



# Local governance to enable the clean energy transition of Greek islands

## *Best Practices, Barriers and the Way forward*

*PANTERA Regional Workshop*

*Green Islands as a driver for the Energy Transition – Going Renewable and Smart*

*13<sup>th</sup> of February 2020, Athens, Greece*



**Kostas Komninos**

*General Director*

*DAFNI Network of Sustainable Greek Islands*



## Network of Sustainable Greek Islands DAFNI

DAFNI, a non-profit organization is a **network** of island local and regional authorities. It's comprised of **48 Municipal and 4 Regional members**.

DAFNI **promotes sustainable development** in Greek islands through integrated actions in the fields of energy, environment and culture

**It is a founding member of the Pact of Islands** initiative promoting sustainability in European islands through local energy planning

**DAFNI is the coordinator of the Smart Islands Initiative** promoting islands as ideas areas for innovative projects in the fields of energy, environment, transport and mobility



# The Path towards the Clean Energy for EU Islands Initiative



2011

**ISLEPACT**  
Pact of Islands

2013

**SMILEGOV**  
Smart Islands  
Strategy

2016

**Smart Islands  
Initiative**  
Smart Islands Declaration

2017

**Clean Energy for  
EU Islands**  
CE4EUI Declaration

# Islands' Clean Energy Transition

## The role of Greek island local authorities

### **As an energy producer**

- Participation in energy production from RES projects through their municipal companies or by joining an Energy Community
- Micro-production of energy from RES on municipal buildings and infrastructure to compensate municipal energy consumption (virtual net-metering)
- Biogas production through anaerobic digestion
- District heating networks exploiting available local RES (geothermal)

### **As an energy consumer**

- Energy savings project in street and public space lighting
- Energy efficient equipment for water resources management
- Energy retrofitting of municipal building

# Islands' Clean Energy Transition

The role of Greek island local authorities

## **As an infrastructure operator and manager**

- To take advantage of the potential new margins for RES installations in order to participate in new investments
- To take advantage of the secure and stable network to invest on energy efficient equipment in water and waste water infrastructure
- To use the smart meters for a more efficient monitoring of municipal electricity consumption and secure energy savings in collaboration with ESCOs
- To install desalination units coupled with RES and potentially flexible load management
- To develop an electro-mobility with RES market as a pilot user and promoter
- To become an aggregator taking advantage of possible flexible municipal loads

# Islands' Clean Energy Transition

The role of Greek island local authorities

## **As a policy promoter and implementer**

- To collaborate with the DSO to inform and educate the consumers regarding the use and benefits of smart meters
- To support the transition of the consumers into prosumers
- To communicate the benefits of the innovative and smart technologies inside and outside the island
- To promote the island becoming a test-bed for research and demo applications
- To promote an integrated management of island infrastructures based on the operation of a smart grid

# Pact of Islands | How it all started



- ISLE-PACT project 2009 – 2012 funded by DG TREN to promote **local sustainable energy planning in EU islands**
- Initiative launched in 2011 under ISLEPACT project to promote **local sustainable energy planning** in islands
- An initiative **in liaison to the Covenant of Mayors** but focusing on the islands' special characteristics
- **Island Sustainable Energy Action Plans (iSEAPs)** produced by the signatories
- **iSEAPs conducted on island-scale** (except of Cyprus and Malta)
- **Methodologies and tools** for planning and monitoring the iSEAPs provided to the signatories
- **117 signatories** from all Member States with islands
- From 12/2016 Pact of Islands is **fully compatible to Covenant of Mayors** and iSEAPs are evaluated by JRC

# SMILEGOV | Enhancing multi-level governance



## Key barriers

- Low acceptance of large scale RES in islands
- Strategic action plans remain plans
- Long licensing process discouraging island local authorities
- Lack of collective investment schemes to share the benefits
- Clean energy not in the top priorities for islanders
- Islands seen as problems instead of opportunities

**Need for a new strategy → Smart Islands Strategy → Smart Islands Initiative**

**Broaden fields of intervention | Strengthen local ownership**

# Smart Islands Initiative

An initiative bringing EU islands together to turn their islands into examples of change and technological disruption towards clean energy transition



<http://www.smartislandsinitiative.eu/>

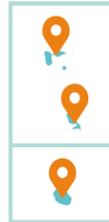
# The Smart Islands Initiative

**The Smart Islands Initiative** is a bottom-up effort of European island authorities and communities which seeks to communicate the significant potential of islands to function as laboratories for technological, social, environmental, economic and political innovation.

