvering, including speed reduction, improved approach and maneuvering and alternative hybrid generation and propulsion

•Minimizing emissions by assessment and validation of efficient supply and use, 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

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OBJECTIVES & RESULTS

- **Existing technologies** assessment for emissions reduction

- Development of an After treatment unit (**Dry EGCS**)

- Develop a **numerical tool** in three scenarios for ship energy and emissions assessment

- Develop an **economical model** for cost/benfit study for different solutions implementation

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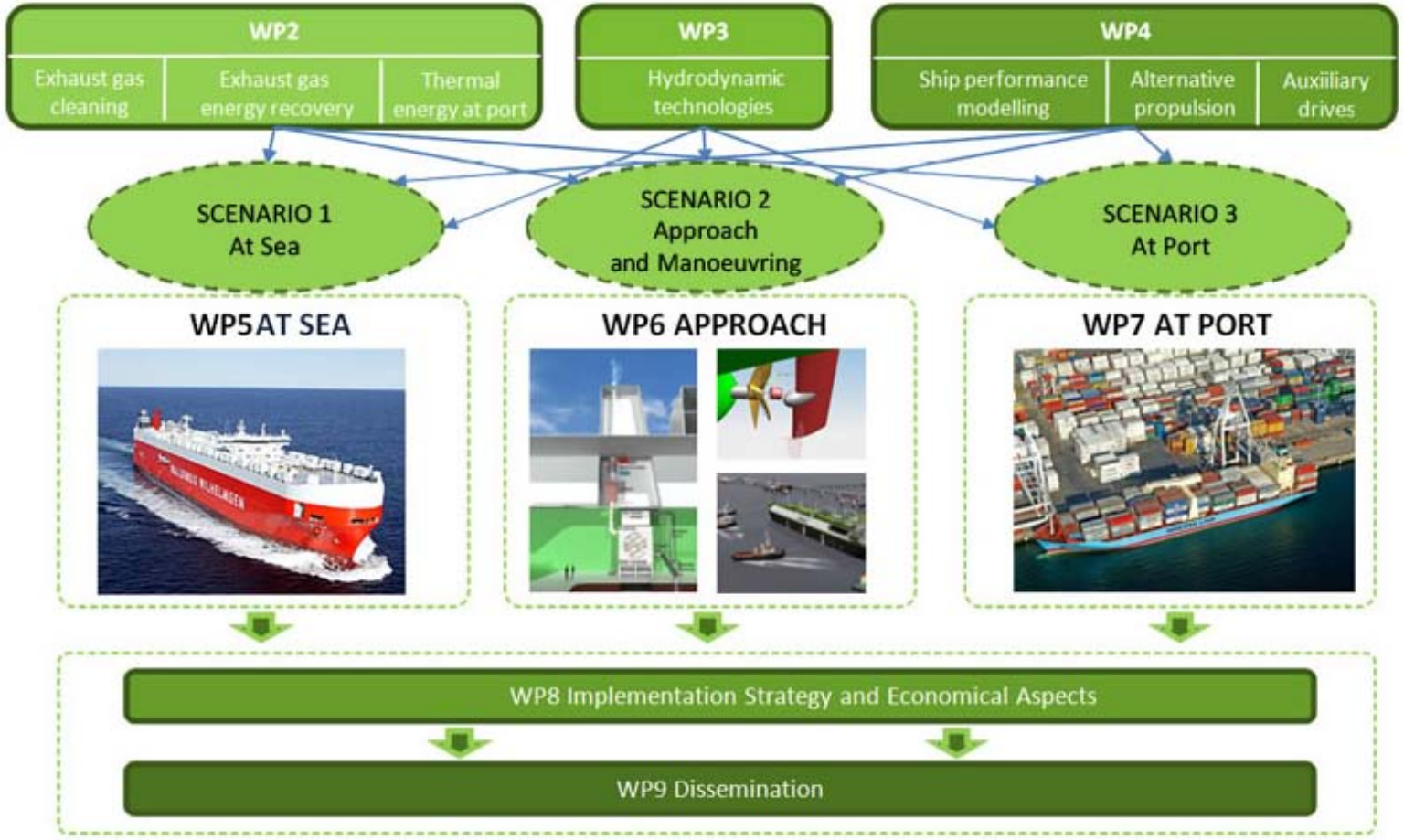
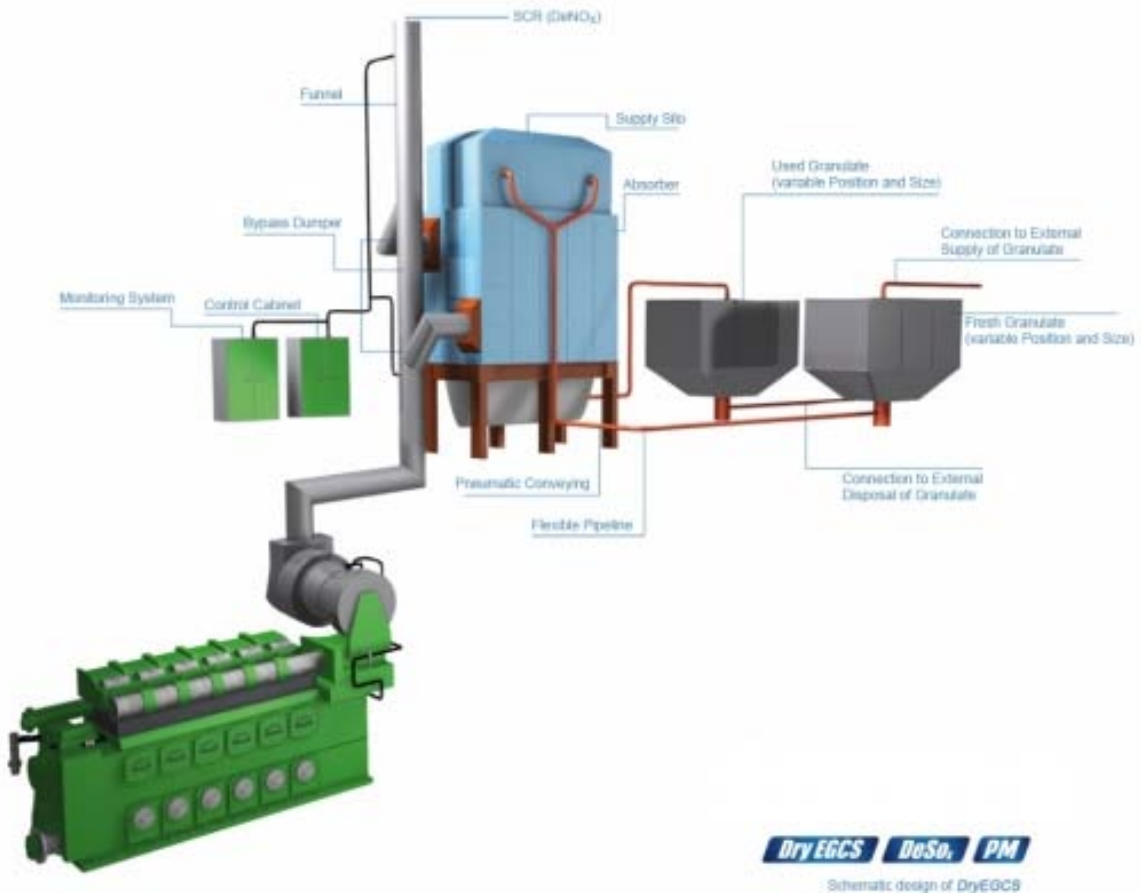
DESCRIPTION OF WORK

