

# Electrical Distribution System Optimisation for Marine Applications

## *Ingeteam*

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## Main Objectives

- Development of a new technology of Power Generation and Distribution System for Marine Applications.
- Improving the nowadays existing AC based classic solutions in terms of : Energy Efficiency, Fuel consumption and Emissions (20%\*), Volume (25%\*), Weight (25%\*) and Maintenance requirements, Cost, and Ship functionality.
- Complying and fulfilling the requirements of classification standards in terms of system protection and operation availability.

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## Technological Challenges

- ❖ Robustness and Stability of the DC bus must be guaranteed for all the operating conditions. Multiple and high coupled Nonlinear Constant Power Loads are present .
- ❖ More Control Degrees of Freedom: The Optimisation of Energy and Power flows becomes a high complex task, but the benefit in terms of fuel consumption could be high.
- ❖ System Protection and Selectivity in case of electrical fault must be assured: At Power converter level, at DC Distribution network level. Coordination needed to prevent blackouts. DC Breakers in coordination with the Power Converters.

# Project Main Activities



## ➤ WP1: Power Generation and DC distribution Analysis (2014)

- Methodology for the Analysis and Dimensioning of the entire system.
- Definition of the evaluation scenario. Analysis of Power demands in Vessels.
- Application of the methodology. **System Optimization. Optimal Design.**
- Evaluation of the benefits obtained.

## ➤ WP2: Protection of DC Distribution System (2014-Mid2015)

- Identification of failure conditions and the worst operation conditions.
- Evaluation of different protection strategies.
- **Design and Development** of the protections **at component level.**
- **Design and Development** of the protections coordination strategy **at system level.**

## ➤ WP3: Experimental evaluation (2015)

- **Small Scale Prototype** Design and Development
- **Definition, Execution and Validation of Test Protocols**

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## Participants

➤ Leader: Ingeteam Power Technology – ***Ingeteam*** (IMD)

➤ Indar (Spain) 

➤ Mondragon University (Spain)



➤ Ulstein (Norway)

