



DECIDE to ACT Experiences with energy communities on Greek islands

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Venue: Online



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DAFNI Network



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

DAFNI is comprised of 52 Municipal and 4 Regional members.

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.

Challenges for the clean energy transition of Greek islands

Challenges (1)

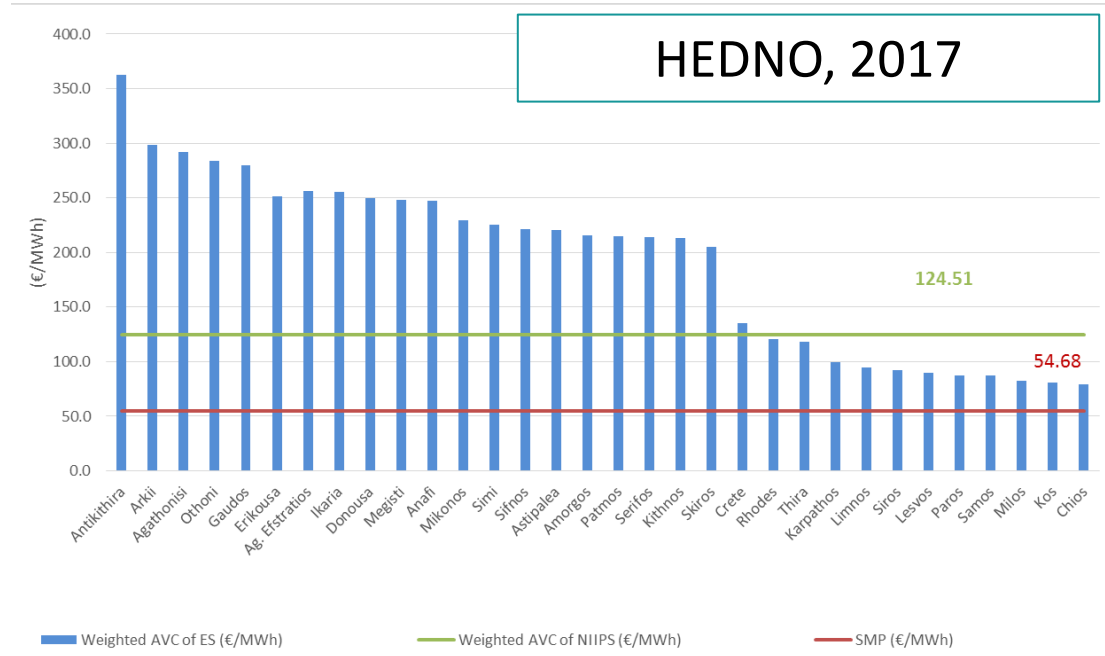
Islands of different

- size
- population
- distance from mainland

Great variety of electrical systems

- Peak demand varies from 100kW to 650MW

High energy cost

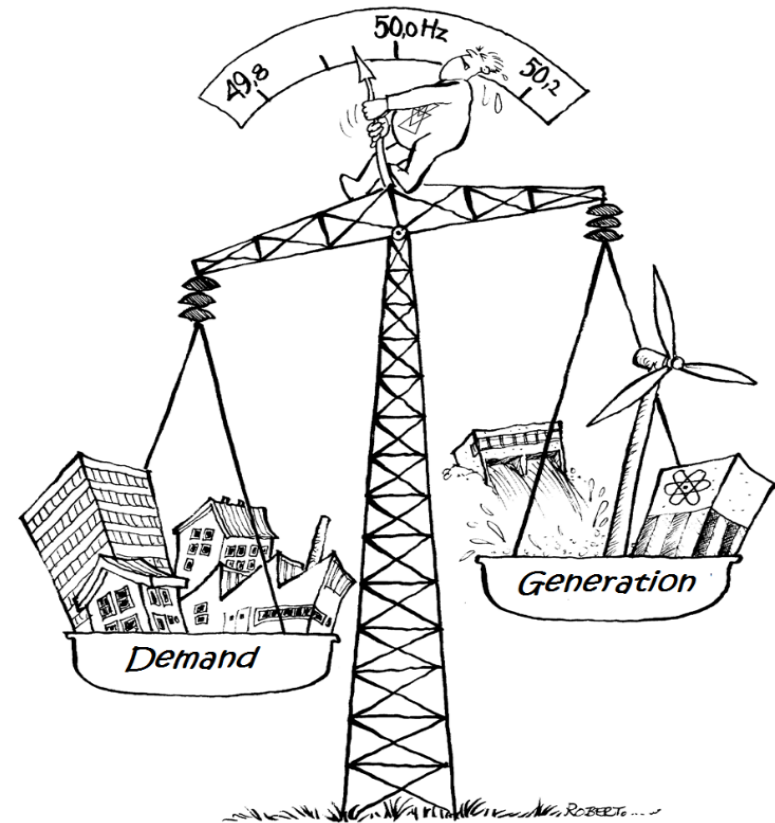


Challenges (2)

Isolated systems with small or no interconnections

Voltage and frequency regulation challenges

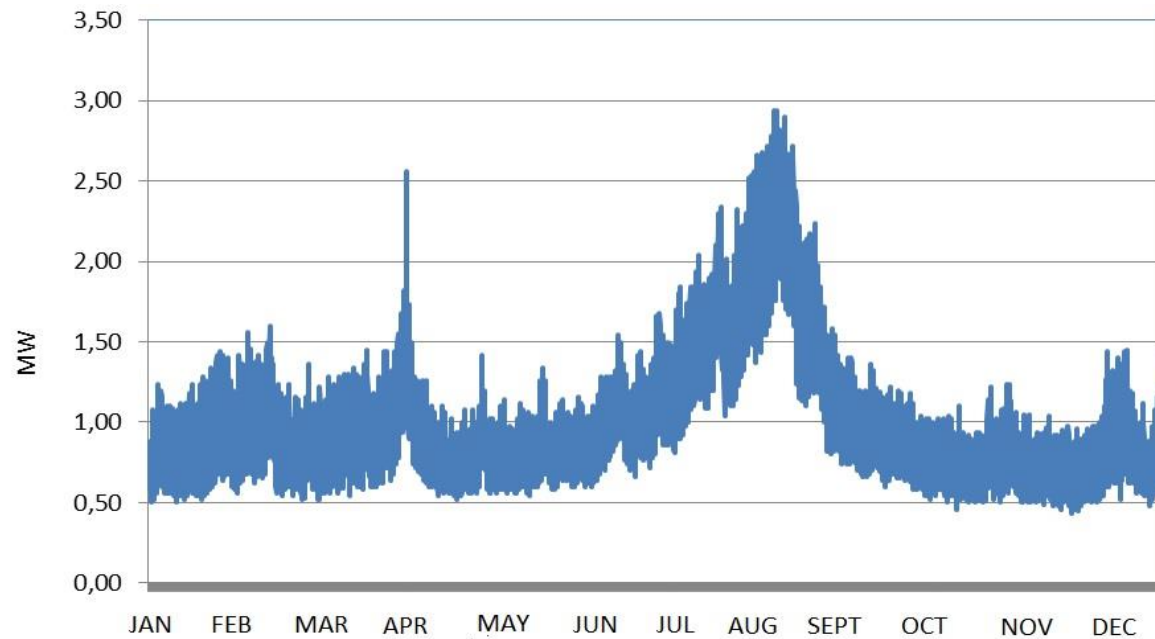
Limited RES penetration to preserve system stability



Challenges (3)

Big variations of demand on both daily and yearly basis

Great increase of demand during summer months due to tourism



Challenges (4)



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Limited space
Limited resources
Fragile ecosystems
Vulnerable to climate change
Lack of economies of scale
Higher costs due to transportation
Water scarcity

All infrastructure located on the island

Need for innovation



Energy communities in Greek islands

Legal framework for ECs in Greece- Law 4513/2018

- Local authorities, local companies and citizens create participatory schemes
- Collaborations between citizens and local actors are increasing, strengthening social cohesion
- The penetration of RES and the decentralization of energy production is strengthened
- Measures to address energy poverty are provided
- The social acceptance of RES projects is increasing
- It is a valuable tool for achieving the ambitious goals of Greek National Energy and Climate Plan, which provides for RES projects of at least 500MW from ECs until 2030

Purpose

The EC is an exclusive urban cooperative with the aim of:

- promoting the social and solidarity economy and innovation in the energy sector;
- tackling energy poverty and promoting energy sustainability;
- clean energy production, storage, and supply;
- enhancing energy self-sufficiency and security in island municipalities;
- and improving end-use energy efficiency at local and regional level.