## Island Quadruple Helix Ecosystems

A collaborative process of public authorities, businesses, academia and civil society actors from islands, setting the Smart Islands Initiative into motion

<http://www.smartislandsinitiative.eu/>



# The Smart Islands Initiative | Key areas of intervention



**ENERGY**



**TRANSPORT**



**WATER**



**WASTE**



**GOVERNANCE**



**ICT**



**ECONOMY**

# The Smart Islands Initiative | The commitments

**We want to become smart, inclusive and thriving societies and to this end we will:**

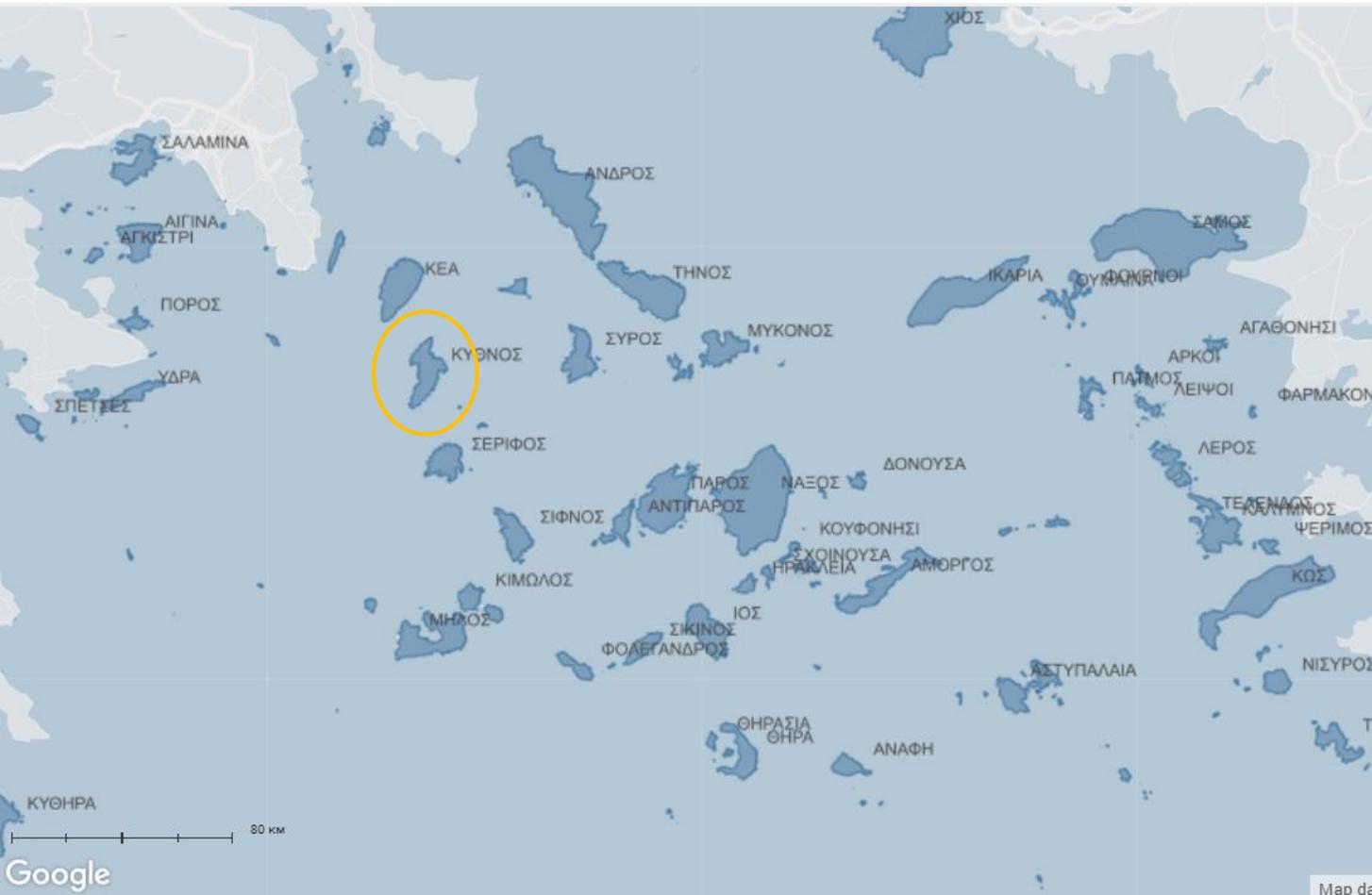
1. Take action to **mitigate and adapt to climate change** and **build resilience** at local level
2. Trigger the uptake of smart technologies to **ensure the optimal management** and use of our resources and infrastructures
3. **Move away from fossil fuels** by tapping our significant renewables and energy efficiency potential
4. Introduce sustainable island mobility including electric mobility
5. **Reduce water scarcity** by applying non-conventional and smart water resources management
6. Become **zero-waste territories** by moving to a **circular economy**
7. Preserve our distinctive **natural** and **cultural capital**
8. **Diversify our economies** by exploiting the intrinsic characteristics of our islands to create new and innovative jobs locally
9. Strengthen social inclusion, education and **citizens' empowerment**
10. Encourage the shift towards alternative, yearlong, **sustainable and responsible tourism**, inland, coastal and maritime

