DAFNI
Network of Sustainable Greek Islands

SUSTAINABLE PLACES 2023

New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

IANOS

MAESHA

insulae
Maximizing the impact of innovative energy approaches in the EU islands

REACT
Renewable Energy for Self-Sustainable Island Communities

RE-EMPOWERED
Renewable Energy EMPOWERing European & InDian Communities

EU Geographical Islands as Leaders of Green Energy

RE-EMPOWERED Project
Kythnos island: a living lab for innovative integrated interventions

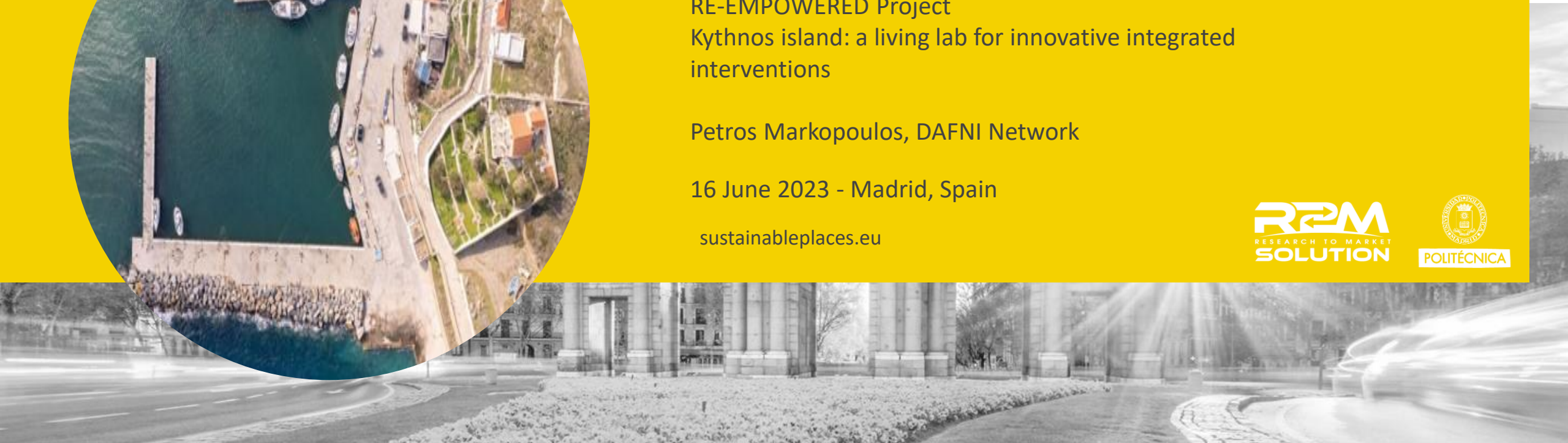
Petros Markopoulos, DAFNI Network

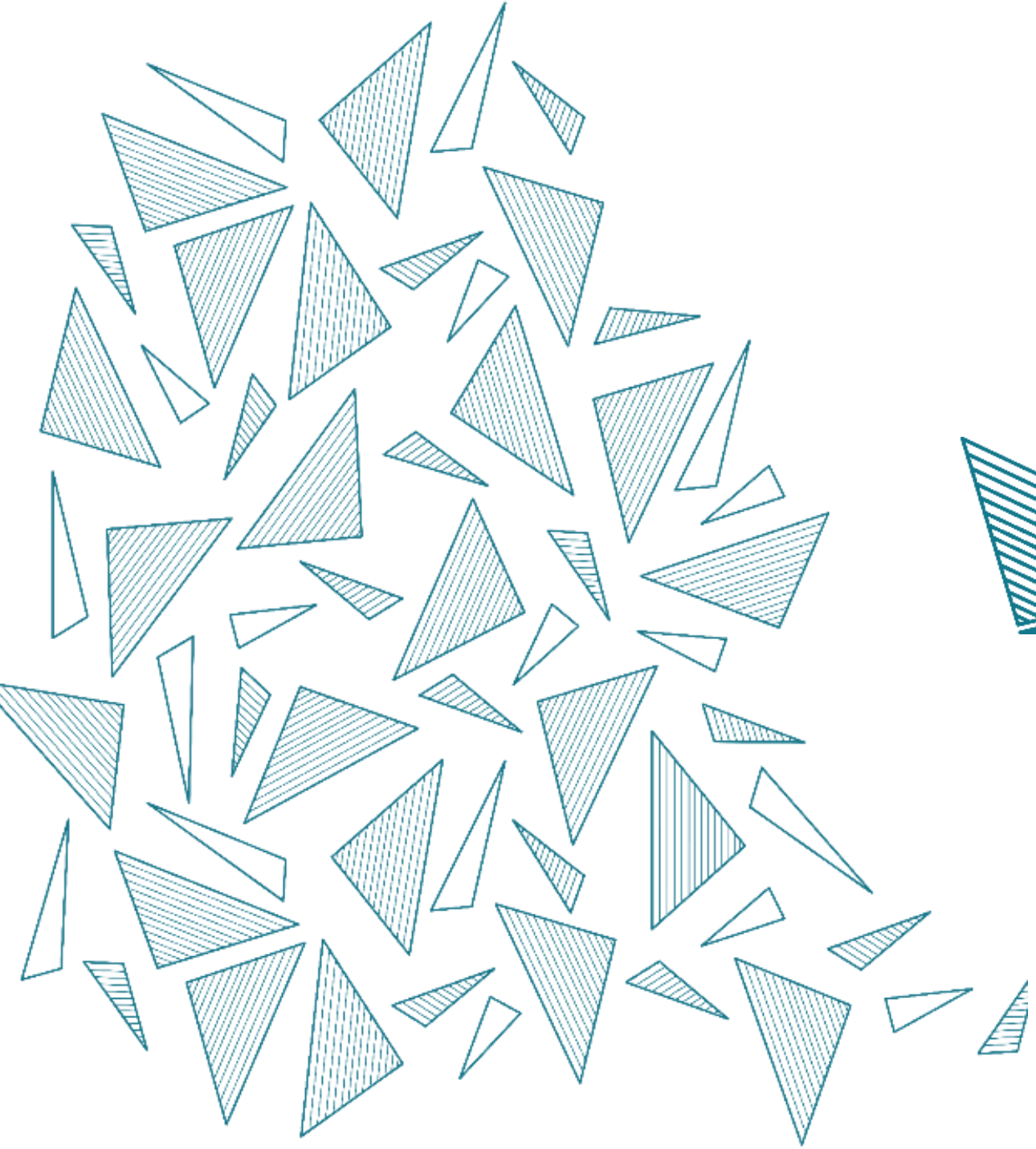
16 June 2023 - Madrid, Spain

sustainableplaces.eu

RPM RESEARCH TO MARKET SOLUTION

POLITÉCNICA





DAFNI

Network of Sustainable Greek Islands

DAFNI
Network of Sustainable Greek Islands

DAFNI – Network of Sustainable Greek Islands is a public interest non-profit organization of the island local and regional authorities in Greece.