ECs are the ideal vehicle for the implementations of RES projects in Greek islands

During the last decades, investors have applied for several GWs of RES power to be installed in the Greek islands

However most projects get stalled due to several reasons such as:

- High costs because of transportation costs and lack of economies of scale
- Limited space and conflict with other land uses (tourism, agriculture)
- Low local acceptance due to impact on landscape

ECs are the ideal vehicle for the implementation of RES projects in Greek islands

ECs can realize such projects in Greek islands as they offer

- Covering of local energy needs
- Optimal sizing
- Compatibility with local cultural identity
- High level of engagement of local community (co-investment)
- Low financial risk as capital costs are shared
- High local acceptance
- ECs are ideal business models to drive the clean energy transition on islands promoting tailor-made solutions with high levels of technical and social innovation in a participatory and cooperative way.

Examples of Energy Community projects ideal for islands

Virtual net-metering

- 5 local accommodation and catering businesses
- Photovoltaic Station 200 kWp
- Investment cost € 150,000
- Average repayment 6 years



Dramatic reduction of energy costs
 Energy significantly more environmentally friendly
 Benefit from law incentives

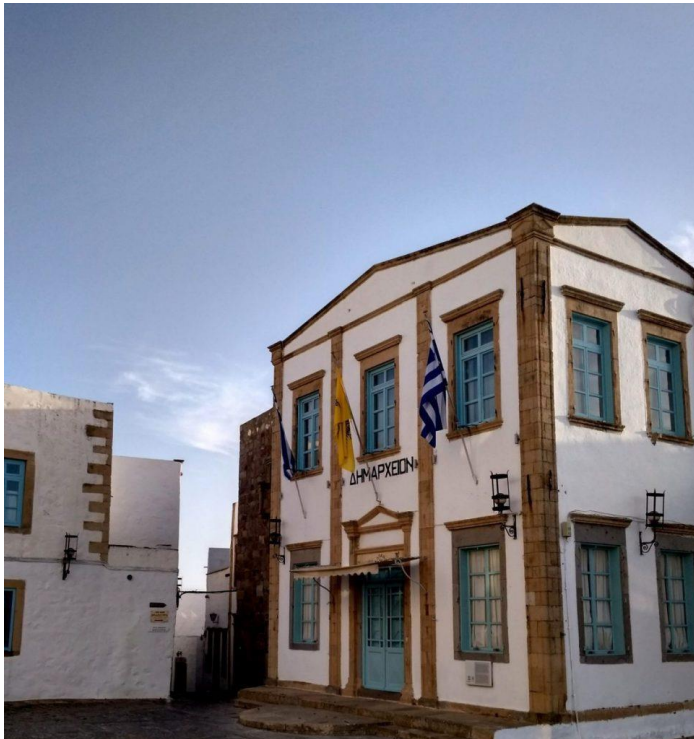
Electromobility

- Municipality and tourism professionals
- Public charging stations for electric vehicles and supply of electric vehicles
- Rental of vehicles to visitors of the island during the tourist season and use by the Municipality and the residents the rest of the year
- Investment cost of € 500,000

Reduction of gaseous pollutant emissions in the transport sector
 Earnings
 Promotion of the island as a "green" tourist destination
 Benefit from law incentives



Energy upgrade of buildings



- Municipality and inhabitants of the island
- Installation of heat pumps, solar water heaters and PVs
- Supply of external insulation materials
- Supply of energy consumption management systems

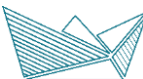
Reduction of gaseous pollutant emissions in the building sector
 Reduction of electricity bills and expenses for heating and cooling
 Tackling energy poverty
 Benefit from law incentives

Hybrid Power Station (HPS)

