MUSICA

Multiple Use of Space for Island Clean Autonomy

The MUSICA consortium, led and coordinated by Dr Gordon Dalton from MaREI ERI, University College Cork, have been successfully awarded the H2020 call BG-05-2019 called "Multi-use of the marine space, offshore and near-shore: pilot demonstrators".

https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/bg-05-2019.html

The EU contribution award **€9 million**	The project is **5-year duration**	**15 partners** from 7 EU Member States	Award date: **May 2019**	Project start date: **January 2020**

The overall Aim of MUSICA is to accelerate the roadmap to commercialisation of its Multi-Use Platform (MUP) and Multi-use of Space (MUS) combination for the small island market, and de-risk for future operators and investors, by validation to TRL7 and providing real plans to move to mass market commercialisation. The MUSICA solution will be a decarbonising one-stop shop for small islands, including their marine initiatives (Blue Growth) and ecosystems.

The overall Aim of MUSICA will be achieved by developing a replicable smart MUP. MUSICA will advance the existing FP7 funded MUP concept developed by the University of the Aegean (UoAeg) and EcoWindWater (EWW), (MUP called EWW in this proposal), currently at TRL5, to TRL7. The EWW floating platform was successfully trialled in Heraclea in 2010 for 2 years, funded by FP7 of €2.8M, €1.8M national funds, remainder EU ESCF Cohesion Fund).

MUSICA – Multiple Use of Space for Island Clean Autonomy

MUSICA will provide a full suite of Blue Growth solutions for a small island:

- Three forms of renewable energy (RE) (wind, PV and wave) (total 870kW), providing high RES penetration and competitively affordable electricity. Three forms of RE provide non-correlated supply.
- Innovative energy storage systems on the MUP, provide all required storage for power on the island and platform, as well as electrical output smoothening (compressed air storage and batteries).
- Smart energy system for the island, including: demand response, modelling and forecasting based on high flexibility services from distributed generation.
- Desalinated water made by desalination unit on the MUP powered by RES providing 1000m3 fresh water for a water stressed island.
- The MUP will provide "green" support services for island's aquaculture (pilot 200 tonnes production)

This project will demonstrate that the MUSICA MUP is a viable enabling infrastructure for multiple RES, desalination and BG aquaculture services for small islands, that can share the same space and work synergistically together, sharing Supply Chains and reducing Operating and Maintenance costs and solving the increasing demand for space.

6 Objectives of MUSICA

The above MUSICA overall Aim will be achieved through the following objectives.

- **Objective 1:** Develop the pilot demonstrator of the MUSICA MUP solution, and install on site at Inousses Island to test & demonstrate the validity of the MUP in a real operating environment to TRL7.
- **Objective 2:** Demonstrate, test and validate the MUSICA MUP solution covering functional and non-functional readiness, cost reduction, shared expenditure and increased economic, environmental and social viability and value add.
- **Objective 3:** Support economically viable replication of the MUSICA smart MUP solution through Exploitation and Sustainability Plans for commercialisation and continuation beyond the project end.
- **Objective 4:** Address environmental, regulatory, legal and data requirements.
- **Objective 5:** Implement health and safety (H&S) plans, and improve professional skills through training
- **Objective 6:** Maximise the societal acceptance and use of MUSICA MUP based RES, water supply and aquaculture support service by the islanders by embedding the principles of Responsible Research and Innovation (RRI). This will achieve full inclusive engagement with the quadruple helix (QH), being the islands citizens and society, industry, research and government.

MUSICA context for its Aim and Objectives

The MUSICA target market of Small Islands for its decarbonising one-stop shop MUP

The concept of having all the required RES, storage and ICT on the MUP is for ease of replication and economies of scale, through multiple use of marine space. Following the initial planning phase, the idea is that the MUP energy solution can be configured to the island requirements and delivered complete. The MUSICA solution will be demonstrated on Innousses island, Aegean Sea, Greece. Innouses has a population of 800, and is a sister island to its larger neighbour, Chios.