It promotes sustainable development in Greek islands through the delivery of integrated actions in the fields of energy, water, waste and transport / mobility enabling the transition to a circular and sector-coupled local economy boosted by touristic activities.

52 Island municipalities

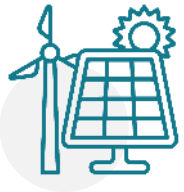
4 Regional authorities

Services

- Strategic plan
- Implementation of infrastructure projects
- Maturation of projects
- Technical studies at all stages
- Tendering
- Support during licensing and consultation procedures
- Joint-procurement and tendering
- Fund-raising
- Capacity building and trainings
- Policy making
- Advocacy

Buildings & Public Space

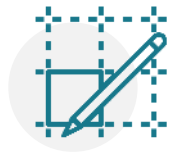
Water Management



Clean Energy & Sustainable Mobility

Waste Management & Circular Economy

Sustainable Tourism



GIS & Spatial Planning

Technological and social innovation
EU funded projects

MUSICA

Multiple Use of Space for Island Clean Autonomy

GREEN HYSLAND

Deployment of H2 Ecosystem on the island of Mallorca

SEANERGY

the Sustainability EducationAl programme for greeNER fuels and enerGY on ports

Transforming ports into clean energy hubs

islander

Accelerating the decarbonization of islands energy systems

insulae

Maximizing the impact of innovative energy approaches in the EU islands

Maximizing the impact of innovative energy approaches in the EU islands

HORIZON 2020

Iceland Liechtenstein Norway grants

Interreg

New Energy Solutions Optimised for Islands

NESOI

EUROPEAN ISLANDS FACILITY

CLIMATE CAMPAIGNERS

Citizens acting on Mitigation Pathways through Active Implementation of a goal-setting network

RE-EMPOWERED
Renewable Energy EMPOWERing European & InDian Communities

Renewable Energy Empowering European & Indian Communities

dialogues

Energy citizenship for a sustainable future

circulargreece
no time to waste

Circular Economy Implementation in Greece

yenesis

Youth Employment Network for Energy Sustainability in Islands

HORIZON 2020

Iceland Liechtenstein Norway grants

Interreg

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The path towards the Clean Energy for EU Islands Initiative

2010-2020	2016-2020	2017-2020	2019-2023	2019-present	2023-2026
FOUNDING MEMBER	SUBCONTRACTOR	COORDINATOR	SUBCONTRACTOR & CO-BENEFICIARY	PROJECT BENEFICIARY	PARTNER & REGIONAL PARTNER

CLEAN ENERGY
FOR EU ISLANDS

30 100% RES islands by 2030

Lighthouse
smart island projects

KYTHNOS ISLAND

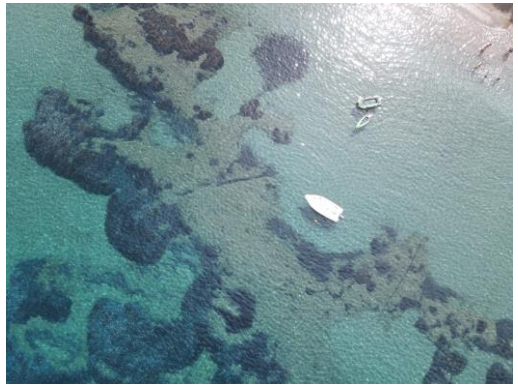
The revival of
a smart island and a
sustainable destination

KYTHNOS ISLAND, GREECE

Located in the northwest Cyclades and although just a couple of hours away from Athens, Kythnos is among the so-called "calmer" Greek islands, offering limited tourism facilities and services targeting, at least until recently, mainly Greek visitors. Due to its slower touristic development, Kythnos has managed to maintain its traditional atmosphere and the unique beauty of its natural landscape carved by the broad agriculture activities of the past and the use of dry-stone walls and windmills!