# Smart Islands Initiative – The Kythnos lighthouse

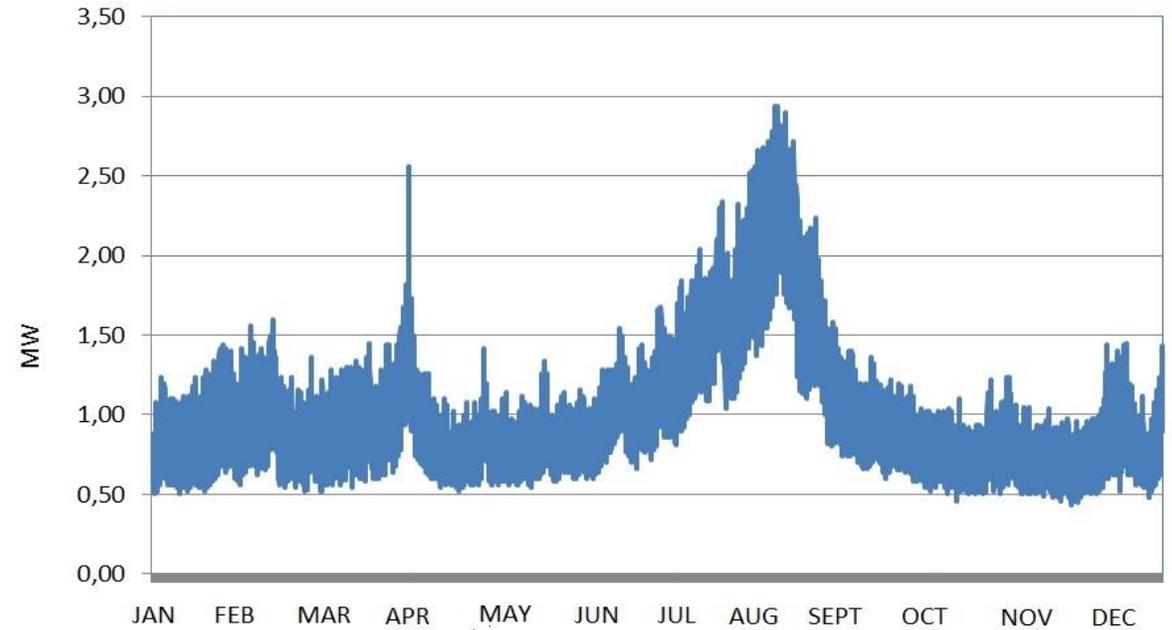


# Kythnos Island

- ✓ 1608 inhabitants
- ✓ 56 n.m. from Piraeus / 26 n.m. from Lavrion
- ✓ Non-interconnected
- ✓ Developing tourism sector