Innousses needs the MUSICA concept for 2 key reasons:

1. Innousses has 0% RES. Islanders pay 3 times the land rate for grid electricity. Moreover, the quality and reliability of the electricity is poor (20kV grid connection to Chios island)
2. Innousses has no local water source. 30% of the island water is produced by a desalination plant powered by diesel.

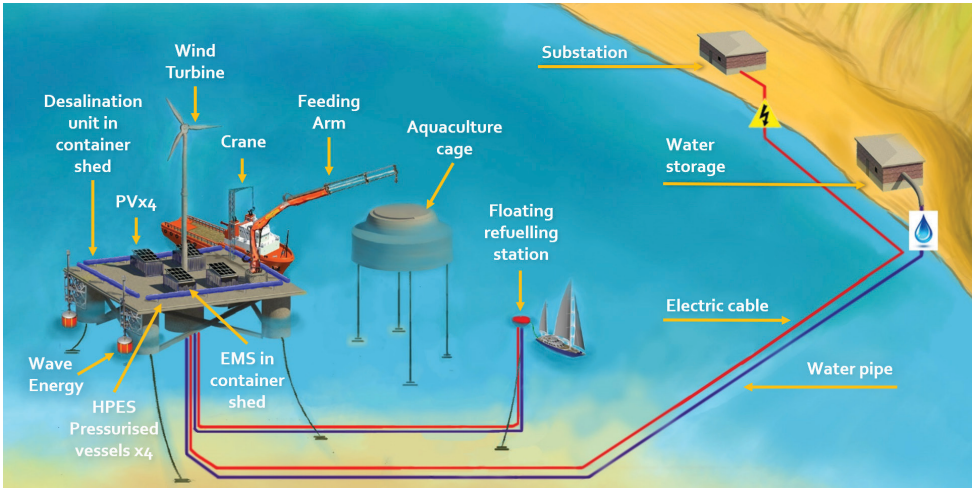

Figure 1: Image demonstrating MUSICA platform, RES, aquaculture, floating electricity and water recharging station services, and connection to shore.

MUSICA defines a "small island" as up to 2000 population. These islands typically do not have access to investment, expertise, infrastructure and economies of scale that larger islands have. These special case islands require logical techno-economic, cost-benefit analysis. Expensive prototype battery storage and overly sophisticated ICT is inappropriate for small islands. Scarce funds are better spent on attaining high RES penetration, desalination and smart all-island coverage. This will be complemented by sufficiently advanced storage and ICT on the MUP, which MUSICA believes is the optimal mix for small islands. Of the 2700 EU islands referred to in the Clean Energy for EU Islands initiative, 75% are 'small' islands where MUSICA can replicate its smart island MUP solution.

Figure 2. Site locations

List of PARTICIPANTS

Part. No	Participant organisation name	Short Name	Country	Main speciality
1	University College Cork	UCC	Ireland	Coordinator; Business models; Decarbonisation roadmaps
2	Heriot-Watt University	HWU	UK	Public engagement
3	University of the Aegean	UoAeg	Greece	Platform & Desalinate
3.1 Eco Wind Water (LTP of UoAeg)		EWW	Greece	Reverse Osmosis Desalination
4	Municipality of Chios	MoC	Greece	Public body
5	Universita da Malta	UM	Malta	Energy Storage
6	Coral Ltd	Coral	Greece	Shipyard Construction & Electricians
7	International Consortium of Research Staff Associations	ICoRSA	Ireland	Public engagement
8	Network of Sustainable Greek Islands	DAFNI	Greece	Stakeholder Assoc.
9	Platforma Oceania de Canarias	Plocan	Spain	Platform manager
10	Innosea	Innosea	France	Engineer
11	Aquabiotech Ltd	ABT	Malta	Aquaculture
12	NeoDyne Ltd	NeoDyne	Ireland	Electrical Design
13	Sinn Power Gmbh	SinnPower	Germany	Wave Energy
14	INSB Hellas Classification Society	INSB	Greece	Standards Body
15	Forkys	Forkys	Greece	Aquaculture developer

Table 1. Beneficiary list