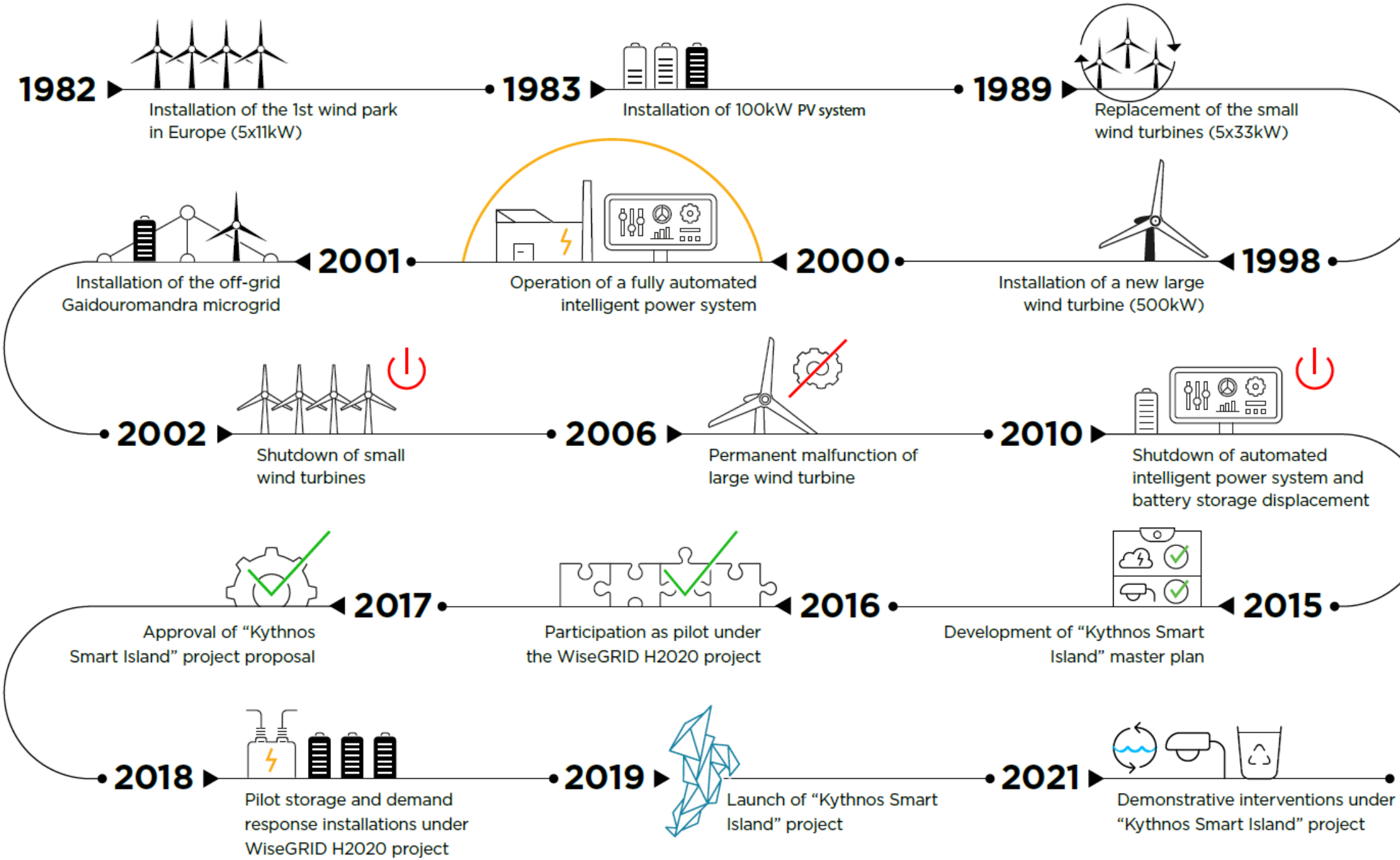
Permanent population: 1608
Area: 99.4 km^2
Distance from the mainland: 2hrs by boat
Main economic activities: tourism, construction, farming, fishing

Electrical system: Non-interconnected
Peak demand: 2.7MW
Thermal station: 5.2MW total capacity
Fuel: Diesel
AVC: 212€/MWh
RES share: 268 kW PV, 665 kW Wind (out of order)



Kythnos has a unique track-record of hosting innovative technological projects in the field of renewable energy systems., making the island one of the first sustainability test-beds in the world.

This great innovation historical background is revived through three projects: Kythnos Smart Island, NESOI – WiRE-K and RE-EMPOWERED


1982
Installation of the 1st wind park in Europe (5x11kW)
1983
Installation of 100kW PV system
1989
Replacement of the small wind turbines (5x33kW)
1998
Installation of a new large wind turbine (500kW)
2000
Operation of a fully automated intelligent power system
2001
Installation of the off-grid Gaidouromandra microgrid
2002
Shutdown of small wind turbines
2006
Permanent malfunction of large wind turbine
2010
Shutdown of automated intelligent power system and battery storage displacement
2015
Development of "Kythnos Smart Island" master plan
2016
Participation as pilot under the WiseGRID H2020 project
2017
Approval of "Kythnos Smart Island" project proposal
2018
Pilot storage and demand response installations under WiseGRID H2020 project
2019
Launch of "Kythnos Smart Island" project
2021
Demonstrative interventions under "Kythnos Smart Island" project

KYONOS SMARTISLAND

Project duration: 3.5years

Project budget: 8M€

Implemented by:

DAFNI
Network of Sustainable Greek Islands

National Technical University of Athens

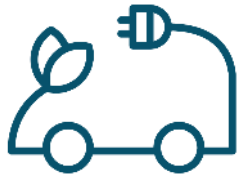
SIEMENS

The project is funded by Siemens in the framework of the Settlement Agreement between the Hellenic Republic and Siemens.

Innovative solutions for the efficient upgrade & smart management of local infrastructures

Kythnos becomes a living lab, not only for clean energy, smart grids and energy efficiency, but also for the **coupling of energy with water, waste and mobility management solutions.**

ENERGY & SMART GRIDS



TRANSPORT & MOBILITY

WASTE MANAGEMENT

WATER MANAGEMENT

STREET LIGHTING

BUILDINGS & PUBLIC SPACE RETROFITTING

ENERGY & SMART GRIDS

Acceleration of the clean energy transition through multiple applications, such as demand side management, integration of storage in the distribution network, research on a local microgrid and extensive sector coupling.

KYONOS SMARTISLAND

Gaidouromandra microgrid upgrade

A pioneering microgrid comprising of 14 summer vacation houses electrified by 5 distributed solar PV units, batteries and a 3kW windturbine