WORK PACKAGE STRUCTURE



DOW. WP2 AFTER TREATMENT AND THERMAL ENERGY

- **Development of advanced engine and exhaust gas cleaning devices models to be used at the computer simulation of the different scenarios**
- **To identify and develop the most efficient after treatment technology with respect to lowest emissions and highest energy efficiency**



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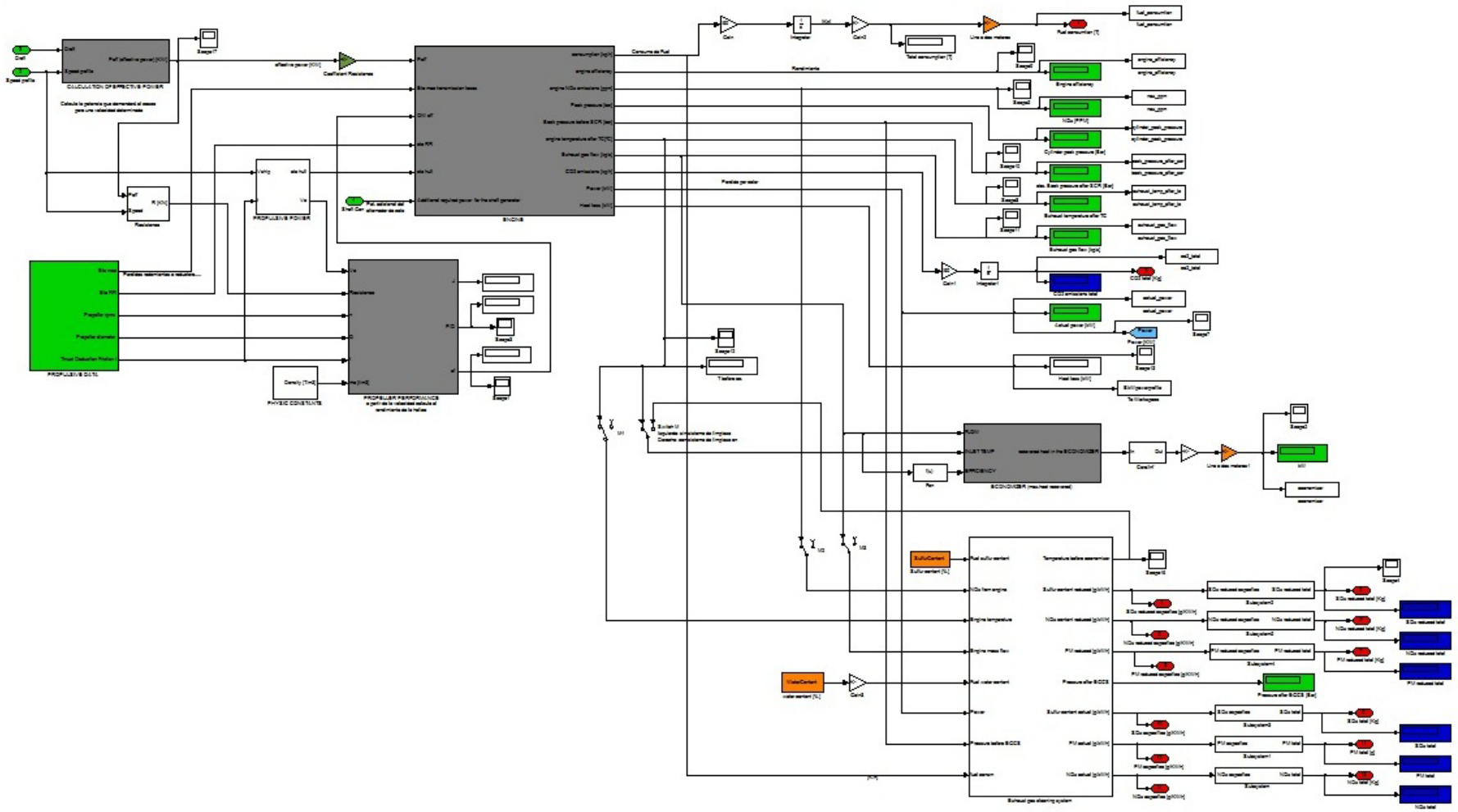
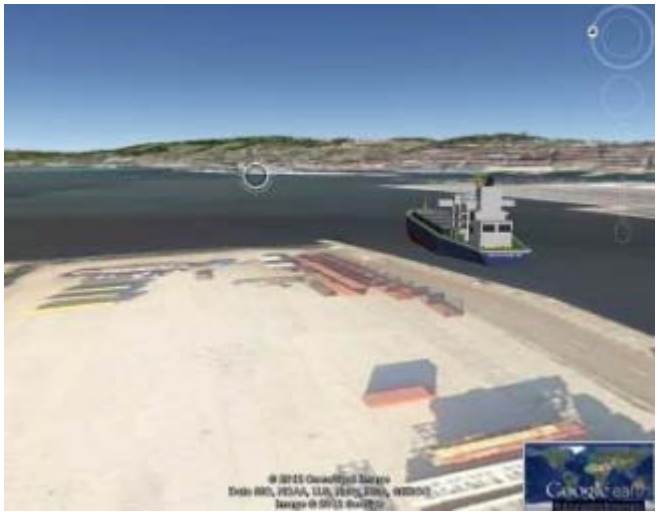
DOW. WP2 AFTER TREATMENT AND THERMAL ENERGY

