

#### THIRD WORLD SYMPOSIUM ON SUSTAINABILITY SCIENCE AND RESEARCH

Sustainability Futures: Challenges and Opportunities Towards a More Sustainable World

# Challenges and Opportunities for Seaports Towards Future Sustainability: The UK's North East Smart Ports Testbed Case Study

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#### **OBJECTIVES OF THE PAPER**

As the maritime sector is lagging behind other sectors in terms of sustainable development through digital transformation strategy and its readiness to accommodate technological innovation, this paper aims to provide insights to determine the focus areas of future technical solutions to be trialled at ports to become 'smart ports'.

This multidisciplinary research project was conducted following UN Sustainable Goal 9 (Industry, Innovation and Infrastructure), 13 (Climate Action through Decarbonisation), 11 (Affordable and Clean Energy), 12 (Responsible Consumption and Production - Circular Economy), 8 (Decent Work and Economic Growth), 3 (Good Health and Wellbeing – Increased Safety and Reduction of Air Pollution), 4 (Quality Education – Further/ Vocational Education, Training and Modern Apprenticeships).

## **APPROACH USED**

The project was structured in work packages (WP) to gain deeper knowledge and understanding of the 5 North East of England ports:

- WP1 Analyse, compare and summarise current problems and define future vision for each port in terms of increasing sustainability and clean economic growth
- WP2 Visits, interviews/ workshops with partners; relate findings to the market sector
- WP3 Produce summary of long-term challenges (against predefined sustainability, logistics, Artificial Intelligence, data, safety and business parameters)
- WP4 Define future commercial opportunities
- WP5 Assess impact of port operations on quality of life of North East communities

#### **DESKTOP STUDY RESULTS: LITERATURE AND PROJECTS**



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	Field	Tools	Focus
Port of Bari	Digitisation	Ports 4.0	Logistics
		GAIA (platform)	RT data exchange
		ISMAEL	Forecasting, IoT, Big Data
Port of Valencia	Digitisation	Open platform (PCS)	-[ Operations (optimisation)
Port of Amsterdam	Digitisation	Poseidon	Geolocation platform
		Public Berth Reservation Platform	Online reservation & planning
		Cyber Secutiry Programme	Online reservation & planning
	_ Energy	Solar, Hydrogen, Shore Power	Energy production & transition
	Innovation	ProDock	Workspace & incubator
Port of Barcelona	Innovation	Startup accelerator	Open support to local economy
		Physical/ digital integration	Logistics & e-governance
	_ Mobility	CarEsmatic Project	Electric & LNG for sea traffic
		Part of STM Project	Standard for sea traffic info
Port of Piraeus	Quality	PPA Quality & Environment Policy	Management system
	& environment		Waste & alternative fuel
Port of Hamburg	Efficiency	SmartPORT project	Logistics (Cloud-based)
			Energy efficiency
		TransPORT Rail	Traffic control & optimisation
Port of Marseille	Quality	French Smart Port in Med	Energy transition & sustainability
	& sustainability	Massileo Project	Water-heating network
		Brain Port Community	Innovation (academy)
Port of Antwerp	Digitisation	Digital Twin & APICA	Digital copy of the port
		Capital of Things	Big Data (Link to city projects)
Port of Rotterdam	Digitisation	Digital Dashboard	Port communication
		Pronto	Real time data & planning
		Port Cyber Reposting Centre	Cyber security
	_ Environment	Pernis Residual Heat	Energy efficiency & transition
	a	Porthos project	CO <sub>2</sub> storage (under sea)
	Mobility	Port Forward	Intermodal connections

# **KEY RESULTS VERIFIED THROUGH INTERVIEWS/ WORKSHOPS**

The workshops (expert interviews, presentation of desktop results, ideation) with local ports highlighted the following key targets and (prospective) activities:

- Becoming business partner of off-shore wind energy companies
- Produce renewable energy on site
- Reduce the environmental impact of port operations, largely by electrifying them and also greening the energy-generation sources of the electricity used
- Capitalise on smart data collection, applying Artificial Intelligence and creating business services application for other partners in the domain of logistics
- Use the port estate as an innovation hub and spin-off territory (business park)

# IMPACT OF PORT OPERATIONS ON QUALITY OF LIFE IN NORTH EAST COMMUNITIES



### MAIN CONCLUSIONS

- The transition to 'smart port' status is a lenghty and challenging process which requires an integrated approach and a new organisational mind set
- Before automation, IT systems, connected logistics and waste elimination are applied within the port and its surroundings, more remedial interventions are needed to increase port operations' efficiency of resources optimisation
- Innovation, cooperation and sustainability goals require each port to strive in the realisation of resilient strategies which manage complexity and deal with different and changing scenarios
- Implementing advanced IT solutions to redefine maritime trade and port operations requires firstly current infrastructures to be upgraded

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