# Kythnos – Electrical system



## ❑ Diesel and fuel oil

- ✓ 4 MWM generating sets of 0.53 MW rated power each
- ✓ 2 MITSUBISHI generating sets of 1.275 MW rated power each
- ✓ 1 MITSUBISHI generating set of 1.250 MW
- ✓ 15kV Medium Voltage distribution grid – 3 lines – 87 km in total
- ✓ High seasonality

# Kythnos – Electrical system

- Wind turbines in Kythnos

5X33kW = 165kW



500kW



# Kythnos – Electrical system

## ☐ PVs in Kythnos



# Beaches



# Villages



# Architecture



# Traditional dancing – Balos





Traditional music

# Honey



# Gastronomy



# Archeology



# Moreover a living lab of Innovation



**1982**  
1<sup>st</sup> wind park in Europe



**1989**

Replacement of the WTs  
(5 x 33kW)



**1998**

Installation of a new Vestas WT  
500kW



**2001**

Operation of the  
Gaiduromantra microgrid  
(PV, storage&diesel genset)

**2018**

Vestas WT repowering

**1983**

Installation of 100kW PV  
system with battery  
storage (400kWh)



**1992**

New inverters in the  
PV system



**2000**

Operation of a fully  
automated Intelligent  
Power System



**2016**

WiseGRID H2020 project



Building on the past  
and  
looking to the future





# Κύθνος «Έξυπνο Νησί»

**Kythnos “Smart Island”**  
A vision for sustainable local development

# Vision for Local Economic Development

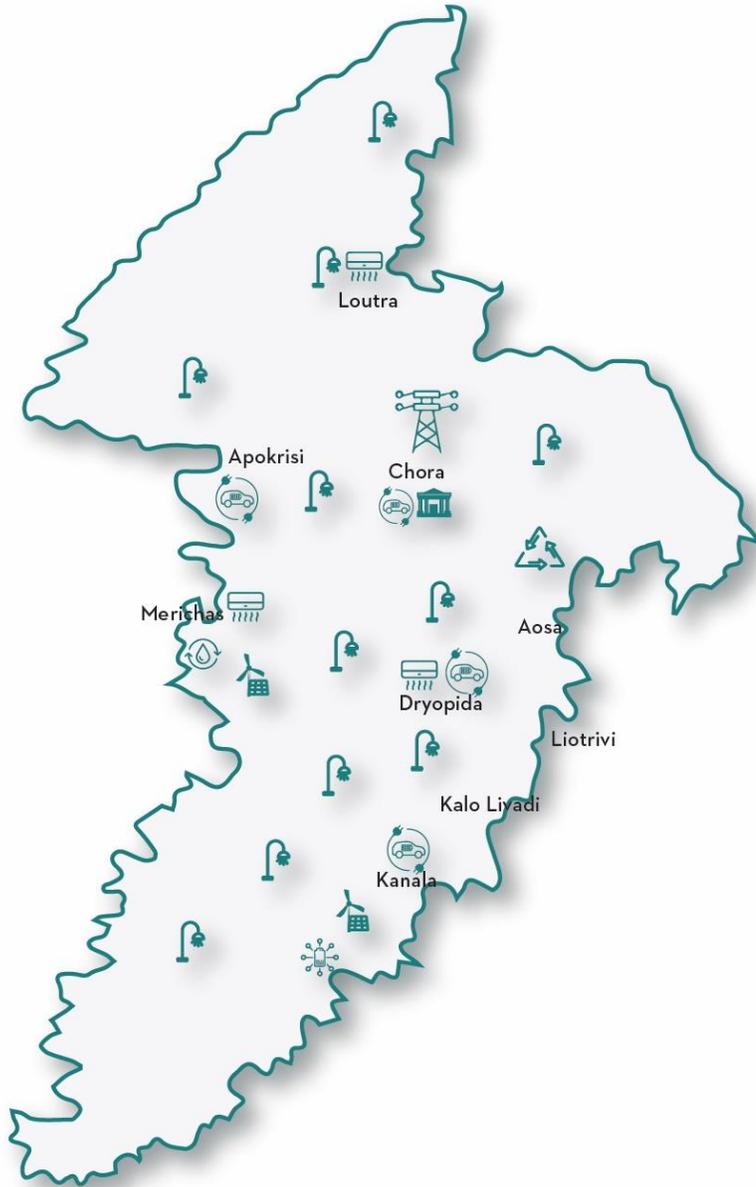
The island's transition in a smart and sustainable development model which will be based on the expansion of the tourism period while in parallel will retain the impact from the relevant activities