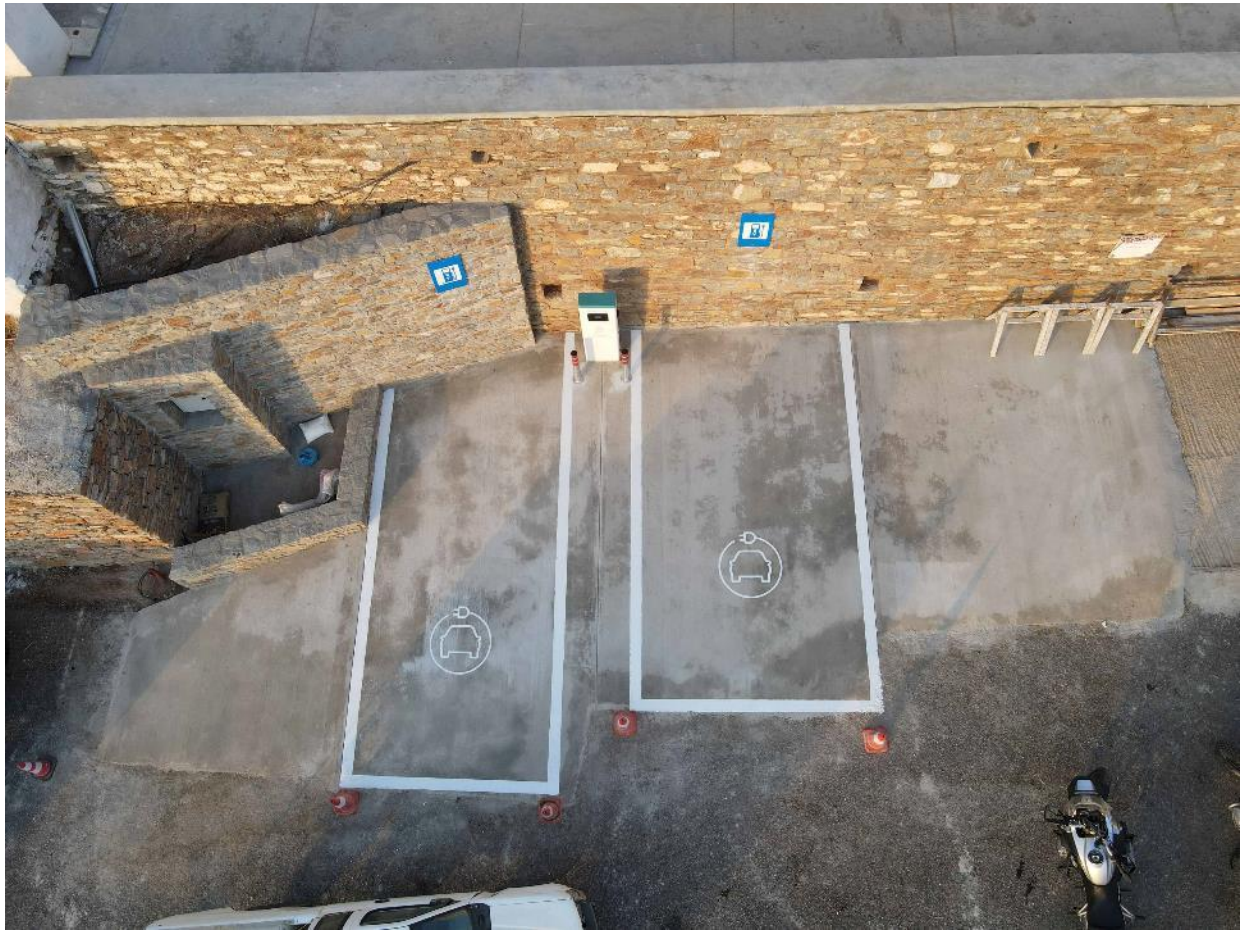
KYONOS SMARTISLAND

TRANSPORT & MOBILITY

Decarbonize the island's transport sector through the uptake of electromobility on land and sea transportation.

