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Project Reference

- EfficientShip is supported by the European Commission Environment LIFE+ 2013 Program Project.
 - N° LIFE13 ENV/FR/000851
- **Duration:** 01/06/2014 - 31/12/2016
- **Project Budget:** 1 245 666 €
- **EC Contribution (50%):** 622 833 €
- **Website:** www.efficientship.eu
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The European LIFE Program

Since 1992 the LIFE Program has been providing financial support for European Union projects relating to the environment and climate change. The general objective of LIFE is to contribute to the development and implementation of ecologically innovative solutions or regulations throughout Europe

Our EfficientShip Project is part of the 2013 LIFE+ Project of the European Commission.

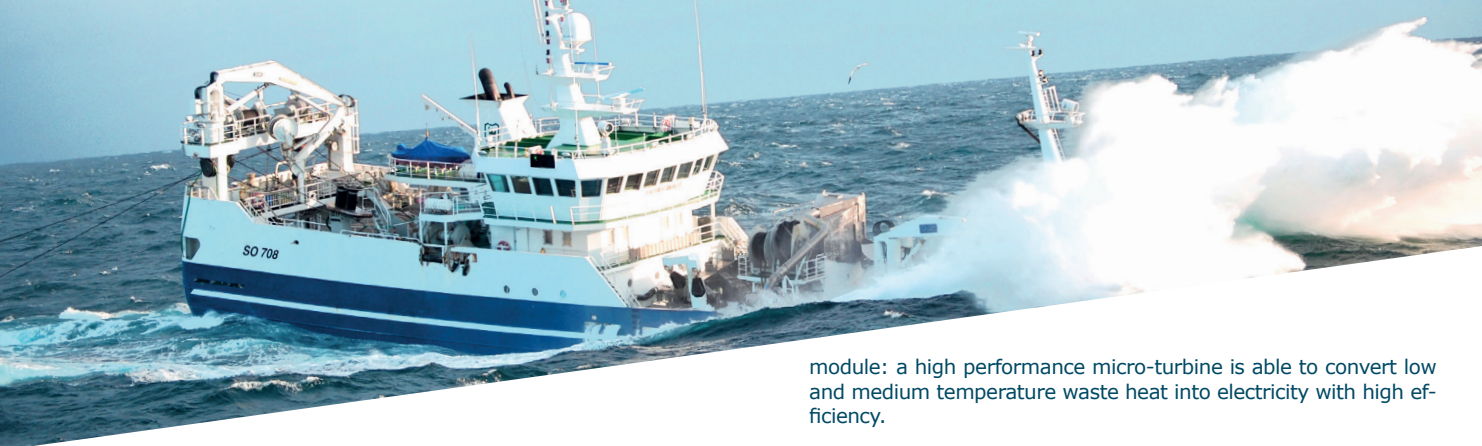
The partnership

- **ENOGIA** (France, project coordinator) – development of ORC module;
- **IFP Energies nouvelles** (France) – support in ORC module development;
- **Killybegs Fishermen's Organisation Ltd** (Ireland) – organization facilitating the demonstration phase;
- **National Research Council** (Italy) – monitoring of fuel consumption and GHG emissions.



LIFE+ EfficientShip





Context

“Climate change is one of the greatest challenges of our time”

This statement, approved by 193 countries during the United Nations Conference on Sustainable Development underlines the worldwide awareness on Global Warming issues. All the economic sectors are concerned by this issue and should therefore find innovative solutions to reduce their greenhouse gas emissions.

The LIFE+ EfficientShip project will target one specific characteristic European industry: marine fisheries. As the European fishing fleet is largely reliant on Diesel engines, this sector is responsible for important GHG emissions that need to be reduced.

EfficientShip Project

The EfficientShip project goals are:

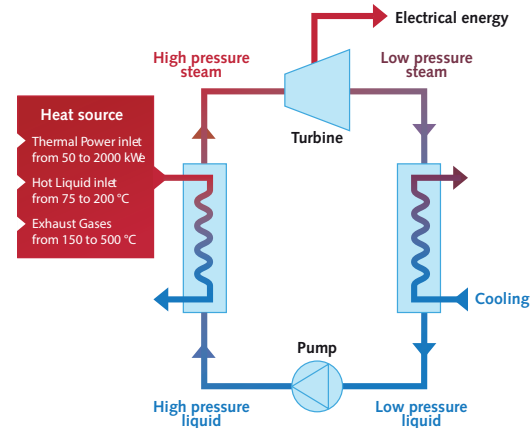
- Develop a new technology: ORC for transport
- Demonstrate a technological innovation to reduce energy consumption and GHG emissions
- Addressing a new market: fishing sector

The ORC Technology

The ORC technology is an innovative solution which converts waste heat from thermal engines into electricity. The ORC technology has been applied for several years to stationary application such as the heavy industry or biomass generation plants. ENOGIA's patented innovation is integrated in proprietary ORC

module: a high performance micro-turbine is able to convert low and medium temperature waste heat into electricity with high efficiency.

In order to recover waste heat from the process, exhaust gas or hot liquid is sent into the first exchanger. The internal working fluid receives the thermal power and converts it into a high pressure



steam which will be expanded into the turbine to produce electricity (from 5 to 100 kWt). The residual heat is then evacuated through the second exchanger connected to a cooling system.

The ORC represents a turnkey solution with reduced ownership costs. The unit is reliable thanks to the patented control algorithm embedded in a dedicated control unit, while the absence of mechanical contact between the turbine pieces leads to low maintenance needs and prevents any premature wear or fluid leakage.

This innovative solution can produce 5 to 15% additional electricity depending on the heat source and the cold source temperature. The ORC is then a prof-



itable solution to renewable electricity production with a 3 to 5 years return on investment. Thanks to its reliability and optimized compactness, ENOGIA's ORCs possess advantages to be used for mobile application such as transport and more precisely maritime fisheries.

ORC on fishing vessels

In this project, the ORC module developed would be the first installed in a mobile engine and on one vessel. ENOGIA'S ORC technology has been designed to take up little space and to be easily integrated into a vessel. It will enable the vessel to save energy while respecting our environment. The ORC module will be installed on an Irish fishing vessel.

Framework of the Project

- ENOGIA and IFPEN will conduct a study of the specificities and functioning of the ship in order to optimize the ORC;
- After construction and validation of the ORC, the module will be installed on the ship for a few months with all the performance monitoring and measuring equipment required.
- According to the procedure established by the CNR, the crew will be in charge of the maintenance of the module and the data collection of the fuel consumption;
- The CNR will evaluate the results from a technical economical and ecological point of view and will also estimate the impact it would have at a European scale.

Objectives and expected results

Objectives:

- The development of an ORC for mobile thermal engines able to lower the gas emission of the ships from 5 to 10% .
- The reduction of the general costs of the sector due to the cost of fuel, and by that to ensure the longevity and reinforce the competitiveness of this sector.

Thanks to the ORC module, we expect :

- A 5 to 10% of reduction in fuel consumption;
- A 5 to 10% reduction of the greenhouse gases;
- A money saving from 5 000 €/year to 11 000 €/year.