- Non – Interconnected island with high cost of energy production
- Local Authority together with the thermal producer (PPC), local businesses, universities and a technology provider
- HPS with small wind turbines, PVs and batteries with guaranteed power of 100 kWp – 2MWp
- Investment cost € **500K – 2.5M**



Full decarbonization of electricity consumption
Significant earnings for local community
Creation of green working places ensuring the just character of the transition
Knowledge from innovation
Promotion of the island as sustainable touristic destination



DAFNI proposal to enable the Greek islands clean energy transition

An integrated approach enabling the clean energy transition of Greek islands (1/2)

Development of technological, business and social innovation in autonomous energy systems of small Non-Interconnected Islands (NII) and island clusters

Characteristics

- No immediate prospect of their full interconnection with the mainland system
- Implementation potential of multiple competing clean energy projects is not expected due to the size of the energy market.

Key points

- Special regulatory framework that will allow the bidding, through an auction process, of one hybrid station for each NII, combining high RES penetration with different technologies for energy production, management and storage.
- Implementation of the investments to be carried out by Energy Communities, in which it is foreseen the de facto participation of the relevant Municipality and PPC, as well as the potential participation of citizens and local bodies / companies. Through the tender process, a strategic investor / technology provider will be selected, to complete the composition of the investment scheme.
- Energy Community to undertake the role of an “Integrated Smart and Green Utility Island Operator”, operating also water production, treatment and distribution systems, waste and biowaste management systems, the network of charging stations for EVs, fleet of shared EVs etc.

An integrated approach enabling the clean energy transition of Greek islands (2/2)

Added value

- The Municipality undertakes to determine places for subsystems' installation, which will be accepted by the local community, thus avoiding usual delays from disputes and appeals.
- The Municipality potentially contributes municipal land, benefitting through the acquisition of shares in the Energy Community.
- PPC participates in the investment scheme, ensuring the financial viability of its existing investments in the thermal power plant.
- Investment funds and know-how are attracted, through participation in the scheme of strategic investors, activating collaborations of domestic and international schemes.
- It is possible to acquire significant know-how in the design, construction and operation of complex hybrid energy systems by the domestic academic and construction sector, as well as HEDNO acting as system operator.
- For a significant number of islands, various "scenarios" of hybrid stations may be created, allowing for the application of different storage technologies, thus realizing the potential of small islands to become innovation laboratories.
- A special brand name is created for small NIIs, which will attract tourism also of special interest (scientific and ecological tourism), extending, this way, their tourist season.
- Through their possible participation in the Energy Community, the interests of local companies that would otherwise be affected by the clean energy transition (e.g. gas stations, PPC employees, car rental companies, etc.) are ensured, in line with the principles of the Just Transition.

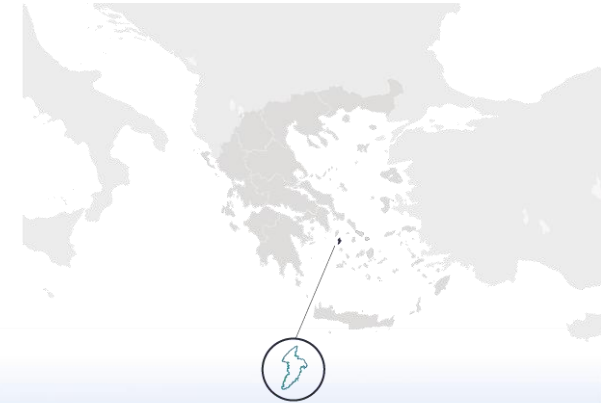
Promoting Energy communities in Greek islands



KYΘNOS SMARTISLAND



Kythnos Smart Island” constitutes a local development vision and strategy for the local municipality bridging the integrated, smart and efficient infrastructure management with local economic development.