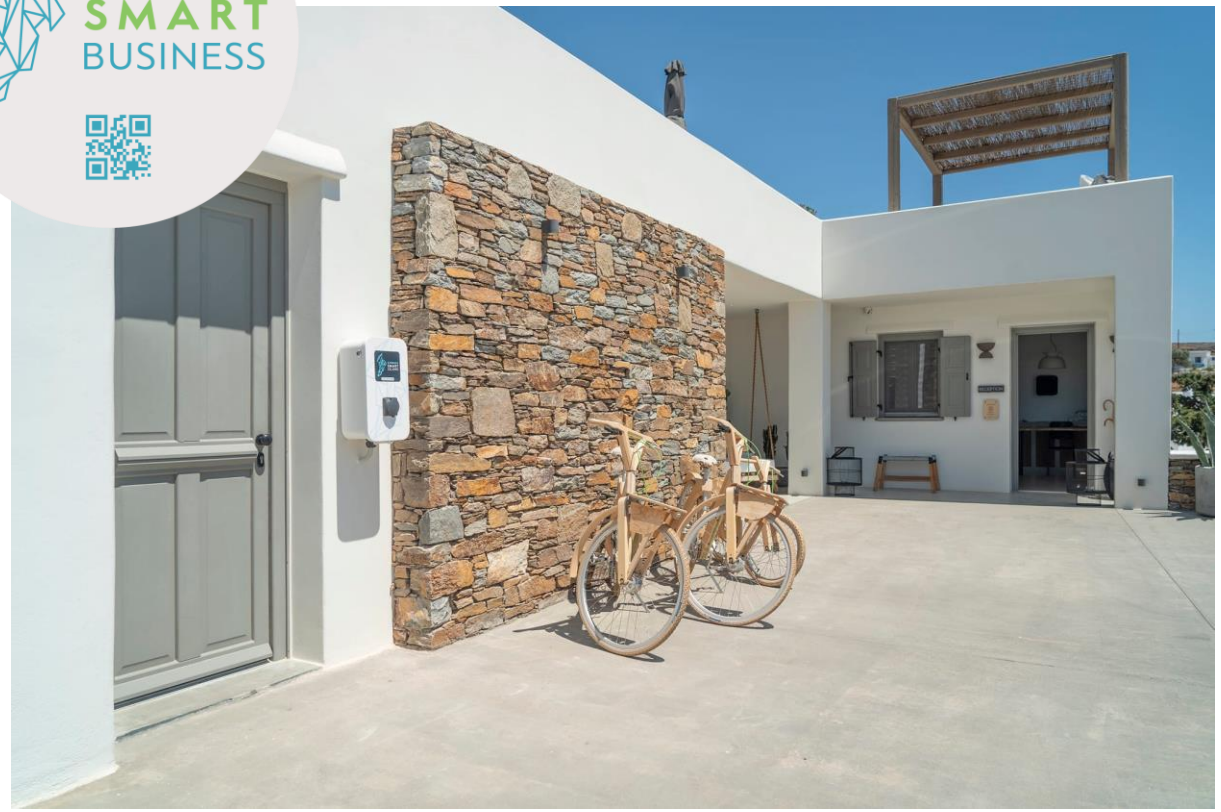
KYONOS SMARTISLAND

Installation of 8 publicly available EV charging stations



Installation of 10 EV charging stations in hotels & restaurants

KYONOS SMART BUSINESS

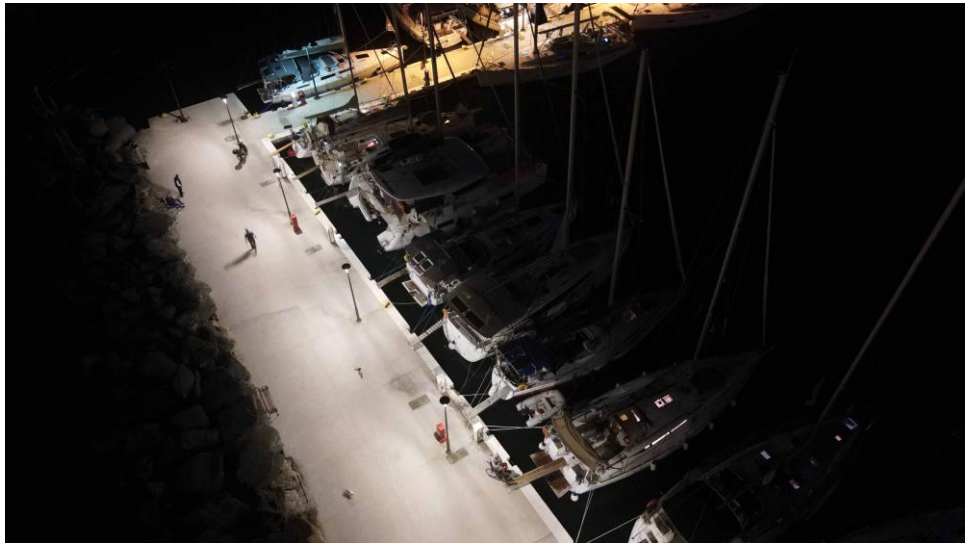


KYONOS SMARTISLAND

Electrification of municipal fleet


Transformation of
Loutra Marina to
Smart Marina

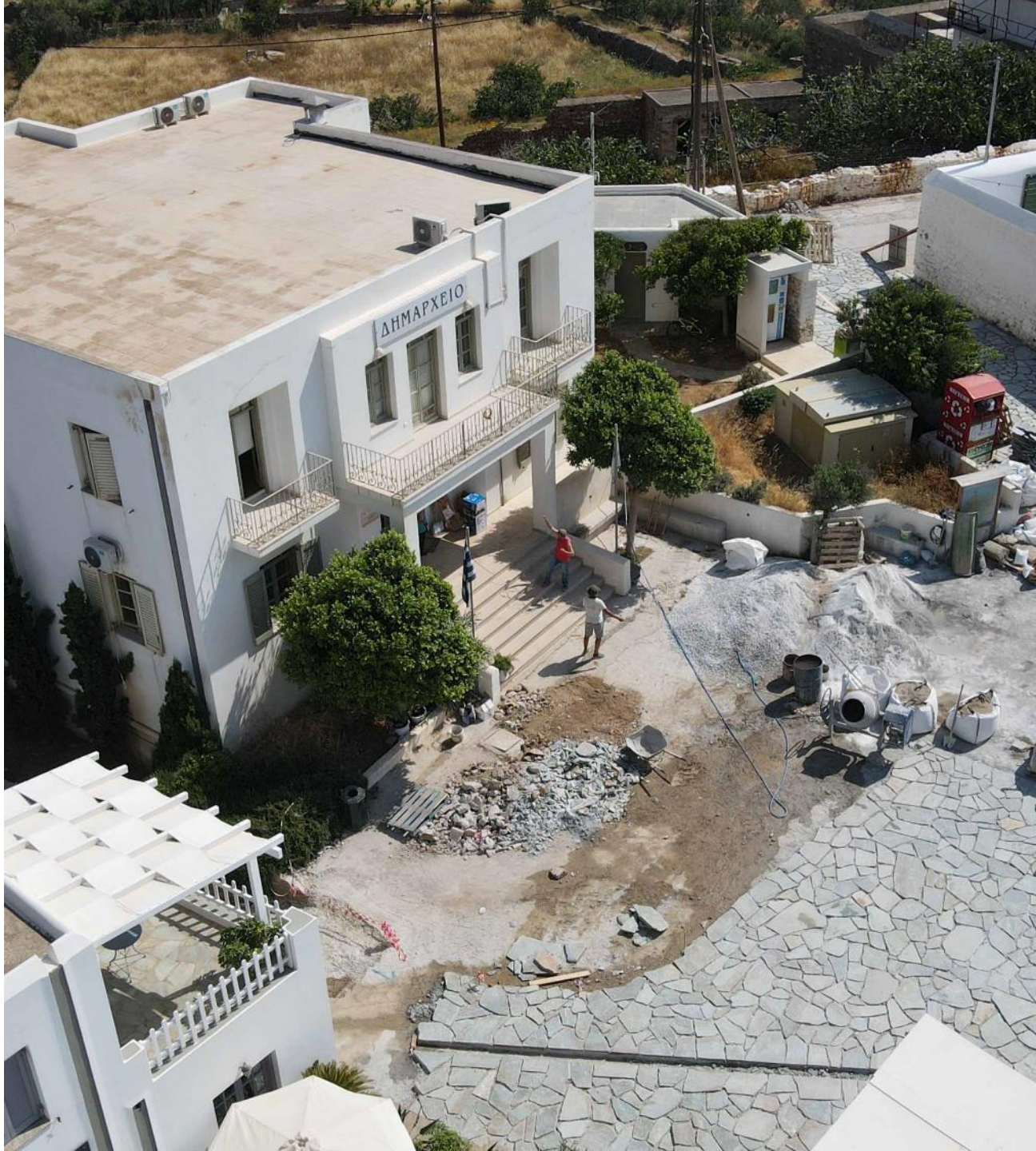
Loutra smart marina



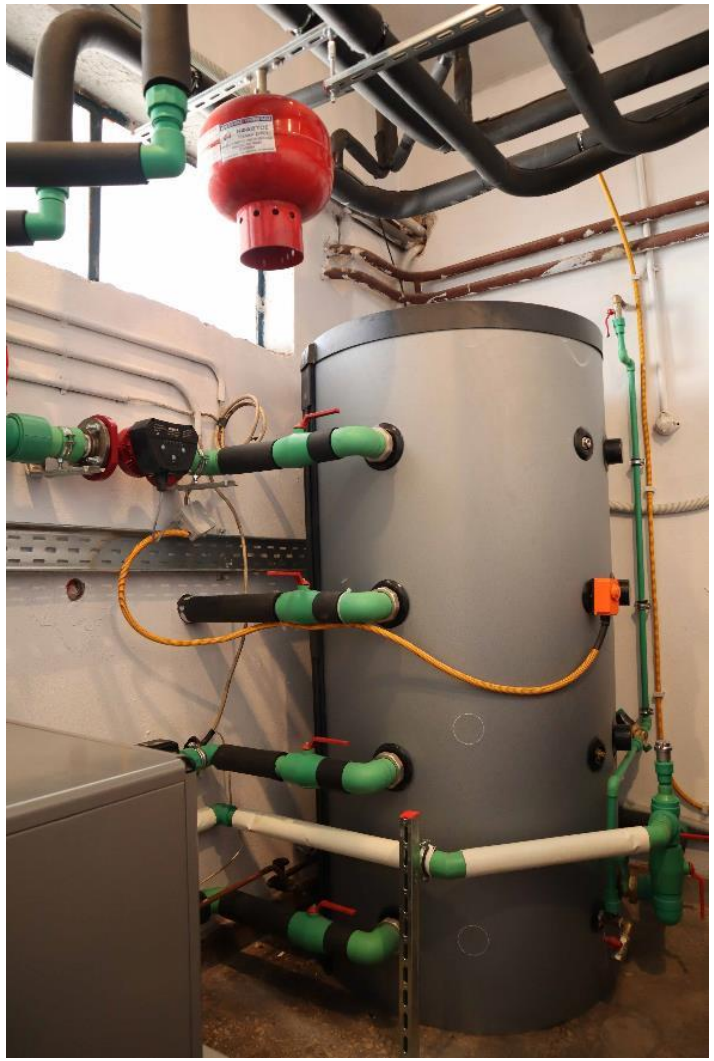
BUILDINGS & PUBLIC SPACE RETROFITTING

Energy upgrade of municipal buildings into Nearly Zero Energy Buildings and sustainable regeneration of public space

KYONOS SMARTISLAND



Upgrade of the HVAC systems in Highschool building



KYONOS SMARTISLAND

Public space regeneration

STREET LIGHTING

Energy upgrade and smartening of the island's street lighting network, while improving visual comfort and minimizing lighting pollution

KYONOS SMARTISLAND

Replacement of the existing luminaires with high efficiency LED

WASTE MANAGEMENT