Towards this direction the Municipality aims:

- ✓ **in the holistic infrastructure planning** integrating smart and innovative solutions in the sectors of energy, water, waste, transport and mobility
- ✓ **in the exploitation of the island's natural and cultural resources** which will boost the development as a smart and sustainable destination

# KYTHNOS SMART ISLAND PROJECT

A vision for sustainable local development



Smart electric system



Smart demand response



Smart microgrids



Smart water management



Smart waste management



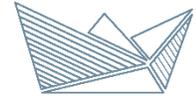
Smart transport & mobility



Smart street lighting



Smart Island Center



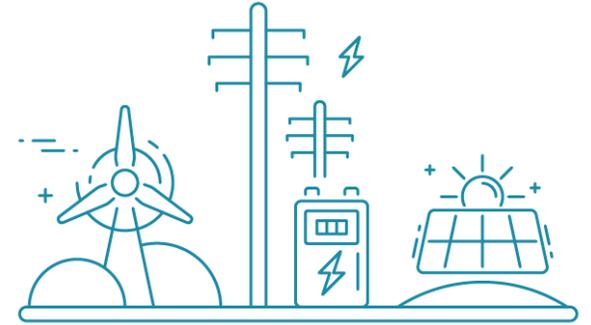
**DAFNI**  
Network of Sustainable Greek Islands

- **Start:** 1<sup>st</sup> April 2019
- **Duration:** 2 years
- **Budget:** ~8M€



**National Technical  
University of Athens**

# Smart Electrical System

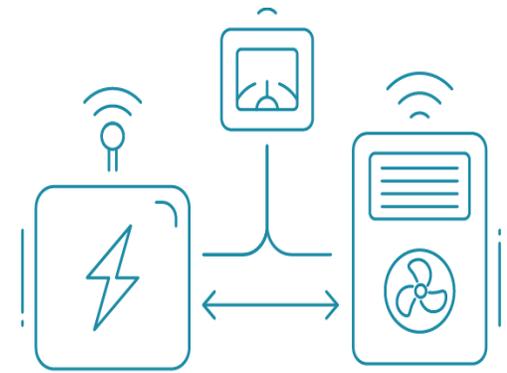


## Objective

**The automated and efficient operation of the Kythnos non-interconnected electrical system**

- Development of an Energy Control Centre
- Ensure RES high penetration
- Investigation of the integration of storage at grid level

# Smart Demand Response

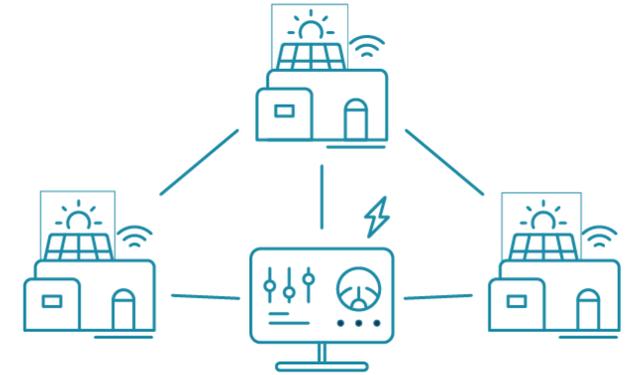


## Objective

**Demonstrate the potential to enhance the electrical consumption efficiency of the existing system through the integration of flexibility at the demand side**

- Installation of *smart and energy efficient electrical appliances* (air conditions and washing machines) in most of the island's *households*
- Installation of *smart home control units* in the respective households allow control and monitoring of the appliances' operation
- Development of *optimized management* of the electrical system and the exploitation of locally produced energy from RES.

