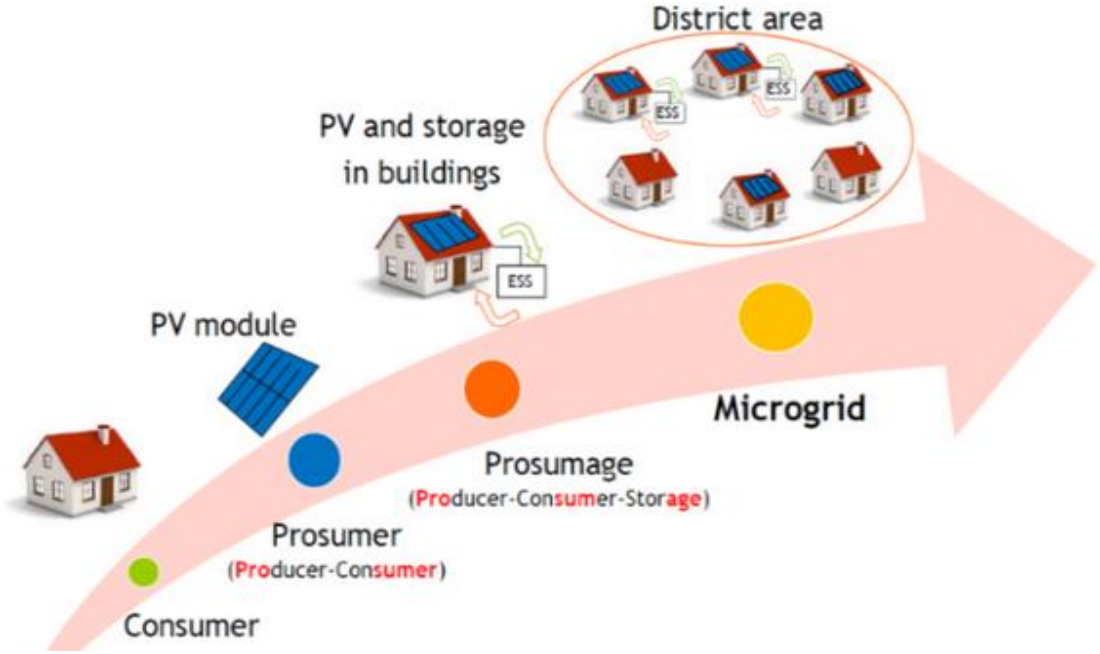


*MICROGRIDS & SMARTGRIDS*

# DEVELOPING AND PROMOTING MICROGRIDS IN RURAL AND ISLAND AREAS THANKS TO PEGASUS PROJECT

*Pilot Project PEGASUS*

Project co-financed by the European Regional Development Fund

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## Background

The centralized power systems are evolving towards more apparently efficient and flexible decentralized schemes, able to integrate distributed renewable sources (RES). “Microgrids” may have a privileged place in this rising scenario. Thanks to the integration of recent advances of RES and smart-grid technologies (and in prospective with the rising of sustainable mobility), electric networks can bring several benefits in terms of resiliency, cost reduction, RES development and sustainability of the electrical vector.

**But what it is a microgrid?**
A MICROGRID is a geographically limited energy system of distributed energy resources, consumers and prosumers, all together managed as a single body - and optionally storage. It can be operated in off-grid or grid-connected mode as well as in dual mode by changing the grid connection status[1].

The microgrid, allowing the access to wholesale market, can determine a concrete possibility of Demand Side Management and peak power curtailment. Moreover, it may continuously run in off-grid- or on-grid mode, as well as in dual mode by changing the grid connection status[2].

In presence of energy storage systems and local capability of voltage and frequency control the urban microgrid may improve power security and quality for the local consumers.

Potentially the microgrids can present an interesting organizational model that can contribute to accompany the energy transition and involve the local owner of the grid (DSO), the medium generators that can have a primary role, the consumers who can group together and become through their own generation, active prosumers. However, there are several unsolved issues such as, who should be the main initiator? What will be the governance inside the organizational model? What will be the existing transferring rules?

**The challenges**
Different types of microgrids have already been classified and distinguished especially in the Unites States according to the different main uses and market segment as: industrial microgrids, campus microgrids, island or isolated microgrids, military microgrids, village community microgrids. Microgrids interact with many stakeholders.

In Europe, experiences of local groups that increase their participation in the decision-making process of energy consumption and investments, are growing as for the case of energy cooperatives (ex. RESCOOP). Within the progressing rate of liberalization inside the European energy markets the presence of distributed RES has brought to the attention of the EU institutions the dilemma on how to include these new forms of market participation[3].

However, it seems at the current stage the regional areas with more difficulties in power supply are more attracting for the implementation of microgrids applications:

[1] *Siemens (2016), Microgrid. White Paper.*
[2] *Siemens (2016), Microgrid. White Paper*.
[3] *The discussion of the Electricity Market Directive is under development at the ITRE Parliament Commission. Energy Post Weekly February 2018.*

- islands (almost 4% of the European population - 400 islands)
- rural areas (28% of the European population).