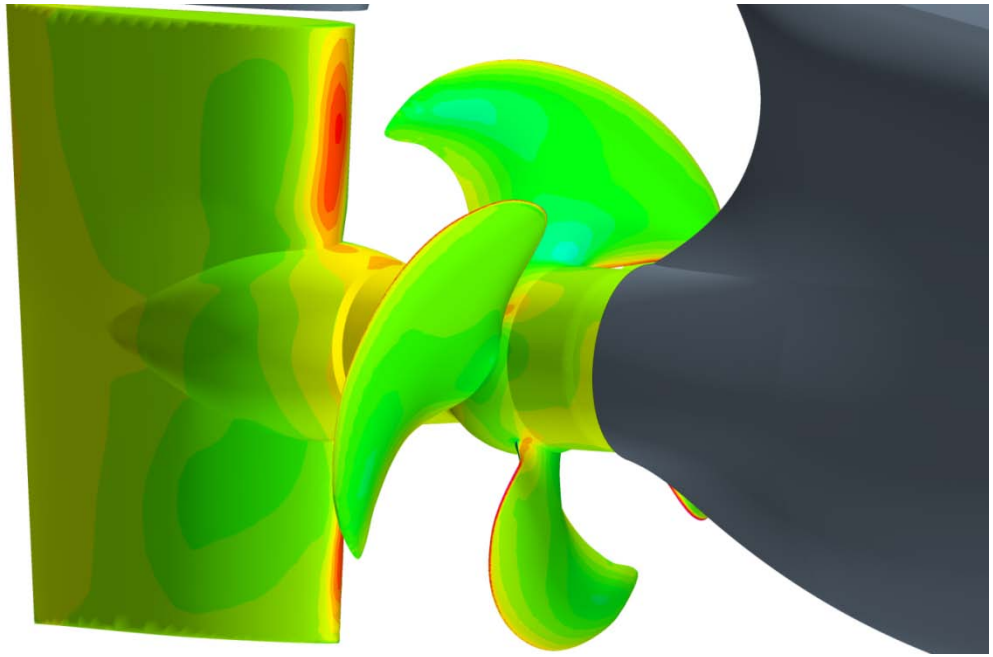
- **Develop a holistic energy efficiency model including adjustments of engine, EGCS and energy recovery**



DOW. WP3 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





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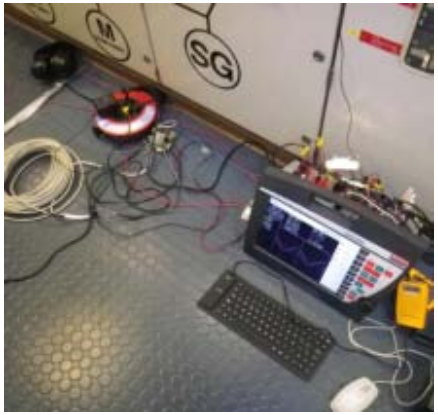
DOW. WP3 PROPULSION AND MANOEUVRING

- Sea trials

- Monitoring of:
  - Propulsion performance
  - Torque in shaft line
  - Shaft rpm
  - Main Engine Fuel consumption
  - Engine Combustion chambers Pressures
  - Ship speed
  - Electric network monitoring
  - Shaft generator
  - Auxiliary gensets



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DOW. WP3 PROPULSION AND MANOEUVRING

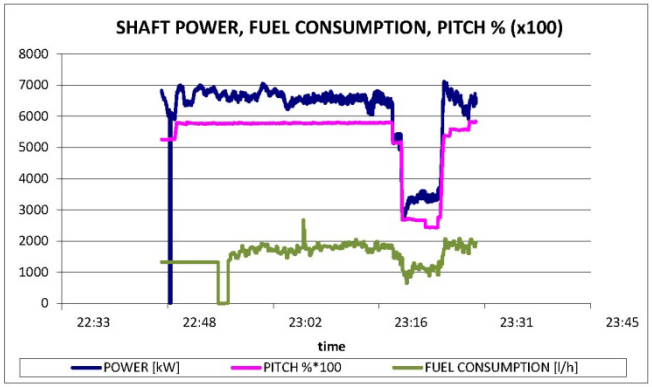


Fig. 46 Shaft power (kW), pitch % indication*100, Fuel consumption (l/h) in St. Nazaire Pilot station