# Smart Microgrids

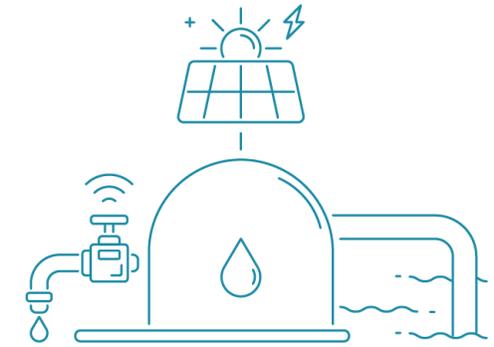


## Objective

**To maximize self-consumption at microgrid scale while minimizing grid losses**

- Modernization of the existing microgrid in Gaidouromandra
- Establishment of a new microgrid at a selected location
- Demonstration of operation in island- and interconnected-mode
- Introduction of small wind turbines connected to the microgrids for diversification of energy sources increase

# Smart Water Resources Management

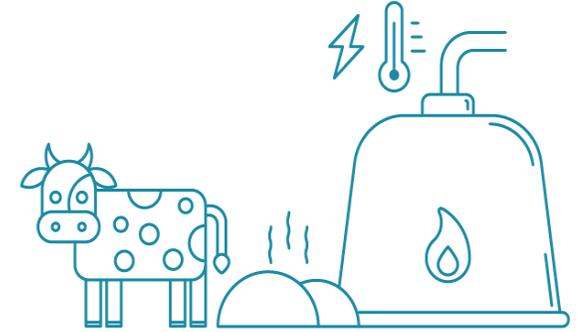


## Objective

### **Optimization of the water production and distribution system**

- Installation of a *PV station* and a small *wind turbine* coupled with *battery storage* which will cover a significant part of the desalination plant's electricity demand;
- Optimization of *the sizing of the upper reservoir* storing the desalinated water in order to provide additional energy storing capabilities to the batteries;
- *Seasonal storage of desalinated water in underground water aquifer* making use of available RES and implement a demo phase of this activity;
- Installation of *water kiosks* in isolated areas where water transportation would be unprofitable, in order to increase fresh water use and consumption
- *Design of an integrated stand-alone water and waste water treatment solution for isolated areas*, where the connection to the network would be unprofitable

# Smart Waste Management

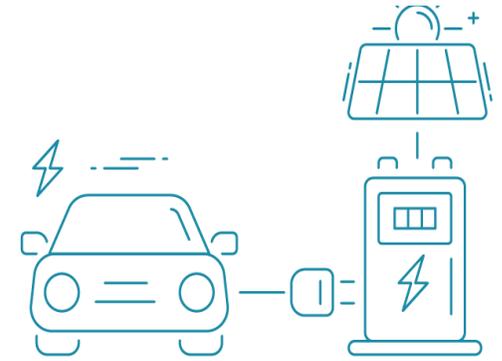


## Objective

### **Optimization of waste management and collection system to transform the island to a zero-waste island**

- Installation of micro-anaerobic digester to produce biogas from local agro-waste
- Maximization of the locally reused waste by-products aiming to strengthen the local circular economy
- Actions for the reduction of the produced waste
- Enablement of decentralized composting at the consumption side (rural)
- Optimization of the waste collection plan

# Smart transport and mobility

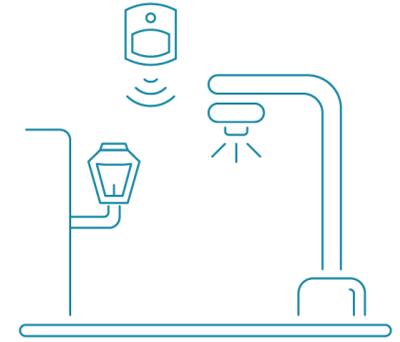


## Objective

**Promote the uptake of electric mobility on land and sea transportation.  
Aim to decarbonize the island's transport sector**

- Installation of *RES-coupled EV charging stations*
- Procurement of EVs (municipal and shared-fleet)
- Installation of a *shore-side charging station for small boats* at Merichas port
- Procurement of a *small electrical boat* to operate between the port and the nearby reputable Kolona beach
- Installation of a central fleet and charging management system