Demonstrate the potential to transform an island into a zero-waste area, while maximizing valorization of waste and minimizing environmental impact

KYONOS SMARTISLAND

Door-2-door collection

KYONOS SMART BUSINESS

WATER MANAGEMENT

Demonstrate the integrated water resource management at island scale, while reducing the water production cost and water losses at the distribution system.

KYONOS SMARTISLAND

Optimization of the water management system

KYONOS SMARTISLAND

New Energy Solutions Optimised for Islands

NESOI

EUROPEAN ISLANDS FACILITY

13 NESOI Projects supported by DAFNI

Objectives:

- Promote investments for energy transition in the islands
- Facilitate the decentralization of energy systems
- Contribute to EU policies and the achievement of 2030 targets

New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

WiRe-K: Wind turbine repowering in Kythnos

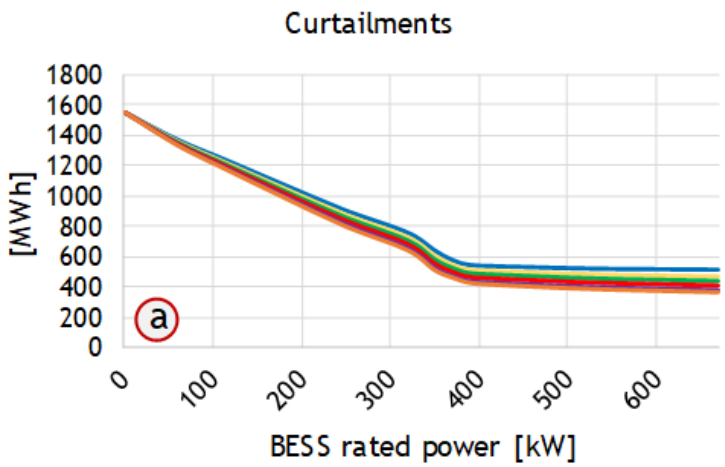
New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

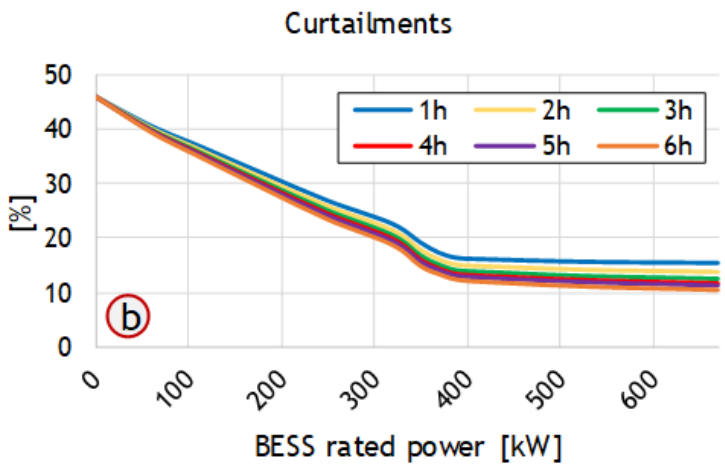
WiRe-K: Wind turbine repowering in Kythnos