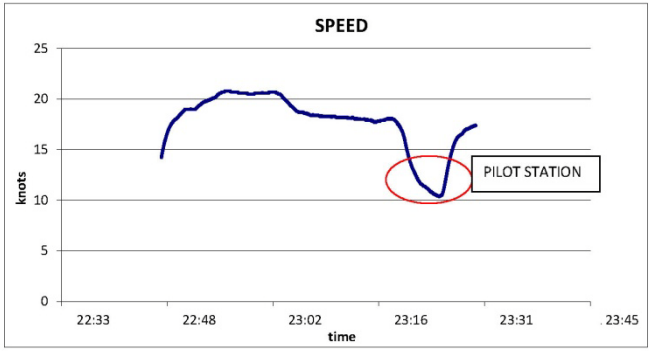


Fig. 47 GPS speed record

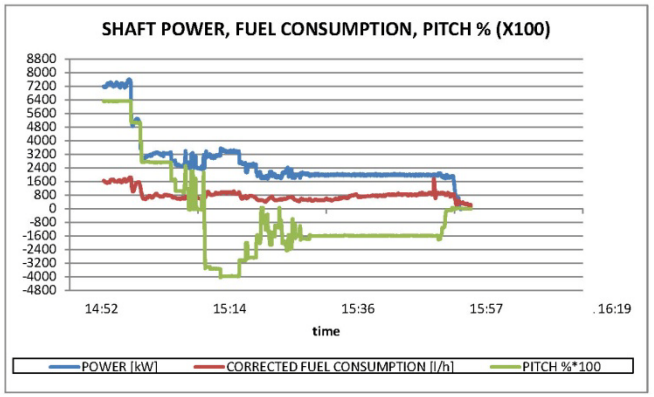


Fig. 41 Shaft power [kW], pitch % indication*100, Fuel consumption [l/h] in manoeuvring

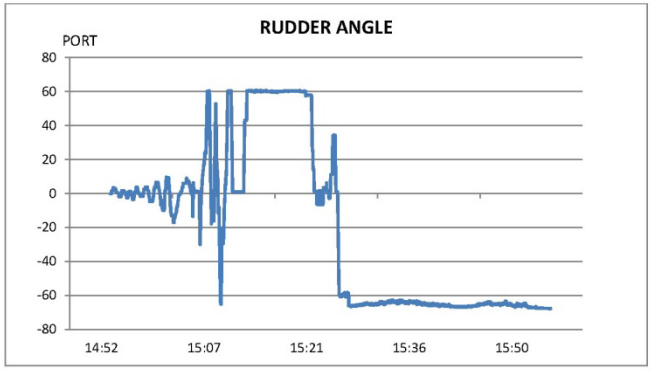
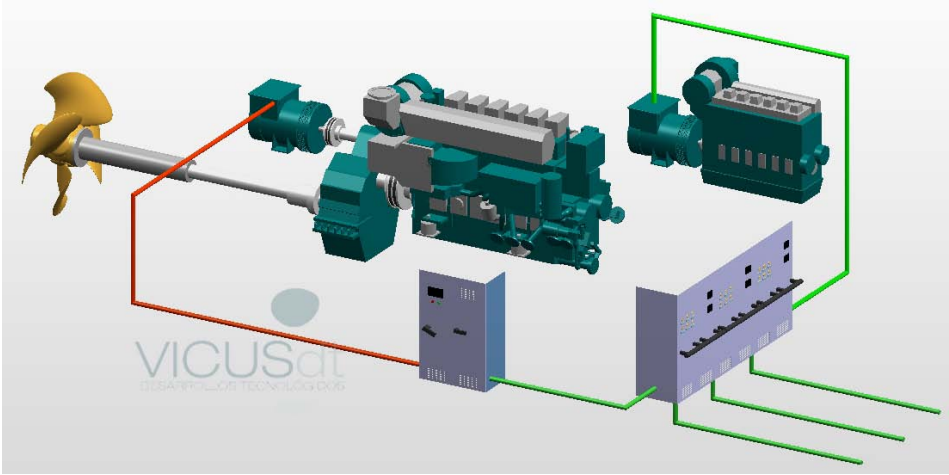