# Smart street lighting



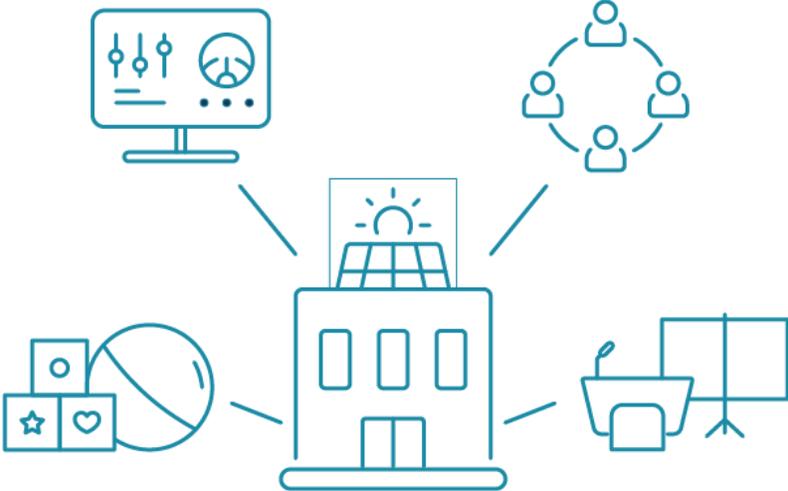
## Objective

**Energy upgrade and smartening of the island's street lighting network but also for the improvement of the visual comfort and minimizing the lighting pollution in Kythnos**

- Replacement of the existing luminaires with high efficiency LED technology ones along with the use of smart control systems;
- Adaptive lighting systems with the possibility to introduce predefined patterns (based on timing, pedestrian or vehicle presence, events, weather etc.);
- Installation of a SCADA infrastructure for the dynamic wireless control of the lighting systems;
- Test of different scenarios of the abovementioned technologies under different conditions and in different locations taking into account the effect of seasonality;

# Kythnos Smart Island Centre and Smart Training Lab

Convert two buildings of cultural heritage in NZEB to promote the Kythnos Smart Island



# Kythnos Energy Community

To enable local ownership and benefit of the project





Island organizations pushing for EU  
islands' clean energy transition



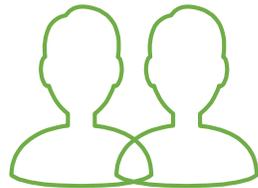
# European Federation of Agencies and Regions for Energy and the Environment

## Our Story

- FEDARENE was created on 8th June 1990 by 6 regional authorities – Rhône-Alpes, Provence-Alpes-Côte-d’Azur, Wallonie, País Vasco, Aquitaine and Nord-Pas-de-Calais.
- The Brussels office opened its doors in November 1991. The six pioneers quickly attracted followers and the network reached 40 members already in 1995.



