Modular multi-purpose offshore platforms, the TROPOS Project Approach

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Modular Multi-use Deep Water Offshore Platform Harnessing and Servicing Mediterranean, Subtropical and Tropical Marine and Maritime Resources.

The TROPOS Project
Project cofinanced by the European Commission under the Seventh Framework Programme
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INTRODUCTION
The project is sponsored by the Public Consortium Canary Islands Oceanic Platform (PLOCAN), held 50% by the Ministry of Economy and Competitiveness (MINECO) and the Autonomous Government of the Canary Islands.

- The main objective in the PLOCAN’s project is the design and construction of an offshore platform which aim is the investigation in the marine science and technologies.

- The PLOCAN Platform will be a fixed structured located off the East coast of the Canary Island, in a distance from the coast of 4km, in depths around 30m.
INTRODUCTION - Where are we?

The Canary Islands

Isla de la Palma
Tenerife
Isla de la Gomera
Gran Canaria
Lanzarote
Fuerteventura
The TROPOS Project plays a key role in the PLOCAN Strategy. The design of a multi-use offshore platform will be conducted parallel to the construction of the PLOCAN Platform.
• Year 2005 → More than half of the population lives within 200 km of the coast
• Year 2025 → Number of citizens living in these areas will be doubled

Challenge: To share sites, infrastructures and costs in diverse activities to be implemented offshore, such as transport, energy, aquaculture or leisure → Multi-Use Oceanic Platforms Concept
CHALLENGES
Maritime Transport
Transport evolution

Container throughput by port region in Southern Europe / Mediterranean (m TEUs)

North Europe: Container throughput by port region (m TEUs)

Source: OSC European Container report Outlook to 2015, p. 53

Source: OSC European Container report Outlook to 2015, p. 38
Renewable energies

- Gravity base
- Tripod
- Monopile
- Jacket
- Combined Jacket + Tower
- Spar buoy
- Semi submersible
CHALLENGES

Offshore Renewable Energies
Wind Power - 2020 Target

FIG 13: WIND POWER PRODUCTION IN THE EU – TWH/SHARE OF CONSUMPTION ACCORDING TO THE NREAPS
Energy evolution

The annual offshore wind capacity will increase steadily from 1.1 GW in 2011 to 6.5 GW in 2020, an average net increase of 21.5% per year.
CHALLENGES

Offshore Aquaculture
Aquaculture evolution
Leisure
CHALLENGES

Multi-use oceanic Platform - Hybrids, synergies - Why not?, Business model
CHALLENGES

Building the future
“Bring together research efforts to face the challenges in ocean management”

- Develop new and innovative designs for multi-use platforms
- Assess the technical, economic and environmental viability to build, set into motion and dismantle multi-use platforms, together with the related transport issues
- Platforms should focus on renewable oceanic energy, in particular:
  - Offshore wind
  - Aquaculture
  - Services related to maritime transport

Directorates concerned:
- Transport
- Energy
- Food, Fisheries and Biotechnology
- Environment
3 funded projects

**H2OCEAN**: Development of a wind-wave power open-sea platform equipped for hydrogen generation with support for multiple users of energy.

http://www.h2ocean-project.eu

**MERMAID**: Innovative Multi-purpose offshore platforms: planning, design and operation

http://www.mermaidproject.eu

**TROPOS**: Modular multi-use deep water offshore platform harnessing and servicing Mediterranean, subtropical and tropical marine and maritime resources

http://www.troposplatform.eu/
OBJECTIVES
OBJECTIVES

- Determine **ideal locations** for multi-use offshore platforms in tropical, subtropical and Mediterranean regions.
- **Research integration** renewable energies (wind), offshore aquaculture, maritime transport and recreational activities.
- Develop an **innovative design for a Multi-use Offshore Platform** that enables the integration of these activities.
- Develop an **innovative design for a Multi-use Offshore Platform** that enables the integration of these activities.
- Assess the **economic feasibility and viability**
- Develop **environmental impact methodology and assessment**.
- Configure **THREE COMPLETE SOLUTIONS**: Mediterranean, Subtropics and Tropics scenarios.
Benefits

• New Business opportunities
• Cost reductions
• Efficiency
• Local Industry
• Educational opportunities
• Employment
• Synergies
• Environmental benefits
• European Strategy for Marine and Maritime Research

• Security: Energy, food, etc.
• Growth of aquaculture industry
• New green technologies
• Low carbon economy
• Strengthen role of European maritime sector
• Support the Europe 2020 strategy
• Tourism
• Eco-friendly
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CONSORTIUM

18 Partners

• 1 Public Consortium
• 1 Association
• 7 Universities
• 3 Research Organizations
• 2 Enterprises
• 4 SMEs
PLANS
Work plan – 36 months

WP1

WP2

WP3

WP4

WP5

WP6

WP7

WP8

M1-M6

M7-M12

M12-M18

M19-M24

M25-M30

M31-M36
**Work packages**

The entire project team will keep a focus moving from concepts to design to application.
Project Management Structure
DELIVERABLES
Focused on delivering products - General

- **A map of optimal areas of installation** drawn from a comprehensive geographic information framework.
- **A novel design of a modular off-shore platform** with integrated technologies and services including: wind and ocean energy, aquaculture, maritime transport, tourism and ocean environmental monitoring.
- A comprehensive viability strategy.
- A comprehensive environmental impact methodology and assessment.
VISION AND PROGRESS
Modular approach
Modular approach - Artistic representation
Modular approach
The TEAL (Transport, Energy, Aquaculture and Leisure) Components
Modular Approach - The Example of the Canary Islands
Transport - Existing Port Infrastructures
Modular Approach - The Example of the Canary Islands

Energy - Local mix of resources - Example of Annual Average Wind Speed
Modular Approach - The Example of the Canary Islands

Aquaculture - Local market and several studies carried out
Modular Approach - The Example of the Canary Islands

Leisure - Local economy mainly based on tourism
Modular Approach - The Example of the Canary Islands

4 possible locations have been defined as an initial draft
Modular Approach - The Example of the Canary Islands

4 possible locations have been defined as an initial draft
Modular Approach – The Example of Greece

Locations are also being defined in Greece...
Modular Approach - The Example of Taiwan
and 3 possible locations in Taiwan

1. LiuChiuYu
   - 50 X 50 Km

2. Penghu Archipelagos
   - 50 X 50 Km

3. Green Island
   - 50 X 50 Km
Modular Approach - The Example of Taiwan
1. LiuChiuYu, TAIWAN
potential for aquaculture, current energy & OTEC (submarine Canyon), leisure, Transport

Offshore Cage-net Aquaculture

Dapeng Bay National Scenic Area

Marine Traffic in Kaohsiung Harbor

Source: MarineTraffic.com
Modular Approach - The Example of Taiwan

2. Penghu Archipelagos, TAIWAN

potential for aquaculture, current energy, wind energy, solar energy, desalination, leisure
Modular Approach - The Example of Taiwan

3. Green Island, TAIWAN

potential for current energy (Kuroshio), OTEC, leisure, transport
GIS Decision Tool

First approach providing the Gebco 0.8° bathymetry
GIS Decision Tool

First approach providing the Gebco 0.8° bathymetry

Canary Islands  Greece  Taiwan
Modular Approach – Technological aspects

Technologies being defined at the moment
THANK YOU!