Fig. 42 Rudder position in manoeuvring

DOW. 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, especially during operation at partial load**
- **To assess combinations of technologies resulting in simplified propulsion systems for ships**
- **Model novel arrangements of auxiliary equipment to improve the efficiency of the propulsion train and power generation system**
- **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**
- **Investigate new combinations of technologies allowing the use of generators at variable speeds**
- **Evaluate the impact of power share strategies on ship power plant performance in order to minimize the emission levels for a given load**



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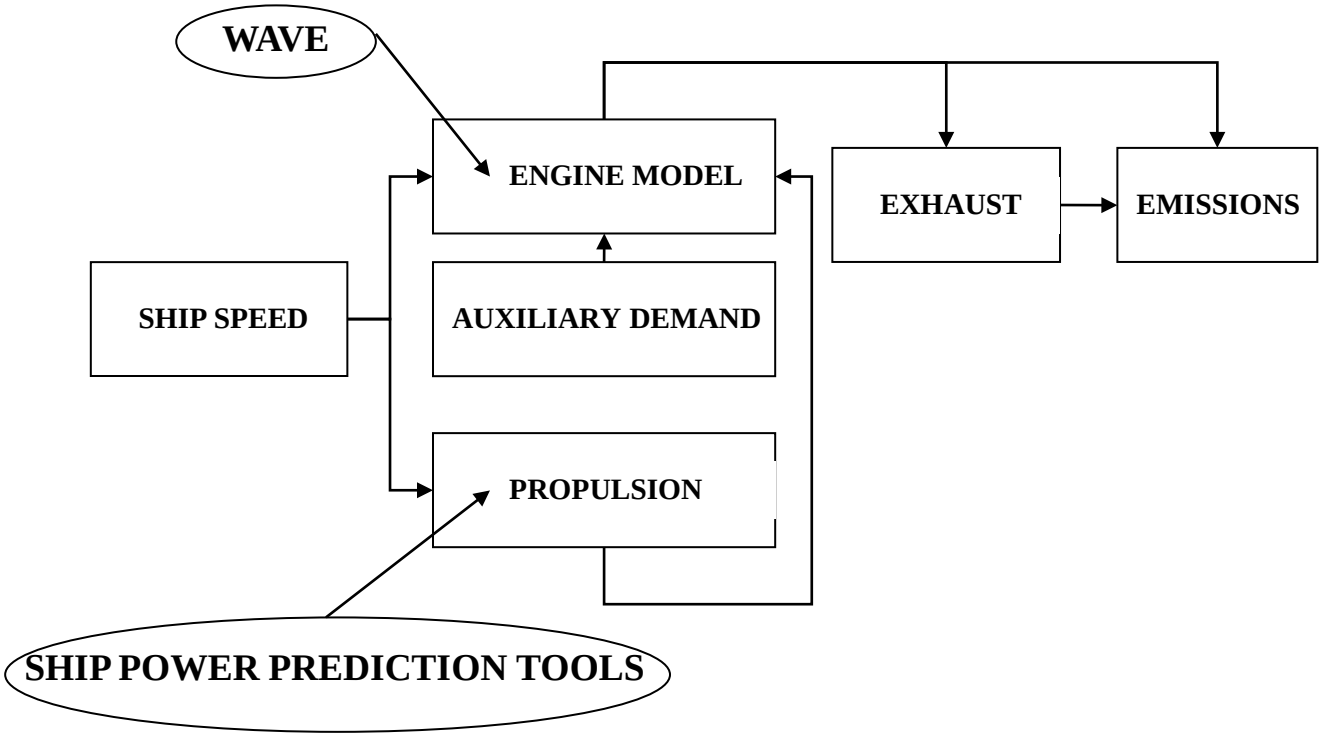
DOW. WP5 AT SEA EMISSION REDUCTION MODELS

- **Develop a model for the At sea condition**



DOW. WP6 PORT APPROACH AND MANOEUVRING EMISSION REDUCTION MODEL

- **The aim of this Work Package is to develop a computational model that involves the technologies and the different types of vessels in the corresponding scenario in order to evaluate the achieved emission reduction and impact**

