SEA TERMINALS

Smart, Energy Efficient and Adaptive Port Terminals
INDEX OF CONTENTS

1. From GREENCRANES to SEA TERMINALS
2. Consortium and Geographical Scope
3. Specific Objectives
4. Activities Description
5. Expected Results
INDEX OF CONTENTS

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3. Specific Objectives
4. Activities Description
5. Expected Results
**From GREENCRANES to SEA TERMINALS**: Facilitating the evolution of port container terminals towards an effective low-carbon emission operative model, integrating smart and energy-efficient technologies through innovative business and environmentally oriented pilots focused on handling machinery and equipment.
GREENCRANES RESULTS

- First LNG Terminal Tractor prototype, already on the market
- New re-motorization policy for RTG cranes at Noatum
- First dual fuel LNG/Diesel Reach Stacker
- Participation in international congresses
- Collaboration with other reference projects in Europe
- Continuation of the work with SEA TERMINALS
INDEX OF CONTENTS

1. From GREENCRANES to SEA TERMINALS
2. Consortium and Geographical Scope
3. Specific Objectives
4. Activities Description
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SEA TERMINALS Consortium and Geographical Scope

Implementing Bodies:

- Smart, Energy Efficient and Adaptive Port Terminals
SEA TERMINALS Stakeholders Interest Group

Puertos del Estado

Ports

European Associations

Industry & Energy

Almazán ingenieros

Equipment Manufacturers

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INDEX OF CONTENTS

1. From GREENCranes to SEA TERMINALS
2. Consortium and Geographical Scope
3. Specific Objectives
4. Activities Description
5. Expected Results
SEA TERMINALS: Three Complementary Approaches for European Ports and Terminals

• Smart Energy Management: Integral Monitoring of Container Terminal (Energy + Operations)
  o Design, prototyping and deployment of a Smart, Energy Efficient and Adaptive Management System – SEAMS Platform
  o Integral Monitoring of Port Container Terminal: SEAMS Platform + BlackBox Concept

• Deployment and Demonstration of Last Generation Low/Zero Emission Prototypes
  o Full Electric Terminal Tractor (SEA-eTractor)
  o Low Carbon (SEA-EcoRTG) and Dual-Fuel (SEA-DFRTG) Rubber Tyred Gantry Crane
  o Eco-Efficient Reach Stacker (SEA-EcoRS) and Empty Container Handler (SEA-ECH)
  o Terminal Dynamic Illumination (SEA-Light)
  o LNG Supply Mobile Module Designed for Port Operations

• Use of Alternative Fuels and Eco-Efficient Technologies in Port Equipment
INDEX OF CONTENTS

1. From GREENCranes to Sea Terminals
2. Consortium and Geographical Scope
3. Specific Objectives
4. Activities Description
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ACTIVITY 1: The SEAMS Platform Concept (Port of Valencia)

SEAMS Platform

- SEA-TDI Server
- Black Box Server
- Register Server
- KPI & Dashboard Server

Machine status

Bottleneck?
- Yes
- No

Turbo-mode

Eco-mode

Terminal Dynamic Illumination
SEA STS Crane
SEA ECO RTG
SEA Electrical Terminal Tractor
SEA ECO Reach Stacker
SEA ECO Empty Container Handler

- Machinery Operative costs
- Energy Consumption
- GHG emissions

Smart, Energy Efficient and Adaptive Port Terminals
ACTIVITY 1: LNG Infrastructure Development (Port of Livorno)

PORTS AND VESSELS

TOSCANA LNG REGASIFICATION PLANT
ACTIVITY 2: REAL LIFE TRIALS

SEA TERMINALS will perform two integrated real life trials at the ports of Valencia (Spain) and Livorno (Italy). Real life trials will be carried out through the following sub-activities

• **Sub-Activity 2.1 Design of Real Life Trials and Demonstration Plan**

SA2.1 will address and prepare the different actions needed to carry out the SEA TERMINALS real life trials. These actions will be based on two approaches:

• **Smart, Energy-Efficient and Adaptive Operations:** Deployment and test of the SEAMS Platform and BlackBox concepts that will encompass the integration of a new dynamic and real time management framework regarding energy efficiency, consumption reduction and emissions minimization at port container terminals.

• **Low carbon / Zero Emission Eco-Efficient Prototypes:** Innovative Prototypes including LNG powered equipment, full electric/hybrid machinery as well as last generation eco-efficient container handling equipment with significant capacity to reduce GHG emissions.
PROJECT SCHEDULE

ACTIVITY 1: MODELLING, ENGINEERING AND PROTOTYPING
- Sub-Activity 1.1. Prototypes Definition and Fine-Tuning
- Sub-Activity 1.2. Prototypes Modelling and Assessment
- Milestone 2. SEAMS Platform Modelling and Assessment
- Milestone 3. LNG bunkering Assessment Report
- Sub-Activity 1.3. Engineering and Prototyping
- Milestone 4. SEA TERMINALS Engineering and Prototyping Study

ACTIVITY 2: REAL LIFE TRIALS
- Sub-Activity 2.1. Design of Real Life Trials and Demonstration Plan
- Sub-Activity 2.2. Port of Valencia Real Life Trials
- Milestone 5. Public Demonstration Day at the Port of Valencia
- Sub-Activity 2.3. Port of Livorno Real Life Trials
- Milestone 6. Public Demonstration Day at the Port of Livorno
- Sub-Activity 2.4. Real Life Trials Validation and Exploitation
- Milestone 7. Real Life Trials Results and Validation

ACTIVITY 3: SEA TERMINALS MARKET AND BUSINESS PLAN
- Sub-Activity 3.1. Product and Market Analysis
- Sub-Activity 3.2. SEA TERMINALS Business and Commercialisation Plan
- Milestone 8. Prototypes Business and Commercialisation Plan
- Milestone 9. SEA TERMINALS Open-Door Days

ACTIVITY 4: MANAGEMENT, COMMUNICATION AND COORDINATION
- Sub-Activity 4.1. Administrative Management
- Sub-Activity 4.2. Technical Coordination
- Sub-Activity 4.3. Communication and Dissemination of Results
- Milestone 1. Project Management Plan
- Milestone 10. Report on Communication and Dissemination Results
- Milestone 11. Final SEA TERMINALS Report
INDEX OF CONTENTS

1. From GREENCranes to SEA TERMINALS
2. Consortium and Geographical Scope
3. Specific Objectives
4. Activities Description
5. Expected Results
EXPECTED RESULTS

• Contribution to a progressive and quick decarbonisation of port container activities in Europe, thus reducing GHG and pollutant emissions.

• Demonstration of feasibility (financial, technical and environmental) of mature integrated solutions based on smart energy management, eco-efficient technologies and alternative fuels applied to port machinery and equipment.

• Provision of an innovative and market-sided approach in the way that energy is managed at port terminals, considering it as key driver for improving operations and competitiveness.

• Promotion of a collaborative framework among ports, port operators and equipment manufacturers, thus establishing new relationships not only based on commercial interests but also on common innovation opportunities.
THANK YOU!

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