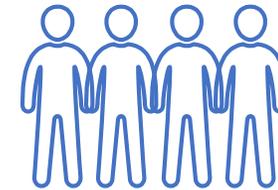
**29 years**



**80 Members**  
(Energy/Environment  
Agencies – Regions –  
Islands)



**23 Member States**



**6 staff members**



**Based in  
Brussels**

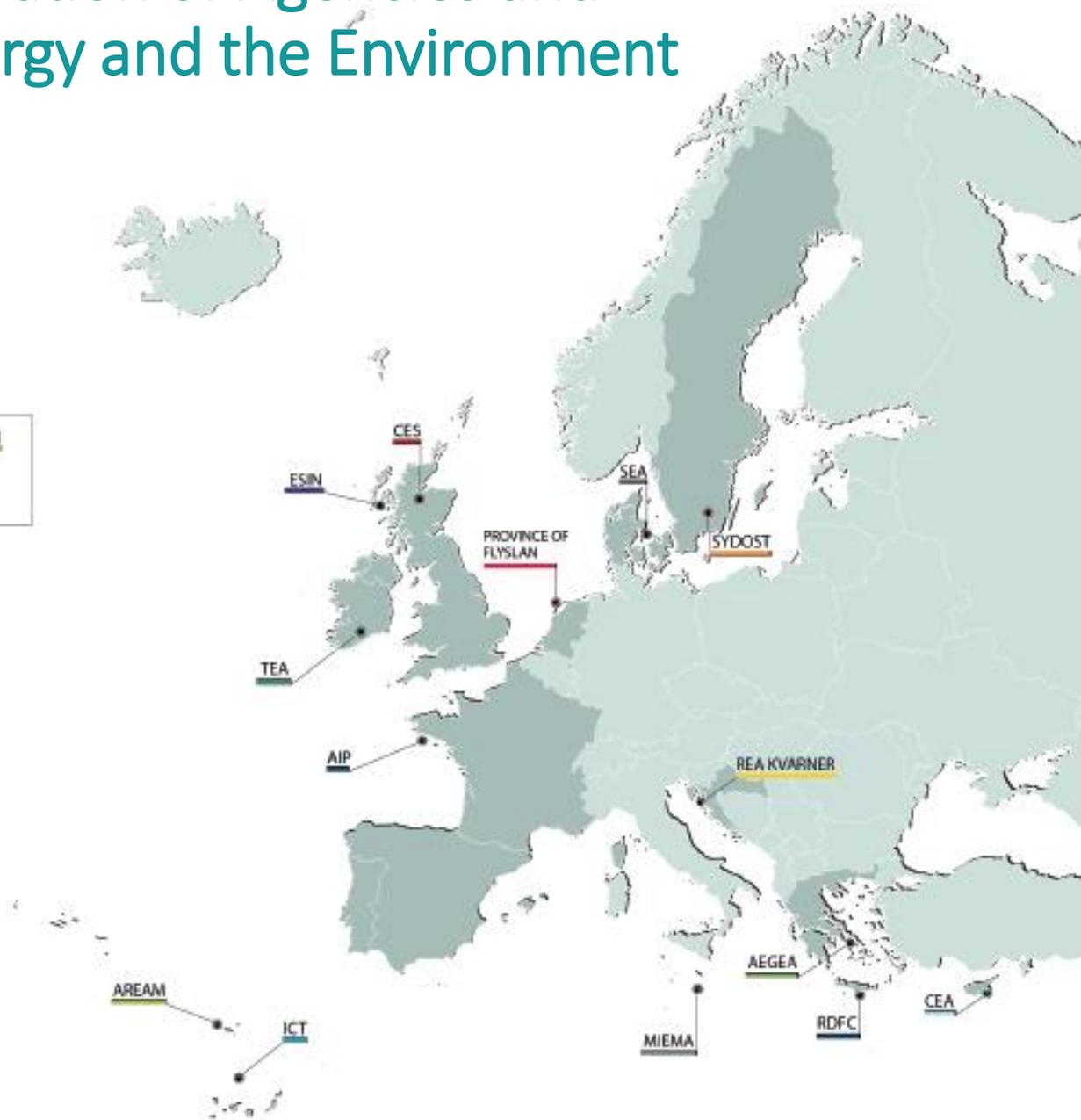
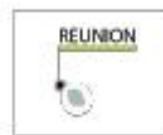


# European Federation of Agencies and Regions for Energy and the Environment

## Islands College

- EL | Aegean Energy & Environment Agency (AEGEA)
- PT | Madeira Regional Agency for Energy & Environment (AREAM)
- UK | European Small Islands Federation (ESIN)
- NL | Province of Fryslan
- HR | Regional Energy Agency Kvarner (REA KVARNER)
- CY | Cyprus Energy Agency (CEA)
- MT | Malta Intelligent Energy Management Agency (MIEMA)
- FR | Ponant Islands Association (AIP)
- FR | Reunion Island SLP Energies
- DK | Samsø Energy Academy (SEA)

- EL | Regional Development Fund of Crete (RDFC)
- ES | Canary Islands Institute of Technology (ICT)
- IE | Tipperary Energy Agency (TEA)
- UK | Community Energy Scotland (CES)
- SE | Southeast Sweden Energy Academy (SYDOST)



# Ευχαριστώ

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**ΔΑΦΝΗ**  
Δίκτυο Αειφόρων Νήσων