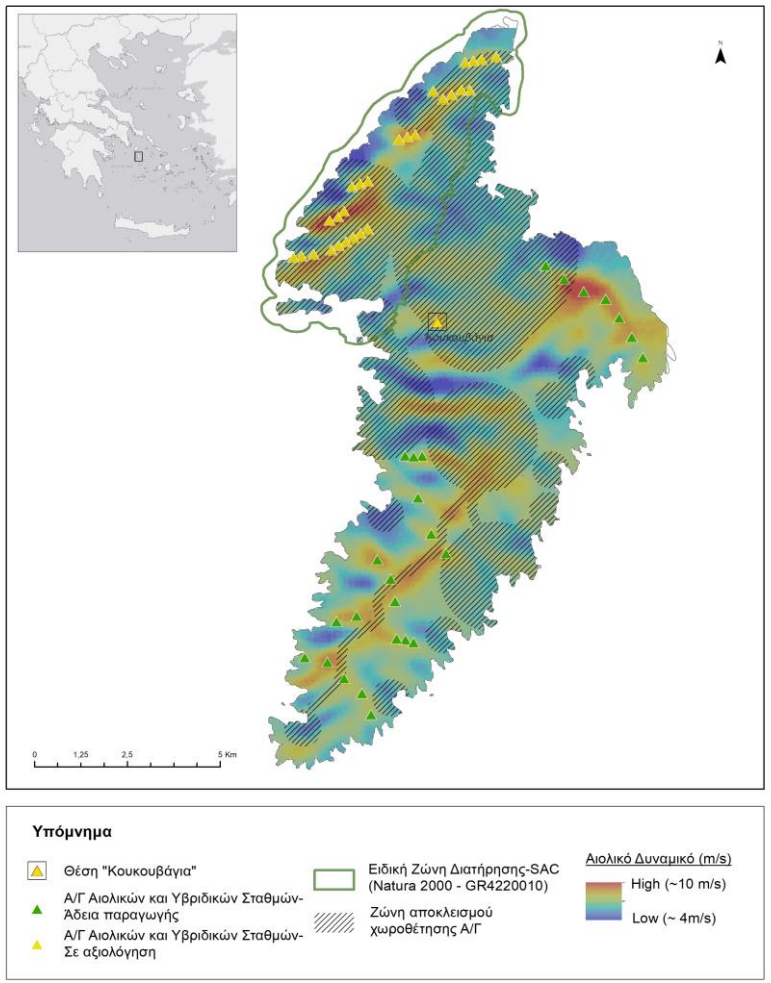
Project beneficiary: **Public Power Corporation Renewables SA (PPCR)**

What is the project about?

- The proposed project includes the replacement of PPCR's existing wind turbine with modern, state-of-the-art wind turbine and a 'behind-the-meter' lithium-ion battery.
- This innovative arrangement allows the full exploitation of the wind turbine's installed capacity, using a large amount of energy that would under other circumstances be curtailed.
- The project has high replicability as it applies to almost all the wind farms located on Greek islands that will need repowering soon.







New Energy Solutions Optimised for Islands
NESOI
EUROPEAN ISLANDS FACILITY

RE-EMPOWERED

Renewable Energy EMPOWERing
European & InDian Communities

The project has received funding from the European Union's Horizon 2020 Research and Innovation under Grant Agreement No 101018420

This project has received funding from the Department of Science and Technology (DST) under ''India- EU Joint Call on Integrated Local Energy Systems''

The goal

The main goal of RE-EMPOWERED is to develop and demonstrate solutions for energy transition of island and weakly connected energy systems, based on Microgrids exploiting multiple energy vectors.

The benefits will be demonstrated leading to an increased share of renewable generation and higher energy efficiency of the wider local energy system.

The solutions

- ✓ **ecoEMS:** Energy Management System for isolated and weakly interconnected systems
- ✓ **ecoMicrogrid:** Energy Management System for smaller off-grid systems
- ✓ **ecoDR:** Smart Meter - Load controller
- ✓ **ecoConverter:** Power electronic converters for dc/ac microgrids
- ✓ **ecoVehicle:** Electric vehicle charger
- ✓ **ecoPlanning:** Energy planning tool
- ✓ **ecoCommunity:** Citizen engagement digital platform
- ✓ **ecoResilience:** Cyclone Resilient infrastructure for wind turbines and PV
- ✓ **ecoMonitor:** Water/air quality monitoring
- ✓ **ecoPlatform:** Cloud-based interoperable platform