The island figures

- Permanent **population**: 1608
- Electrical system: Non-interconnected
- Peak demand**: 2.7MW
- Thermal station**: 5.2MW total capacity
- Fuel: Diesel
- AVC: 212€/MWh
- RES : 268 kW PV, 665 kW Wind (out of order)
- Main economic activities: tourism, construction, farming, fishing

Project duration: 3.5years

Project budget: 8M€

- 1982 1st windpark in Europe
- 1983 Installation of 100kW PV system with battery storage
- 1989 Replacement of the Windturbines (5 x 33kW)
- 1998 Installation of a new Vestas Windturbine 500kW
- 2000 Operation of a fully automated Intelligent Power System
- 2001 Operation of the Gaidouromantra microgrid
- 2016 WiseGRID H2020 project launch

Vision for local economic development





WATER MANAGEMENT

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



STREET LIGHTING

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

BUILDING & PUBLIC SPACE RETROFITTING

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



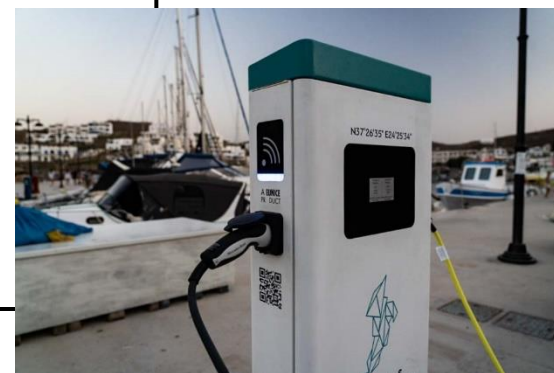
ENERGY & SMART GRIDS

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.



WASTE MANAGEMENT

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



TRANSPORT & MOBILITY

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

Participatory planning for Kythnos Smart Island





smart & sustainable island

VOLKSWAGEN
ATHENS CELLSTATION




HELLENIC REPUBLIC
MINISTRY OF INFRASTRUCTURE
AND TRANSPORT


HELLENIC REPUBLIC
Ministry of Interior


HELLENIC REPUBLIC
MINISTRY OF
DEVELOPMENT AND INVESTMENTS


HELLENIC REPUBLIC
MINISTRY OF FOREIGN AFFAIRS



The 4 pillars

e-vehicles



Switching the existing fleet of combustion vehicles to electric ones

on-demand mobility



Public transportation will operate on demand, taking us wherever we wish, whenever we need

charging & energy



A hybrid energy system will replace the existing diesel generators, to feed the charging infrastructure



future option autonomous driving



NESOI projects supported by DAFNI

JEDI: Just clean energy transition of Diapontia Islands

TESLA: Transport electrification on sea and land in Antiparos

SCGM NaKou: Smart, clean and green marinas in Naxos and Koufonisi

DGReS-Aegean: Decarbonization of Generation and Resilience of Security of Power Supply in an autonomous North-Aegean Archipelago

WiRe-K: Wind turbine repowering in Kythnos

B-IO: Promoting green and circular economy through biomass exploitation in Ios

BIOG-LEMNOS: Promoting green and circular economy through Biogas exploitation in Lemnos

GHEKO: Green Hydrogen Ecosystem on Kos Island

ENERSIK: Energy planning for clean energy transition for Ikaria

RACETRACE: Energy planning for clean energy transition for Samothrace

ENERRAS: Energy planning for clean energy transition for Astypalea



JEDI: Just clean Energy transition of Diapontia Islands

Islands: OTHONOI | EREIKOUSSA | MATHRAKI

Project beneficiary: Municipality of Central Corfu and Diapontia Islands

What is the project about?

- The project foresees the **full decarbonization** of Ereikoussa and Othonoi islands' power systems, which are not interconnected with the mainland. The existing diesel-based power stations will be replaced by hybrid power stations combining a wind turbine, a photovoltaic station and a battery system.
- **It also includes the transformation of the port of Mathraki island into a smart marina, including the creation of an Energy Community who will own and operate the project.**



The project's impact

- Roughly 203.3 toe of primary energy savings are anticipated from the total interventions
- Avoidance of 1.8 ktnCO₂-e (at an annual basis)
- Around 15 energy poor households will have their electricity consumption fully served
- High replicability potential in insular and urban areas served by ferry connection across EU.
- Project's Indicative cost: ~ 3.34M€
- Economic savings: 407,000€
- Payback period: 8 years

Thank you!