At the same time the business model on how the microgrids should function in terms of upfront investments, sharing of asset value, benefit and cost assessment and break-even remain unclear. Other questions include how to value the security of supply, the revenue streamline, the value of losses…

In a nutshell, microgrids can be new market players, especially the ones run by local energy communities, but there is a need for investigation on the economic and organizational sides that can support the regulation to make microgrids more capable to operate and sustainable.

## The project PEGASUS

Through the PEGASUS project, an EU project co-financed under the Interreg Programme MED, 10 partners from North Mediterranean countries are trying to simulate the functioning of microgrids in 7 different pilot territories. The main aim is to provide answers to the questions raised above, based on real data and through the involvement of the main local actors. The project also includes an important module on the transfer of the results and plans to associate closely local and regional authorities so that they can use the proposed measures to introduce dedicated support to microgrids in their respective policies.

Since the beginning of the project, one year ago, most of the work has been focused on the selection of pilot sites, the installation of measurement devices and the launching of the first simulations.

**The seven pilot sites are very different and can be spread into the following categories:** village community microgrid (2 sites), building-scale microgrid (3 sites), university microgrid (1 site), and medium-voltage microgrid (1 site).

- The Greek and French microgrids are both focusing on a village community, and base their simulation of the microgrid on numerous data, mainly monitored from residential households. **In France** the pilot site is located in the centre of a small mountain village, Saint-Julien-en-Quint. It gathers the 40 consumers connected to the central low voltage substation. Most of them are residential users, but there are also a few agricultural buildings as well as public premises.

- **In Mega Evvidrio (Greece)** the site is even bigger and measures will be registered on 62 buildings, 55 of them are residential (among the 171 permanently inhabited houses of the community) and the rest representing public offices. In the pilot site there are several PV plants, among which 5 PV parks of 100 kWp each, 5 PV systems (10 kWp) on roofs, while another 75 autonomous PV systems are going to be installed on the roofs of houses.

- **In Cyprus**, the demo is centered within a controlled research hub with a microgrid architecture within the University of Cyprus (which makes it rather a nanogrid than a microgrid). It consists of controllable and uncontrollable loads of the FOSS lab, an electric vehicle charging station, PV systems and storage equipment.

- **The Potenza** pilot site, quite different from the previous ones, aimed at demonstrating the achievable advantages (primary energy, peak shaving, reduction of energy bills) by the Municipality in two different sites: a swimming pool, where a 165 kW CHP is able to provide about 95% and 85% % of the required thermal energy and electricity, respectively, and also to feed through the existing distribution network, about 70% of the electricity consumed by an electric escalator, having an installed power of 192 kW, used to transport people from the outskirts to the city centre.

- **In Malta,** the pilot site is located in Gozo Island and consists of 10 public and private buildings, having both consumers and prosumers profiles. The objective is to simulate a microgrid operation, including storage systems and flexible electricity tariffs.

- **In the Sport Park Ruše (Slovenia),** the pilot site is based in a sports resort and includes two existing PV plants of 100 kWp each. The objective is to make the best use of the PV resource eventually including storage systems so as to provide cheaper electricity tariffs to end-users.

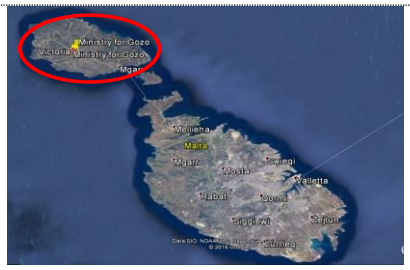
- **In the Dalmatian Municipality of Preko (Croatia)**, the microgrid is composed of 5 consumers and 1 prosumer with the involvement of the Local Public Authority. The aim is also to provide cheaper electricity for the neighbouring consumers.

For all these pilot sites, the monitoring started at the end of 2017 / beginning of 2018 and will last one year. The economic and technical feasibility studies will integrate these real data to develop a microgrid model and identify the conditions of reproducibility.

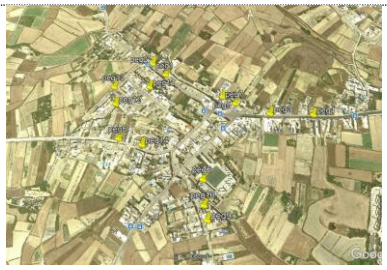
**What is a microgrid?**

*A MICROGRID is a localized grouping of electricity generation, energy storage and loads that normally operate connected to a traditional centralized grid. It is a small – scale power grid that can operate independently or in conjunction with the main electrical grid.*

## Pilot in Island: Gozo (Malta)




Geographical view of the location of the pilot



Location of the residential user

View of the PV instalment

## Pilot in Island: Preko (Croatia)


Location of Preko

Location of Preko

Location of Pilot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**Meet the Pegasus partners:**