The pilots

1 **BORNHOLM**
Denmark

2 **KYTHNOS**
Greece

3 **GHORAMARA**
India

4 **KEONJHAR**
India

RE-EMPOWERED
Renewable Energy EMPOWERing
European & InDian Communities

Kythnos, Greece

1st site

Kythnos Power System

2nd site

Gaidouromandra microgrid

RE-EMPOWERED
Renewable Energy EMPOWERing European & InDian Communities

Kythnos Power System

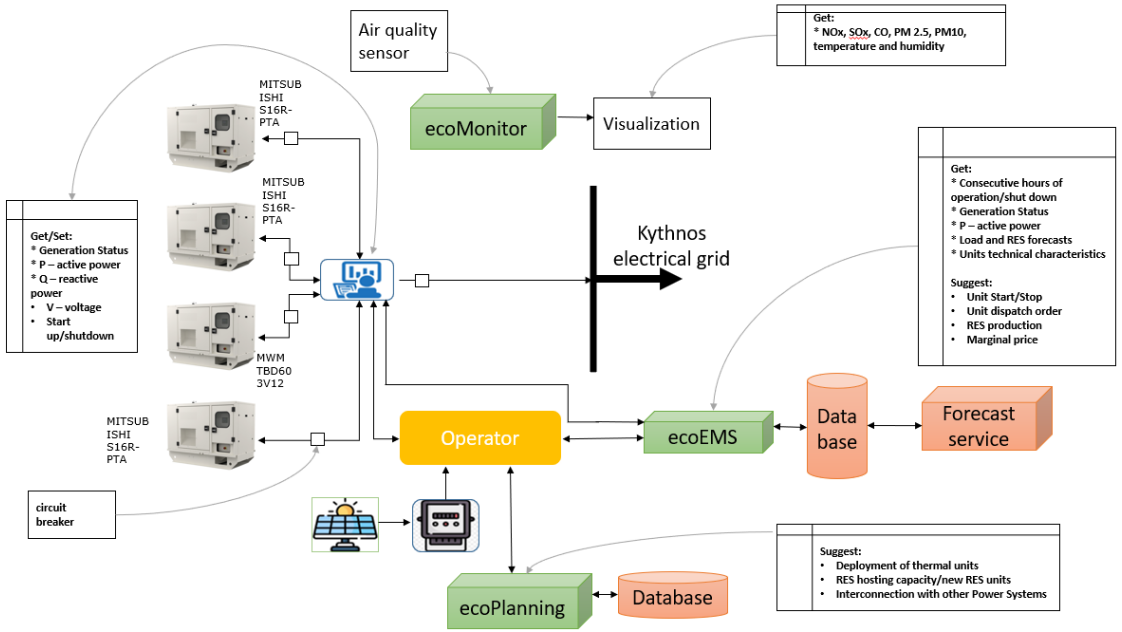
Peak load: 3.118 MW

No. of electricity customers: 3,353

Installed capacity of fossil fuel (diesel) Generation: 5.2 MW

Installed capacity of renewable energy generation units: 908.65kW

Kythnos island demo site



- ✓ Suggestions on the optimized and efficient operation of Kythnos power system i.e. optimal dispatch of the generation units of the Kythnos power system based on RES and load forecasting will be made.
- ✓ Simulations that support the decision-making process regarding the deployment of new electricity generation units (conventional and renewable) on the electric systems of NIIs and the interconnection between NIIs will be performed.
- ✓ Monitoring of the air quality will also take place.

RE-EMPOWERED
Renewable Energy EMPOWERing European & InDian Communities

Gaidouromandra Microgrid

A small seaside settlement of holiday homes in the southern part of Kythnos. It is one of the first microgrids in Europe, developed through European projects and has been operating since 2001 to supply electricity to the settlement.

Gaidouromandra Microgrid

It includes PVs, a battery energy storage system (BESS) and a diesel generator (as a back-up source).

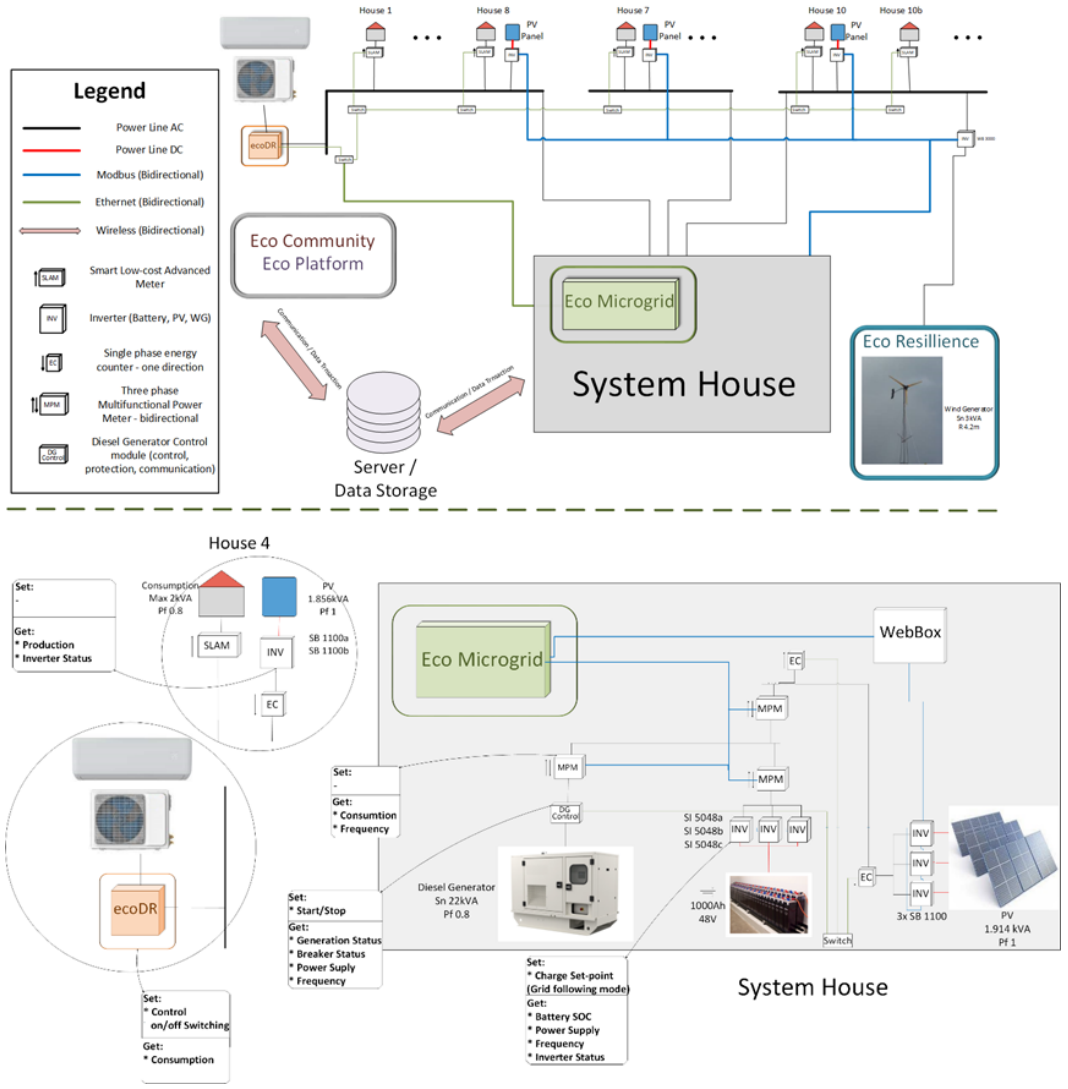
The optimized and efficient operation of the microgrid will be ensured by providing optimal dispatch of the resources of the microgrid. A hardware solution will be implemented in the field.

A smart meter/load controller for demand side management. Flexible loads will be controlled by the energy management system.

A cloud-based platform will be used to collect and manage the data from Gaidouromantra site.

A digital platform for raising citizen engagement will be used (app for mobile phones, showing consumption, used for demand side management).

A small wind turbine will be manufactured by NTUA and installed in Gaidouromantra.



RE-EMPOWERED
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Gaidouromandra Microgrid

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