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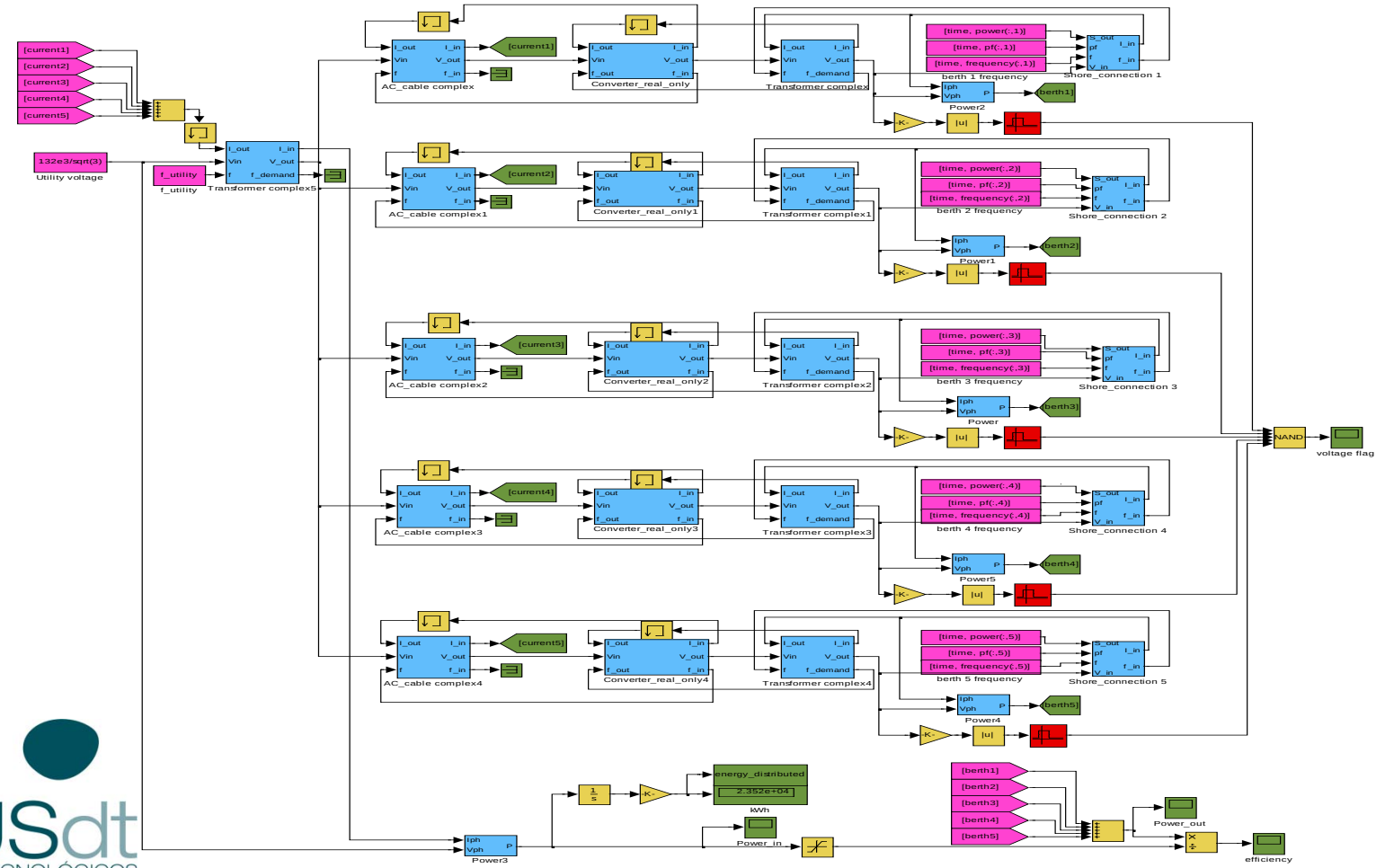
DOW. WP7 AIMING AT ZERO EMISSIONS WHEN SHIP DOCKED

- **The aim of this work package is to develop models for the loads and power supply systems for various types of ships and different port power supply infrastructures to assess and optimize the potential benefits that “cold ironing” can bring**



DOW. WP8 IMPLEMENTATION STRATEGY AND ECONOMICAL ASPECTS

- **Assessment of the economic aspects of emissions reduction scenarios and operations dealt on WP5 WP6 and WP7**

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